



**REQUEST FOR PROPOSALS  
DEMANDE DE PROPOSITIONS**

**RETURN BIDS TO :  
RETOURNER LES SOUMISSIONS  
À:**

National Research Council Canada (NRC)  
Procurement Services  
1200 Montreal Road, Building M-22  
Ottawa, Ontario  
K1A 0R6  
Bid Fax: (613) 991-3297

<b>Title/Sujet</b>  <b>Chaudière à biomasse réalisé en conception - construction</b>	
<b>Solicitation No./N. de l'invitation</b> <b>17-22024</b>	<b>Date</b> <b>15 juin 2017</b>
<b>Solicitation Closes/L'invitation prend fin at/à 14 h on/le 19 juillet 2017</b>	<b>Time Zone/Fuseau Horaire</b> <b>HAE</b>
<b>Address Enquiries To/Adresser demandes de renseignements à :</b> Collin Long Telephone No./N. de téléphone : <b>(613) 993-0431</b>	

**Instructions: See Herein**

**Instructions: Voir aux présentes**

Proposal To:

We hereby offer to sell to Her Majesty the Queen in right of Canada, in accordance with the terms and conditions set out herein, referred to herein or attached hereto, the goods, services, and construction listed herein and on any attached sheets at the price(s) set out therefor.

Proposition aux:

Nous offrons par la présente de vendre à Sa Majesté la Reine du chef du Canada, aux conditions énoncées ou incluses par référence dans la présente et aux annexes ci-jointes, les biens, services et construction énumérés ici sur toute feuille ci-annexée, au(x) prix indiqué(s).



<b>Vendor/Firm Name and Address</b> <b>Raison sociale et adresse du fournisseur/de l'entrepreneur</b>	
<b>Telephone No./N. de telephone</b> <b>Facsimile No./N. de télécopieur</b>	
<b>Name and title of person authorized to sign on behalf of Vendor/Firm (type or print)</b> <b>Nom et titre de la personne autorisé à signer au nom du fournisseur/de l'entrepreneur (taper ou écrire en caractères d'imprimerie)</b>	
<b>Signature</b>	<b>Date</b>

Demande de proposition pour La conception et la construction d'une chaudière à biomasse Au Central Heating and Cooling Plant, Ottawa

12 juin 2017

## **1. PRÉSENTATION DES PROPOSITIONS**

- 1.0 Vous êtes par la présente invité(e) à soumettre une proposition technique, en quatre (4) exemplaires ainsi que deux (2) exemplaires d'une proposition financière distincte pour satisfaire au besoin dont fait état la présente demande de proposition (DP). Une enveloppe **doit** porter lisiblement la mention « Proposition technique » et l'autre, « Proposition financière ». Les coûts ne doivent figurer nulle part ailleurs que dans la proposition financière. Fournir de l'information financière dans la proposition technique entraînera la disqualification du soumissionnaire. Toutes les propositions doivent inclure la page de couverture signée et datée par un ou une représentant(e) autorisé de la compagnie.

## **2. DESCRIPTION DES TRAVAUX**

Fournir des services professionnels pour la conception, la construction et la mise en service d'une chaudière à biomasse pour l'installation centrale de chauffage et de refroidissement de Confédération Heights conformément à l'énoncé détaillé des travaux joint à l'annexe «A».

## **3. DURÉE DU CONTRAT**

- 3.1 Le CNRC prévoit que les travaux de conception commenceront lors de l'attribution du contrat et que les travaux de construction se termineront au plus tard le 31 mars 2018.

## **4. DEMANDE DE RENSEIGNEMENTS**

- 4.1 Si vous voulez obtenir plus de renseignements sur l'un des aspects de cette DP, veuillez communiquer, au moins sept jours ouvrables avant la date limite, avec l'autorité contractante. Toutes les demandes doivent être présentées par écrit. On ne peut garantir une réponse aux demandes reçues moins de sept jours ouvrables avant la date de clôture. L'information verbale reçue ne liera pas le CNRC.

### **Collin Long**

Services d'approvisionnement

Conseil national de recherches Canada

1200, chemin de Montréal, édifice M-22

Ottawa (Ontario) K1A 0R6 Téléphone : **613-993-0431**

E-mail : **Collin.Long@nrc-cnrc.gc.ca**

- 4.2 Afin de garantir que les soumissionnaires aient tous accès à la même information, les réponses aux demandes de renseignements générales seront envoyées simultanément à tous les soumissionnaires. Toutes les questions ainsi que les réponses seront distribuées à tous les soumissionnaires, sauf si leur publication révélait des renseignements exclusifs. Le soumissionnaire qui pose la question ne sera pas identifié. Les questions techniques qui sont considérées comme exclusives par le soumissionnaire doivent être clairement indiquées. Dans ces cas, le CNRC répondra

individuellement au soumissionnaire. Si le CNRC ne considère pas la question comme exclusive, le soumissionnaire pourra la retirer, ou acceptera que la question et la réponse soient mises à la disposition de tous les soumissionnaires.

- 4.3 Au cours de la période de publication, les soumissionnaires qui tentent d'obtenir des renseignements concernant tout aspect de cette DP en s'adressant à une personne-ressource du CNRC autre que l'autorité contractante indiquée dans le présent document risquent de voir leur offre jugée inadmissible (pour cette seule raison).
- 4.4 Le soumissionnaire a la responsabilité d'obtenir, si nécessaire, des précisions sur les exigences contenues dans le présent document avant de présenter sa proposition. Le soumissionnaire doit obtenir une confirmation écrite de l'autorité contractante de tout changement ou toute modification à cette DP.

## **5. DATE LIMITE DE RÉCEPTION DES PROPOSITIONS**

- 5.1 Les propositions doivent parvenir, au plus tard à 14 h le 19 juillet, 2017 à **l'autorité contractante** :

**Collin Long**  
Services d'approvisionnement  
Conseil national de recherches Canada  
1200, chemin de Montréal, édifice M22  
Ottawa (Ontario) K1A 0R6 Téléphone : 613-993-0431

### **Aucune proposition ne devra être envoyée directement au chargé de projet**

- 5.2 Les propositions doivent être livrées sous pli cacheté et porter mention exacte du nom du soumissionnaire et du numéro de la DP. C'est la responsabilité du soumissionnaire de s'assurer que sa proposition est estampée avec la date et l'heure de livraison signée par la réceptionniste comme preuve que le CNRC a bien reçu la proposition avant la date limite de clôture. Le soumissionnaire est responsable de toutes les conséquences et de tous les risques liés à une livraison incorrecte des soumissions.
- 5.3 Les demandes de soumissions doivent être conformes aux instructions et conditions uniformisées (applicables aux demandes de soumissions) telles que précisées à **l'annexe 14 : Conditions générales**.
- 5.4 Compte tenu du caractère de la présente demande, la transmission de ces documents par télécopieur ne sera pas acceptée.
- 5.5 Le CNRC n'acceptera aucune soumission par courrier électronique ou sur disquette.
- 5.6 Les propositions reçues après la date de clôture ne seront pas examinées et seront retournées à l'expéditeur. L'expéditeur assume l'entière responsabilité de l'envoi et de la livraison en temps utile de sa proposition et ne saurait en aucun cas l'imputer au CNRC. Aucun renseignement supplémentaire ne sera accepté après la date de clôture, à moins que le CNRC n'ait demandé un éclaircissement.

## 6.0 NIVEAU DE SÉCURITÉ

6.1 Avant l'exécution des obligations prévues dans le contrat, tout le personnel associé au projet devra avoir été l'objet d'une **vérification de la fiabilité** en vertu de la politique du gouvernement canadien concernant la sécurité.

6.2 Avant l'attribution de l'offre à commandes et l'établissement d'une commande, une Liste de vérification relative à la sécurité (LVRS), formulaire TBS/SCT 350-103 incluse à l'annexe « G », devra être établie.

## 7.0 DISPOSITIONS RELATIVES A L'INTEGRITE

7.1 En répondant à la présente DDP, le contracteur est assujéti aux dispositions d'intégrité contenues dans les documents suivants:

- *Régime d'intégrité* du gouvernement du Canada
- La **Politique d'inadmissibilité et de suspension** (la « Politique ») en vigueur à la date d'émission de la demande de soumissions
- que toutes les directives connexes en vigueur à cette date

7.2 Ces document sont incorporées par renvoi à la demande de soumissions et en font partie intégrante. Le soumissionnaire doit respecter la Politique et les directives, lesquelles se trouvent à l'adresse suivante :

<https://achatsetventes.gc.ca/politiques-et-lignes-directrices/guide-des-clauses-et-conditions-uniformisees-d-achat/1/2003/21>

## 8. CRITÈRES D'ÉVALUATION, DIRECTIVES ET EXIGENCES

### LISTE DE CONTRÔLE DES EXIGENCES OBLIGATOIRES

Pour être considérées par le CNRC et SPAC, les propositions doivent satisfaire aux exigences obligatoires qui suivent et doivent inclure la section/page à laquelle il est fait renvoi dans la proposition du soumissionnaire. Toute proposition qui faillit à indiquer clairement que toutes les exigences obligatoires ont été satisfaites ne sera pas considérée plus avant.

**Tableau A1 : Liste de contrôle des exigences obligatoires**

Numéro de référence de l'exigence	Référence à l'Énoncé des travaux	Exigences obligatoires	Conforme (Oui/Non)	Section/page dans la proposition du soumissionnaire
M1	1.2, 4.3.2	Chaudière d'une capacité d'environ 1,5 MW de puissance thermique		

Numéro de référence de l'exigence	Référence à l'Énoncé des travaux	Exigences obligatoires	Conforme (Oui/Non)	Section/page dans la proposition du soumissionnaire
M2	1.2 (item 5) 4.3.2	Proposition de maintenance de l'équipement avec des options tarifées à 3, 4 et 5 ans.		
M3	4.3.3	Proposition de contrat de combustible de deux ans (\$/GJ eau chaude) avec avec des options tarifées à 3, 4 et 5 ans.		
M4	3.0	Vérification de la conformité du combustible aux spécifications		
M5	3.1	Le stock de combustible soutient trois (3) jours de fonctionnement continu		
M6	1.2	Taux de variation du débit minimal de 3 :1. Charge partiel minimum de 30% est requis par le REAS.		
M7	4.3.10	Exigences relatives au comptage et aux détecteurs qui sont évalués séparément		
M8	1.2, 4.3.12	Programme de formation		
M9	5.1	Coût et conception des modifications pour des températures d'alimentation et de reprise de 95/65 °C		
M10	5.1	Courbe de performance pour des températures d'alimentation et de reprise de 145/110 °C et 95/65 °C		
M11	1.2, 5.3, 5.4	Détails soulignant comment l'entrepreneur satisfera à l'ACE et à la réglementation sur les émissions		
M12	5.8	Horaire détaillé pour tous les		

Numéro de référence de l'exigence	Référence à l'Énoncé des travaux	Exigences obligatoires	Conforme (Oui/Non)	Section/page dans la proposition du soumissionnaire
		travaux complétés, incluant un test de performance par Mars 2018		

### Tableau A2: Optional Items Checklist

Liste des articles additionnels qui improuvera la valeur du contrat. Cela peut être inclut sure une page séparée si nécessaire.

Numéro de référence de l'exigence	Référence à l'Énoncé des travaux	éléments facultatifs	Inclu (Oui/Non)	Section/page dans la proposition du soumissionnaire
O1	1.2	Efficacité énergétique (optionnel)		

### Tableau B : EXIGENCES COTÉES

Afin de se qualifier pour le processus de cotation, les propositions doivent satisfaire aux exigences cotées suivantes et doivent inclure la section/page à laquelle il est fait renvoi dans la proposition du soumissionnaire.

Numéro de référence de l'exigence	Critère	Évaluation	Points	Section/page dans la proposition du soumissionnaire	Évaluation totale
<b>Expérience</b>					<b>20</b>
R1	Nombre de projets similaires exécutés entre 2007 et	Un (1) pt par projet fructueux en Ontario, un demi-point (0,5) pour les autres	Max (5) pts		

Numéro de référence de l'exigence	Critère	Évaluation	Points	Section/page dans la proposition du soumissionnaire	Évaluation totale
	2017	provinces, un quart de point (0,25) pour l'international, à concurrence d'un max, de cinq (5) pts			
R2	Nombre de projets d'envergure similaire exécutés dans un cadre similaire (centrale) entre 2007 et 2017	Un (1) pt par projet fructueux d'envergure similaire et un (1) pt par installation, à concurrence d'un max. de cinq (5) pts	Max (5) pts		
R3	Historique de collaboration et de partenariat avec des sous-traitants entre 2007 et 2017	Deux (2) pts par projet fructueux avec un partenaire/concepteur principal et un (1) pt par entrepreneur électrique/mécanique, max. de cinq (5) pts	Max (5) pts		
R4	Expérience dans la conclusion et la gestion de contrats de biocombustible (GJ/année)	Un demi-point (0,5) par contrat de combustible de rechange (pas de puces de bois gradées), un (1) pt par contrat d'approvisionnement en copeaux de bois, max. de	Max (5) pts		



Numéro de référence de l'exigence	Critère	Évaluation	Points	Section/page dans la proposition du soumissionnaire	Évaluation totale
		cinq (5) pts			
<b>Approche technique</b>					<b>35</b>
R5	Fiabilité	Fiabilité éprouvée (un (1) pt par année d'exploitation commerciale éprouvée), max. de cinq (5) pts	Max (5) pts		
R6	Facilité de maintenance	Ensemble complet qui est évalué par le temps d'arrêt le plus bas pour la maintenance planifiée (5 points), le prochain temps d'arrêt le plus bas (4 points), etc.	Max (5) pts		
R7	Performance	Points pour une performance de sortie thermique supérieure à 80%. 1 point par 1% d'efficacité de chaudière supérieur à 80% à MCR. Maximum de dix (10) points	Max (10) pts		
R8	Conception et calendrier (10)	Une conception qui s'intègre bien avec l'installation en termes d'espace et d'accès, permet à l'opérateur de	Max (15) pts		

Numéro de référence de l'exigence	Critère	Évaluation	Points	Section/page dans la proposition du soumissionnaire	Évaluation totale
		s'appuyer pour une installation à plus grande échelle (maximum 15 points)			
<b>Coût</b>					<b>20</b>
<b>R9</b>		Entretien (maximum de cinq (5) points) et Contrats de carburant (maximum de dix (10) points). Coûts évalués sur cinq (5) ans de prix contractuels.  Maximum de points pour le coût le plus bas, 50% pour le prochain coût le plus bas, 25% pour le troisième coût le plus bas, 12,5% pour le quatrième plus bas	Max (15) pts		
<b>R10</b>		Coût total installé (max 15 points) avec 15 points pour l'offre la plus basse, 7,5 points pour le deuxième plus bas, 3,75 pts pour le troisième,	Max (15) pts		

Numéro de référence de l'exigence	Critère	Évaluation	Points	Section/page dans la proposition du soumissionnaire	Évaluation totale
		2 pts pour le 4ème.			
<b>Considérations additionnelles</b> (pondérées également) :					<b>20</b>
R11	Innovation de la technologie	Pour ressembler étroitement aux installations à plus grande échelle en ce qui concerne la manutention du carburant, le stockage du carburant, la maintenance, l'exploitation, les performances supérieures. Jusqu'à un (1) point pour chaque élément jusqu'à un maximum de 7,5 points	Max (7.5) pts		
R12	Contrat de combustible – coût et utilisation de ressources locales	Des services supplémentaires qui minimiseront les interventions de l'opérateur jusqu'à un (1) point par service à un maximum de deux (2) points. Pour la distance de livraison: 5,5 points pour la livraison dans les 250 km, 2,5 points pour la livraison dans les	Max (7.5) pts		

Numéro de référence de l'exigence	Critère	Évaluation	Points	Section/page dans la proposition du soumissionnaire	Évaluation totale
		500 km et 1 point pour la livraison dans un radius de 1000 km.			
<b>Total</b>					<b>100</b>

## 9. CONDITIONS DE LA PRÉSENTATION

- 9.1 Le Conseil national de recherches n'effectuera aucun paiement pour les coûts encourus pour la rédaction et la présentation des propositions en réponse à cette demande ni pour ceux engagés pour une explication ou une démonstration demandée par le CNRC. Le Conseil national de recherches se réserve le droit de rejeter toute proposition ou d'accepter une proposition dans sa totalité sans négociation. Il ne sera pas nécessairement adjudgé de marché à l'issue de ce concours. Le CNRC se réserve le droit d'annuler ou de réémettre cette exigence en tout temps.
- 9.2 Le choix du soumissionnaire sera fondé sur la base du mérite global de sa proposition et non pas uniquement sur celle du coût. Parmi les soumissionnaires répondant aux critères, on choisira celui qui aura le plus faible ratio de coût par point. Le CNRC se réserve le droit d'entrer en négociations avec le soumissionnaire gagnant avant l'adjudication du contrat. Le tableau suivant illustre le rapport cotation-prix de la soumission. Les chiffres ne sont indiqués qu'à titre d'exemple.

<u>Proposition</u>	<u>Cote</u>	<u>Gagnant</u>
A	72	
B	90	*****
C	78	
D	85	

- 9.3 Les propositions soumises devront être valides pour au moins soixante (60) jours à compter de la date de clôture de la DP.
- 9.4 Votre proposition doit comprendre l'énoncé suivant :
- « Nous certifions par la présente que le prix indiqué ne dépasse pas le prix le plus bas demandé à tous nos autres clients, notamment notre client préféré, en échange de services semblables. »

## **10. CONFIDENTIALITÉ**

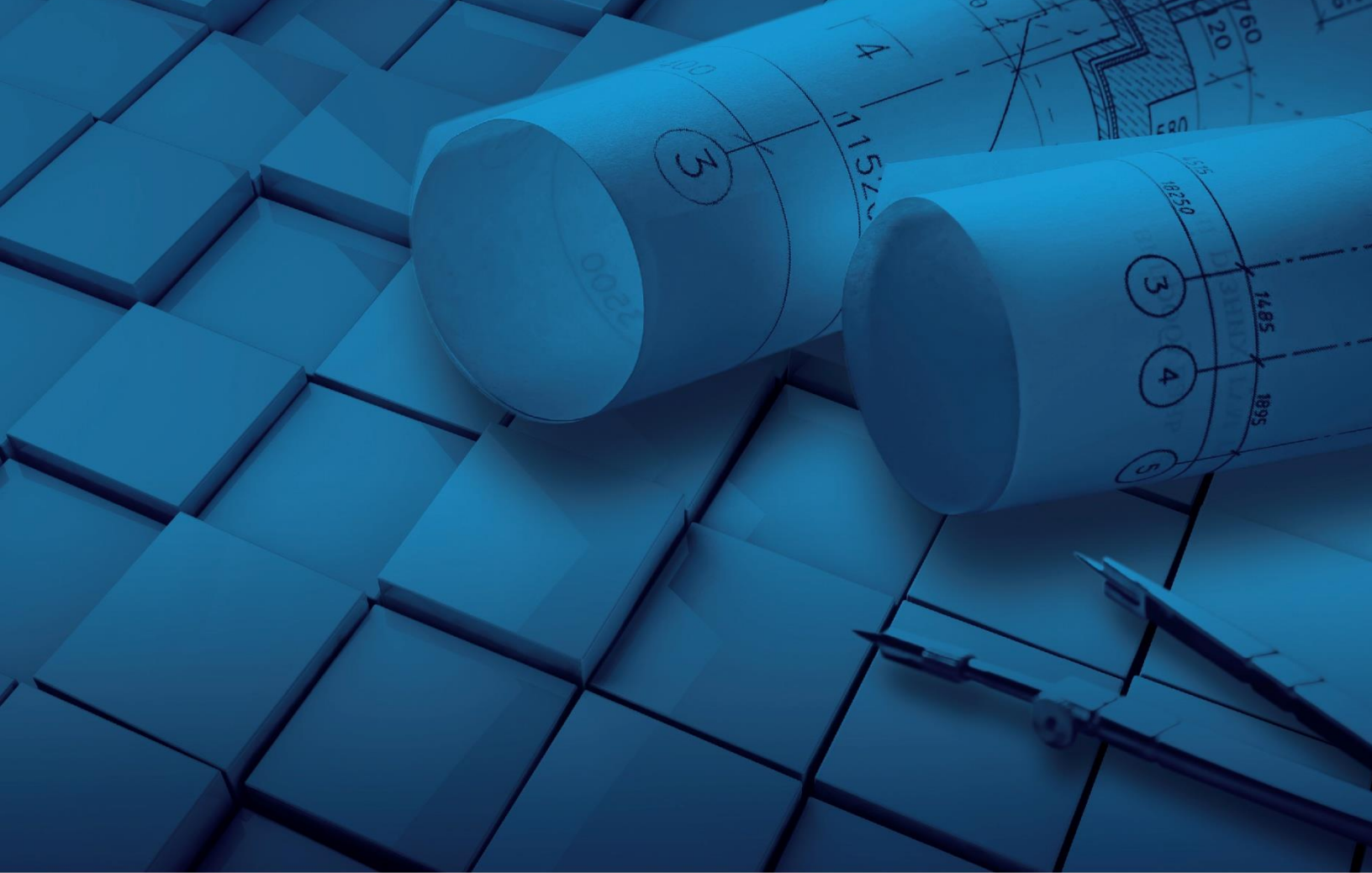
- 10.1 Ce document est NON CLASSIFIÉ, cependant l'entrepreneur doit traiter comme étant confidentielle, pendant et après la période du contrat, toute information de nature confidentielle concernant les affaires du CNRC venant à la connaissance de ses agents.

## **11. CODE CRIMINEL DU CANADA**

- 11.1 Le Canada peut rejeter une soumission dans l'un ou l'autre des cas suivants le soumissionnaire ou l'un de ses employés ou sous-traitants visé dans la soumission a été reconnu coupable en vertu de l'article 121 (« Fraudes envers le gouvernement » et « Entrepreneur qui souscrit à une caisse électorale »), 124 (« Achat ou vente d'une charge ») ou 418 (« Vente d'approvisionnements défectueux à Sa Majesté ») du Code criminel.

## **12. COMPTE RENDU**

- 12.1 Après l'attribution du contrat, les soumissionnaires peuvent demander un compte rendu sur les résultats de la demande de soumissions. Les soumissionnaires devraient en faire la demande à l'autorité contractante dans les 15 jours ouvrables, suivant la réception de l'avis les informant que leur soumission n'a pas été retenue. Le compte rendu peut être fourni par écrit, par téléphone ou en personne.



# DEVIS

**NO. DE SOLICITATION:** 17-22024

**Edifice:** Centrale de chauffage et de refroidissement des buttes de la Confédération  
501 chemin Heron  
Ottawa, Ontario

**PROJET:** Chaudière à biomasse réalisé en conception - construction

**Date:** Juin 2017



# DEVIS

## TABLE DES MATIERES

**Annonce Achatsetventes**

**Taxes de ventes Ontario**

**Compagnies de cautionnements**

**Articles de convention**

**Plans et devis** **A**

**Measurements & Verification of Boiler  
Efficiencies and Outputs** **A1**

**Ontario Regulations 1/17** **A2**

**Environmental Activity and Sector Registry –  
Limits and Other Requirements** **A3**

**Guidelines for the Control of Air Emissions  
From Small Wood-Fired Combustors (<3 MW)** **A4**

**Wood Chip Fuel Specifications** **A5**

**Modalités de paiement** **B**

**Conditions générales** **C**

**Conditions de travail et échelle des justes salaires N/A** **D**

**Conditions d'assurance** **E**

**Condition de garantie du contrat** **F**

**Liste de vérification des exigences relatives à la sécurité LVERS** **G**



## ANNONCE ACHATSETVENTES

### Chaudière à biomasse réalisé en conception - construction

Le Conseil national de recherches du Canada, a une demande pour un projet qui comprend :

Le Conseil national de recherches du Canada (CNRC) sollicite, au nom de SPAC, une proposition pour une solution clé en main (conception-construction) en vue de l'étude technique détaillée, de la conception, de la construction et de la mise en service d'une (1) chaudière à biomasse préfabriquée à la Centrale de chauffage et de refroidissement des Buttes de la Confédération, sise au 501, chemin Heron Road, Ottawa (Ontario) K1V 1A7. La capacité de la puissance thermique de la chaudière à biomasse préfabriquée doit être 1,5 MW. La proposition doit inclure une solution de conception et de construction, un contrat pour l'équipement et l'approvisionnement de combustible ainsi que les directives techniques et les emplacements pour la mise en place de la chaudière et des accessoires et paquet de maintenance. Les emplacements recommandés sont limités et indiqués sur les dessins annexés. D'autres emplacements peuvent être recommandés et présentés comme option de rechange uniquement.

#### 1. GENERAL :

Adresser à le représentant ministériel (ou à son représentant) ou à l'Agent des contrats toute question portant sur tout aspect du projet. Ils sont les seuls autorisés à fournir des réponses.

On ne tiendra nullement compte des informations obtenues d'une personne autre que le représentant ministériel (ou son représentant) ou l'Agent des contrats et ce, autant à l'octroi du contrat qu'au cours des travaux.

Les entreprises souhaitant présenter des soumissions pour ce projet devraient obtenir les documents relatifs aux appels d'offres en s'adressant au fournisseur de service Achatsetventes.gc.ca AGAO. Si des addenda sont ajoutés, ils seront distribués par Achatsetventes.gc.ca AGAO. Les entreprises qui choisissent de préparer leurs soumissions en se fondant sur des documents d'appel d'offres provenant d'autres sources le font à leurs propres risques et seront tenues d'informer le responsable de l'appel d'offres de leur intention de soumissionner. Les troupes d'appel d'offres ne pourront être diffusées le jour même de la clôture des soumissions.

#### 2. VISITE DU SITE OBLIGATOIRE

Les soumissionnaires ont l'obligation de participer à une des visites du site à la date et à l'heure prévues. Les soumissionnaires qui ont l'intention de présenter une soumission doivent envoyer au moins un représentant à cette visite.

Les visites de chantier se tiendront le 26 juin et le 29 juin, 2017 à **10 :00**. Rencontrer Lisa Paterick à 501 chemin heron, Ottawa, ON. Les soumissionnaires qui, pour une raison quelconque, ne peuvent pas participer à la visite à la date et à l'heure prévues ne pourront obtenir un deuxième rendez-vous; leur soumission sera donc considérée comme non conforme. **AUCUNE EXCEPTION NE SERA FAITE.**

#### 3. DATE DE FERMÉTURE :

La date de fermeture est le 19 juillet, 2017 14 :00

#### 4. CRITÈRES DE SÉCURITÉ OBLIGATOIRES POUR LES ENTREPRENEURS

##### 5.1 EXIGENCES OBLIGATOIRES RELATIVES A LA SECURITE

- .1 L'entrepreneur doit détenir en permanence, pendant l'exécution du contrat à commandes, une attestation de vérification d'organisation désignée (VOD) en vigueur, délivrée par la Direction de la sécurité industrielle canadienne (DSIC) de Travaux publics et Services gouvernementaux Canada (TPSGC).
- .2 Les membres du personnel de l'entrepreneur devant avoir accès à des établissements de travail dont l'accès est réglementé doivent TOUS détenir une cote de FIABILITÉ en vigueur, délivrée ou approuvée par la DSIC de TPSGC.
- .3 L'entrepreneur doit respecter les dispositions:
  - a) de la Liste de vérification des exigences relatives à la sécurité et directive de sécurité (s'il y a lieu), reproduite à l'Annexe D;
  - b) du Manuel de la sécurité industrielle (dernière édition)@ <http://ssi-iss.tpsgc-pwgsc.gc.ca/msi-ism/msi-ism-fra.html>

## 5.2 VÉRIFICATION DE L'ATTESTATION DE SÉCURITÉ À LA CLÔTURE DES SOUMISSIONS

- .1 Le soumissionnaire doit détenir une attestation de vérification d'organisation désignée (VOD) en vigueur, délivrée par la Direction de la sécurité industrielle canadienne (DSIC) de Travaux publics et Services gouvernementaux Canada (TPSGC) **ET DOIT L'INCLURE AVEC LEUR SOUMISSION OU FAIRE SUIVRE DANS LES 48 HEURES SUIVANT LA DATE ET L'HEURE DE CLÔTURE DE L'APPEL D'OFFRE.** Des vérifications seront effectuées par l'intermédiaire de la DSIC pour confirmer l'attestation de sécurité du soumissionnaire. L'omission de se conformer à cette exigence rendra la soumission non conforme et celle-ci sera rejetée.
- .2 L'entrepreneur général doit nommer tous ses sous-traitants dans un délai de 72 heures suivant la clôture des soumissions, et ceux-ci doivent aussi détenir une attestation VOD valide et soumettre les noms, dates de naissance ou numéros de certificats de sécurité de toutes les personnes qui seront affectées au projet.
- .3 Il faut noter que les sous-traitants qui doivent exécuter des tâches pendant l'exécution du contrat subséquent doivent aussi satisfaire aux exigences obligatoires du contrat en matière de sécurité. De plus, aucune personne ne possédant pas le niveau de sécurité exigé ne sera admise sur le site. Le soumissionnaire retenu devra s'assurer que les exigences liées à la sécurité sont satisfaites pendant toute l'exécution du contrat. La Couronne ne sera tenue responsable d'aucun retard ni d'éventuels coûts supplémentaires liés à l'inobservation par l'entrepreneur des exigences en matière de sécurité. L'omission de satisfaire à ces exigences sera suffisante pour résilier le contrat pour cause d'inexécution.
- .4 Pour toute question concernant les exigences liées à la sécurité pendant la période de soumission, les soumissionnaires doivent communiquer avec l'agente de sécurité @ 613-993-8956.

## 6.0 CSPAAAT (COMMISSION DE LA SECURITE PROFESSIONNELLE ET DE L'ASSURANCE CONTRE LES ACCIDENTS DU TRAVAIL

- .1 Tous les soumissionnaires doivent fournir une attestation de la CSPAAAT valide avec leur offre ou avant l'attribution du contrat.

## 7.0 L'OMBUDSMAN DE L'APPROVISIONNEMENT

### .1 Services de règlement des différends

Les parties reconnaissent que l'ombudsman de l'approvisionnement nommé en vertu du paragraphe 22.1(1) de la *Loi sur le ministère des Travaux publics et des Services gouvernementaux* veillera à proposer aux parties concernées un processus de règlement de leur différend, sur demande ou consentement des parties à participer à un tel processus de règlement extrajudiciaire en vue de résoudre un différend entre elles au sujet de l'interprétation ou de l'application d'une modalité du présent contrat, et obtiendra leur consentement à en assumer les coûts. Le Bureau de l'ombudsman de l'approvisionnement peut être joint par téléphone, au 1-866-734-5169 ou par courriel, à l'adresse [boa.opo@boa-opo.gc.ca](mailto:boa.opo@boa-opo.gc.ca).

### .2 Administration du contrat

Les parties reconnaissent que l'ombudsman de l'approvisionnement nommé en vertu du paragraphe 22.1(1) de la *Loi sur le ministère des Travaux publics et des Services gouvernementaux* examinera une plainte déposée par [le fournisseur ou l'entrepreneur ou le nom de l'entité à qui ce contrat a été attribué] concernant l'administration du contrat si les exigences du paragraphe 22.2(1) de la *Loi sur le ministère des Travaux publics et des Services gouvernementaux* et les articles 15 et 16 du *Règlement concernant l'ombudsman de l'approvisionnement* ont été respectées, et si l'interprétation et l'application des modalités ainsi que de la portée du contrat ne sont pas contestées. Le Bureau de l'ombudsman de l'approvisionnement peut être joint par téléphone, au 1-866-734-5169 ou par courriel, à l'adresse [boa.opo@boa-opo.gc.ca](mailto:boa.opo@boa-opo.gc.ca).

### .3 Le Bureau de l'ombudsman de l'approvisionnement (BOA) a été mis sur pied par le gouvernement du Canada de manière à offrir aux fournisseurs un moyen indépendant de déposer des plaintes liées à l'attribution de contrats de moins de 25 000 \$ pour des biens et de moins de 100 000 \$ pour des services. Vous pouvez soulever des questions ou des préoccupations concernant une demande de soumissions ou l'attribution du contrat subséquent auprès du BOA par téléphone, au 1-866-734-5169 ou par courriel, à l'adresse [boa.opo@boa-opo.gc.ca](mailto:boa.opo@boa-opo.gc.ca). Vous pouvez également obtenir de plus amples informations sur les services qu'offre le BOA, en consultant son site Web, à l'adresse [www.opo-boa.gc.ca](http://www.opo-boa.gc.ca).

Le représentant ministériel responsable ou son représentant: **Lisa Paterick**  
Téléphone: **613 990-0460**

L'autorité contractante : **Collin Long** [collin.long@nrc-cnrc.gc.ca](mailto:collin.long@nrc-cnrc.gc.ca)  
Téléphone : **613 993-0431**

# Entrepreneurs non résidents

Guide de la TVD 804F

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## Publication archivées

**Avis aux lecteurs : Concernant la taxe de vente au détail (TVD)** – Le 1<sup>er</sup> juillet 2010, la taxe de vente harmonisée (TVH) de 13 % est entrée en vigueur en Ontario pour remplacer la TVD provinciale en la combinant avec la taxe fédérale sur les produits et services (TPS). Conséquemment, les dispositions de la TVD décrites dans cette page et dans d'autres publications ont expiré le 30 juin 2010.

A compter du 1<sup>er</sup> juillet 2010, cette publication fait partie des archives pour la TVD **seulement**. Puisque ce document reflète la loi de la TVD qui était en vigueur au moment où il fut publié et peut ne plus être valide, veuillez l'utiliser avec prudence.

- Les renseignements contenus dans le présent Guide décrivent les responsabilités d'un entrepreneur non résident qui obtient un contrat en vue d'effectuer des travaux de construction en Ontario, ainsi que celles de ses clients ontariens. Veuillez prendre note que le présent Guide remplace la version précédente publiée en mars 2001.

## Définition d'un entrepreneur non résident

Un entrepreneur non résident est un entrepreneur en construction dont le siège social est situé à l'extérieur de l'Ontario et qui a obtenu un contrat de construction pour effectuer des travaux en Ontario, mais qui n'a pas tenu de façon continue un établissement stable en Ontario au cours des douze mois qui ont précédé la signature du contrat, ou qui n'est pas une société constituée en Ontario. Un contrat de construction est un contrat pour ériger, remodeler ou réparer un bâtiment ou autre structure situé sur un terrain.

Un entrepreneur est une personne qui se livre à la construction, la modification, la réparation ou la rénovation de biens immobiliers et s'entend, sans s'y limiter,

1. d'un entrepreneur général et d'un sous-traitant,
2. d'un charpentier, d'un maçon, d'un tailleur de pierres, d'un électricien, d'un plâtrier, d'un plombier, d'un peintre, d'un décorateur, d'un paveur et d'un constructeur de ponts,

3. d'un entrepreneur en tôle, en carreaux et en terrazzo, en chauffage, en climatisation, en isolation, en ventilation, en pose de papier peint, en construction de routes, en revêtement de toiture et en ciment,

qui installe ou qui incorpore des articles dans un bien immobilier. (Consultez le Guide de la taxe de vente au détail n° 206F - Biens immobiliers et accessoires fixes).

## **Inscription et cautionnement**

Tout entrepreneur non résident à qui l'on accorde un contrat de construction pour des travaux en Ontario doit s'inscrire auprès du ministère des Finances (ministère), Unité des programmes centralisés, et verser un cautionnement équivalant à 4 p. 100 du total de la valeur de chaque contrat. Ce cautionnement peut être acquitté en espèces, par chèque certifié (libellé à l'ordre du Ministre des Finances), par lettre de crédit ou par certificat de cautionnement.

Afin de s'inscrire auprès du ministère et pour obtenir plus de précisions sur le dépôt d'un cautionnement, les entrepreneurs peuvent communiquer avec l'Unité des programmes centralisés du ministère, 33, rue King Ouest, CP 623, Oshawa, Ontario, L1H 8H7, sans frais 1 866 ONT-TAXS (1 866 668-8297) ou télécopieur 905) 435-3617.

Tout entrepreneur non résident qui vend et qui fournit seulement des biens taxables à des clients de l'Ontario, ou qui fournit des services taxables en Ontario, peut obtenir un permis de vendeur régulier lui permettant de percevoir et remettre la TVD sur ses ventes. Tout entrepreneur non résident à qui un permis de vendeur régulier a été émis doit tout de même s'inscrire séparément auprès du ministère et verser un cautionnement s'il se voit accorder un contrat de construction en Ontario.

## **Lettre de conformité**

Après avoir reçu le cautionnement, le ministère envoie à l'entrepreneur non résident une lettre de conformité en deux exemplaires attestant que les exigences relatives à la TVD ont bien été respectées. L'entrepreneur doit alors remettre un exemplaire de cette lettre à son client.

S'il omet de le faire, le client doit retenir 4 p. 100 de chaque paiement dû à l'entrepreneur non résident et remettre les sommes retenues au Ministre des Finances (le ministre). Les paiements doivent être envoyés à l'Unité des programmes centralisés en prenant soin d'y joindre les détails du contrat visé. Au lieu d'effectuer ces paiements de 4 p. 100, le client peut remettre au ministre un certificat de cautionnement équivalant à 4 p. 100 du prix contractuel total.

Remarque : Tout client qui néglige d'observer ces règles pourrait être tenu de verser une somme égale à 4 % de tous les montants payables à l'entrepreneur non résident ou tout autre montant qui, de l'avis du ministère, devrait être assujéti à la TVD à la suite de l'exécution du contrat.

# Calcul de la TVD

## Juste valeur

La TVD doit être versée sur la « juste valeur » des matériaux achetés ou importés en Ontario et utilisés pour l'exécution du contrat en Ontario. Par « juste valeur », on entend :

- le prix d'achat en devises canadiennes;
- tous les frais de manutention et de livraison facturés par le fournisseur; et
- tous les droits de douane ainsi que les taxes de vente et d'accise fédérales (mais non la taxe fédérale sur les produits et services [TPS]).

L'entrepreneur est aussi tenu de payer la TVD aux fournisseurs de l'Ontario au moment de l'achat ou de la location (avec ou sans bail) de services, matériaux, machines ou d'équipement taxables.

## Machines et équipement - loués à bail

Lorsque des machines ou un équipement loués auprès d'un fournisseur de l'extérieur de l'Ontario sont apportés dans la province, la TVD est exigible sur les paiements de location pendant toute la période de séjour des machines et de l'équipement en Ontario.

## Machines et équipement - appartenant à l'entrepreneur

1. Si un entrepreneur apporte des machines et de l'équipement en Ontario pour une durée inférieure à douze mois, la TVD applicable doit être calculée selon la formule suivante :

$$1/36 \times \text{valeur comptable nette à la date d'importation} \times \text{nombre de mois en Ontario} \times \text{taux de taxe.}$$

Aux fins de cette formule, la TVD est exigible pour chaque mois ou partie de mois pendant lesquels les biens se trouvent en Ontario. En outre, on considère qu'un mois constitue une période de 31 jours consécutifs, et qu'une partie de mois représente plus de 12 jours. La TVD exigible est fondée sur le nombre de jours où les machines et l'équipement se trouvent en Ontario et non sur le nombre de jours d'utilisation effective des machines ou de l'équipement.

Exemple: De l'équipement est apporté en Ontario le 28 mars et sorti de la province le 8 mai. L'équipement a donc séjourné pendant 41 jours dans la province. La TVD est alors payable sur les 31 premiers jours de séjour temporaire en Ontario vs l'usage de l'équipement. Étant donné que la période restante (10 jours) n'est pas considérée comme une partie d'un mois, aucune TVD n'est exigible sur cette période.

1. Si l'on prévoit que les machines ou l'équipement apportés en Ontario resteront dans cette province pendant plus de 12 mois, l'entrepreneur doit payer la TVD selon la formule suivante :

valeur comptable nette à la date d'importation × taux de taxe

Si, au moment de l'importation des machines et de l'équipement, la durée du séjour n'est pas connue, le vendeur peut appliquer la formule (a). Si, par la suite, il s'avère nécessaire de garder les machines et l'équipement en Ontario pendant une durée dépassant 12 mois, la TVD versée selon (a) pourra être déduite du montant de la TVD payable selon (b).

À l'aide de la formule (a) ou (b) ci-dessus, les entrepreneurs calculeront et remettront la TVD exigible sur la déclaration à produire une fois le contrat dûment exécuté.

## Fabrication de matériel à des fins personnelles

Il arrive qu'un entrepreneur doive fabriquer divers éléments, tels que des portes et fenêtres, pour exécuter son contrat de construction. Par fabrication, il faut entendre tout travail effectué dans une usine à l'extérieur d'un chantier de construction, une unité mobile ou un atelier sur un chantier de construction ou à proximité de ce dernier. La fabrication a lieu lors de la transformation de matières brutes en produits fabriqués qui seront utilisés dans l'exécution de contrats immobiliers.

Un entrepreneur est considéré comme un entrepreneur fabricant si :

1. les produits fabriqués sont destinés à un usage personnel dans l'exécution de contrats immobiliers; et que
2. le coût de fabrication des produits dépasse 50 000 \$ par an.

(Consultez le Guide de la taxe de vente au détail [no 401F - Entrepreneurs- fabricants](#)).

## Contrat avec le gouvernement fédéral

Lorsqu'un entrepreneur non résident conclut un contrat de construction avec le gouvernement fédéral, pour la construction d'un bâtiment et(ou) l'installation d'équipement, c'est la nature de l'équipement qui détermine si le contrat doit être soumissionné sur une base taxe comprise ou taxe non comprise.

Les contrats pour la construction d'un bâtiment et l'installation d'équipement qui dessert directement ce bâtiment (par ex. les ascenseurs, escaliers roulants, luminaires, systèmes de chauffage central, air climatisé, etc.) doivent être soumissionnés sur une base taxe comprise. L'entrepreneur est considéré comme le consommateur des articles utilisés dans l'exécution de ces contrats et doit payer ou rendre compte de la TVD sur les articles utilisés aux fins de ces contrats. Le simple fait qu'un contrat soit conclu avec le gouvernement fédéral ne donne pas droit, en soi, à une exemption.

Les contrats pour l'installation d'équipement qui devient un accessoire fixe et qui ne dessert pas directement un bâtiment (par ex. le matériel de manutention, l'outillage de production, l'équipement de télécommunication et le matériel de formation) peuvent être soumissionnés sur une base taxe non comprise. Les entrepreneurs qui entreprennent des contrats de ce genre sont permis d'acheter un tel équipement en exemption de la TVD en remettant un Certificat d'exemption de taxe valide aux fournisseurs. Seul un entrepreneur non résident inscrit auprès du ministère et ayant versé un cautionnement peut remettre un Certificat d'exemption de taxe.

## **Exonérations**

Il arrive que des entrepreneurs fournissent et installent de l'équipement ou du matériel pour certains clients ayant droit à une exemption de la TVD (par ex. fabricants, conseils de bandes indiennes, agriculteurs et organismes diplomatiques). Une fois installés, l'équipement ou les matériaux deviennent des biens immobiliers s'ils sont fixés en permanence au sol, ou des accessoires fixes s'ils sont fixés de façon permanente à un bâtiment ou une structure immobilière. Étant donné que la responsabilité de la TVD incombe à l'entrepreneur, ce dernier doit communiquer avec le ministère pour déterminer si le client est admissible à l'exonération, avant d'offrir un contrat taxe non comprise.

## **Indiens inscrits, bandes indiennes et conseils de bandes indiennes**

L'entrepreneur non résident peut acheter des matériaux de construction en exemption de la TVD pour certains bâtiments et certaines structures situés dans des réserves. Le coût de ces projets doit être défrayé par un conseil de bande, et les bâtiments doivent servir à des fins communautaires, au bénéfice de la réserve. Dans le cas de contrats pour des projets de construction communautaires exonérés de taxe, le contrat doit être offert sur une base taxe non comprise. L'entrepreneur non résident peut acheter les matériaux sans payer la TVD s'il remet aux fournisseurs un Certificat d'exemption de taxe valide. Comme précisé ci-dessus, seul un entrepreneur non résident inscrit auprès du ministère et ayant versé un cautionnement peut remettre un Certificat d'exemption de taxe. (Consultez le Guide de la taxe de vente au détail n° 204F - Certificats d'exemption de taxe).

Les entrepreneurs non résidents doivent payer eux-mêmes la TVD sur les articles achetés à des fins d'incorporation à un bâtiment ou une structure, érigé à l'intention d'un Indien inscrit particulier dans une réserve. (Consultez le Guide de la taxe de vente au détail n° 808F - Indiens inscrits, bandes indiennes et conseils de bandes indiennes).



## Exécution du contrat

Une fois le contrat dûment exécuté, l'entrepreneur qui a dû déposer un cautionnement doit remplir une « Déclaration de la taxe de vente au détail - Entrepreneurs non résidents [PDF - 93 KO] » qui est fournie par le ministère.

Lorsque le cautionnement a été acquitté en espèces ou par chèque certifié, le montant déposé peut être déduit de la TVD que l'entrepreneur doit payer. Si le montant de cette taxe est supérieur au montant déposé, l'entrepreneur doit verser la différence. Dans le cas contraire, si le montant déposé est supérieur au montant de la taxe exigible, la différence lui sera remboursée.

Si, au lieu d'un acquittement en espèces, un certificat de cautionnement a été déposé, ce dernier fera l'objet d'une main-levée une fois que le paiement de la taxe aura été intégralement acquitté. Toutes les déclarations peuvent faire l'objet d'une vérification.

## Références législatives

- Loi sur la taxe de vente au détail, paragraphes 19 (2) et 39 (3) 4 et 5
- Règlement 1012 pris en application de la Loi, paragraphes 15.3 (1) (2) (5) (6) et (7)
- Règlement 1013 pris en application de la Loi, articles 1 et 3

## Pour plus de renseignements

Les informations contenues dans cette publication ne sont données qu'à titre d'indication. Pour plus de renseignements, adressez-vous au ministère des Finances de l'Ontario en composant le 1 866 ONT-TAXS (1 866 668-8297) ou visitez notre site Web à [ontario.ca/finances](http://ontario.ca/finances).

## Compagnies de cautionnement reconnues

Publiée septembre 2010

Voici une liste des compagnies d'assurance dont les cautionnements peuvent être acceptés par le gouvernement à titre de garantie.

### 1. Compagnie canadiennes

Assurance ACE INA  
Allstate du Canada, Compagnie d'assurances  
Ascentus Ltée, Les Assurances (cautionnement seulement)  
Aviva, Compagnie d'Assurance du Canada  
AXA Assurances (Canada)  
AXA Pacific Compagnie d'assurance  
Le Bouclier du Nord Canadien, Compagnie d'Assurance  
Certas direct, compagnie d'assurances (cautionnement seulement)  
Chubb, Compagnie d'assurances du Canada  
Commonwealth, Compagnie d'assurances du Canada  
Compagnie d'assurance Chartis du Canada (anciennement La Cie d'assurance commerciale AIG du Canada)  
Co-operators General, Compagnie d'assurance  
CUMIS, Compagnie d'assurances générales  
La Dominion du Canada, Compagnie d'assurances générales  
Échelon, Compagnie D'Assurances Générale (cautionnement seulement)  
Economical, Compagnie Mutuelle d'Assurance  
Elite, Compagnie d'assurances  
La Compagnie d'Assurance Everest du Canada  
Federated, Compagnie d'assurances du Canada  
Federation, Compagnie d'assurances du Canada  
La Compagnie d'assurance et de Garantie Grain  
Gore Mutual Insurance Company  
The Guarantee, Compagnie d'Amérique du Nord  
Industrielle Alliance Pacifique, Compagnie d'Assurances Générales  
Intact Compagnie d'assurance  
Jevco, Compagnie d'assurances (cautionnement seulement)  
Compagnie canadienne d'assurances générales Lombard  
Compagnie d'assurance Lombard  
Markel, Compagnie d'assurances du Canada  
Missisquoi, Compagnie d'assurances

La Nordique compagnie d'assurance du Canada  
The North Waterloo Farmers Mutual Insurance Company (fidélité du personnel seulement)  
Novex Compagnie d'assurance (fidélité du personnel seulement)  
La Personnelle, compagnie d'assurances  
La Compagnie d'Assurance Pilot  
Compagnie d'Assurance du Québec  
Royal & Sun Alliance du Canada, société d'assurances  
Saskatchewan Mutual Insurance Company  
Compagnie d'Assurance Scottish & York Limitée  
La Souveraine, Compagnie d'Assurance Générale  
TD, Compagnie d'assurances générales  
Temple, La compagnie d'assurance  
Traders, Compagnie d'assurances générales  
La Compagnie Travelers Garantie du Canada  
Compagnie d'Assurance Trisura Garantie  
Waterloo, Compagnie d'assurance  
La Compagnie Mutuelle d'Assurance Wawanesa  
Western, Compagnie d'assurances  
Western, Compagnie de garantie

## 2. Compagnie provinciales

Les cautionnements de garantie des compagnies suivantes peuvent être acceptés à condition que le contrat de garantie soit conclu dans une province où la compagnie est autorisée à faire affaires, comme il est indiquée entre parenthèses.

AXA Boréal Assurances Inc. (I.-P.-É., N.-B., Qué., Ont., Man., C.-B.)  
ALPHA, Compagnie d'assurances Inc. (Québec)  
Canada West Insurance Company (Ont., Man., Sask., Alb., C.-B., T.-N.-O.) (cautionnement seulement)  
La Capitale assurances générales inc. (T.-N.-L., N.-É., I.-P.-É., Qué. (cautionnement seulement), Man., Sask., Alb. C.-B., Nun., T.-N.-O., Yuk.)  
Coachman Insurance Company (Ont.)  
La Compagnie d'Assurance Continental Casualty (T.-N.-L., N.-É., I.-P.-É., N.-B., Qué., Ont., Man., Sask., Alb. C.-B., Nun., T.-N.-O., Yuk.)  
GCAN Compagnie d'assurances (T.-N.-L., N.-É., I.-P.-É., N.-B., Qué., Ont., Man., Sask., Alb. C.-B., Nun., T.-N.-O., Yuk.)  
The Insurance Company of Prince Edward Island (N.-É., I.-P.-É., N.-B.)  
Kingsway Compagnie d'assurances générales (N.-É., N.-B., Qué., Ont., Man., Sask., Alb., et C.-B.)  
La Compagnie d'Assurance Liberté Mutuelle (T.-N.-L., N.-É., I.-P.-É., N.-B., Qué., Ont., Man., Sask., Alb. C.-B., Nun., T.-N.-O., Yuk.)  
Norgroupe Assurances Générales Inc.  
Orléans, compagnie d'assurance générale (N.-B., Qué., Ont.)  
Saskatchewan Government Insurance Office (Sask.)  
SGI CANADA Insurance Services Ltd. (Ont., Man., Sask., Alb.)  
Société d'assurance publique du Manitoba (Man.)  
Union Canadienne, Compagnie d'assurances (Québec)  
L'Unique assurances générales inc. (T.-N.-L., N.-É., I.-P.-É., N.-B., Qué. (cautionnement seulement), Ont. (cautionnement seulement), Man., Sask., Alb. C.-B. (cautionnement seulement), Nun., T.-N.-O., Yuk.)

## 3. Compagnie étrangères

Aspen Insurance UK Limited  
Compagnie Française d'Assurance pour le Commerce Extérieur (fidélité du personnel seulement)  
Eagle Star Insurance Company Limited

Société des Assurances Ecclésiastiques (fidélité du personnel seulement)  
Lloyd's, Les Souscripteurs du  
Mitsui Sumitomo Insurance Company, Limited  
NIPPONKOA Insurance Company, Limited  
Assurances Sampo du Japon  
Tokio Marine & Nichido Incendie Compagnie d'Assurances Ltée  
XL Insurance Company Limited (cautionnement seulement)  
Zurich Compagnie d'Assurances SA

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## **Articles de convention**

Contrat de construction – Articles de convention  
(23/01/2002)

- A1 Contrat
- A2 Description des travaux et date d'achèvement
- A3 Prix du contrat
- A4 Adresse de l'entrepreneur
- A5 Tableau des prix unitaires

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# Articles de convention

Les présents Articles de convention faits en double le 8<sup>ième</sup> jour de janvier, 2015

## Entre

Sa Majesté la Reine, du chef du Canada (ci-après appelé “ Sa Majesté”) représentée par le Conseil National recherches du Canada. (ci-après appelé “ le Conseil”)

Et Les installations électriques Pichette Inc.

( ci-après appelé “l’Entrepreneur”)

Font foi que sa Majesté et l’Entrepreneur ont établi entre eux les conventions suivantes:

## A1 Contrats

(23/01/2002)

- 1.1 Sous réserve des paragraphes A1.4 and A1.5, les documents constituant le contrat passé entre Sa Majesté et l’Entrepreneur (ci-après appelé le Contrat) sont:
  - 1.1.1 les présents Articles de convention;
  - 1.1.2 les documents intitulés “Plans et devis” et annexés aux présentes sous la cote “A”;
  - 1.1.3 le document intitulé “Modalités de paiement” et annexé aux présentes sous la cote “B”;
  - 1.1.4 le document intitulé, “Conditions générales” et annexé aux présentes sous la cote “C”;
  - 1.1.5 le document intitulé, “Conditions de travail” et annexé aux présentes sous la cote “D”;
  - 1.1.6 le document intitulé, “Conditions d’assurance” et annexé aux présentes sous la cote “E”;
  - 1.1.7 le document intitulé, “Conditions de garantie du contract” et annexé aux présentes sous la cote “F”; et
  - 1.1.8 toute modification au Contract en accord avec le Conditions générales.
  - 1.1.9 le document intitulé “Échelles de juste salaire pour les contrats fédéraux de construction”, désigné dans le présent document par l’appellation “Échelles de justes salaires”.

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## Articles de Convention

1.2 Le Conseil désigne de **SAGI**  
du CNRC, du gouvernement du Canada, Ingénieur aux fins du Contrat et à toute fin, y compris aux fins  
accessoires, l'adresse de l'Ingénieur est réputée être:

### 1.3 Dans le Contrat

1.3.1 "Entente à prix fixe" désigne la partie du Contrat où il est stipulé qu'un paiement global sera fait  
en contrepartie de l'exécution des travaux auxquels elle se rapporte; et

1.3.2 "Entente à prix unitaire" désigne la partie du Contrat où il est stipulé que le produit d'un prix  
multiplié par un nombre d'unité de mesurage d'une catégorie sera versé à titre de paiement pour  
l'exécution des travaux visés par cette entente.

1.4 Toute dispositions du Contrat qui s'applique expressément et seulement à une Entente à prix unitaire ne  
s'applique à aucune partie des travaux qui relève de l' Entente à prix fixe.

1.5 Toute dispositions du Contrat qui s'applique expressément et seulement à une Entente à prix fixe ne  
s'applique à aucune partie des travaux qui relève de l' Entente à prix Unitaire.

### A2 Description des travaux et date d'achèvement (23/01/2002)

2.1 Entre la date des présentes Articles de convention et le jour de , l'Entrepreneur exécute, avec  
soin et selon le règles de l'art, à l'endroit et de la manière indiquée, les travaux suivants :

plus particulièrement décrits dans les Plans et devis, incluant les addenda no.

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## Articles de Convention

### A3 Prix du marché

(23/01/2002)

- 3.1 Sous réserve de toute addition, soustraction, déduction, réduction ou compensation prévue en vertu du Contrat, Sa Majesté, aux dates et de la manière énoncées ou mentionnées dans les Modalités de paiement, paie à l'Entrepreneur:
- 3.1.1 la somme de \$ (TPS/TVH en sus), en considération et l'exécution des travaux ou des parties de travaux à laquelle s'applique l'Entente à prix fixe, et
- 3.1.2 une somme égale à l'ensemble des produits du nombre d'unités de mesurage de chaque catégorie de travail, d'outillage ou de matériaux indiqué dans le Certificat définitif de mesurage mentionné ou paragraphe CG44.8, ce nombre d'unités étant multiplié selon le cas par le prix de chaque unité indiquée dans le Tableau des prix unitaires relativement à l'exécution des travaux ou des parties de travaux qui ont fait l'objet d'une Entente à prix unitaire.
- 3.2 Pour le gouverne de l' Entrepreneur et des personnes chargées de l'exécution du Contrat au nom de sa Majesté, mais sans toutefois comporter une garantie ou un engagement de quelque nature de la part de l'une ou l'autre partie, il est estimé que la somme totale payable par Sa Majesté à l'Entrepreneur pour la partie des travaux qui a fait l'objet d'une Entente à prix unitaire, sera d'environ N/A \$
- 3.3 L'alinéa A3.1.1 ne s'applique qu'à une Entente à prix fixe.
- 3.4 L'alinéa A3.1.2 et le paragraphe A3.2 ne s'appliquent qu'à une Entente à prix unitaire.

A4 Adresse de L'Entrepreneur

(23/01/2002)

- 4.1 Aux fins du Contrat, y compris les fins accessoires, l'adresse de l'Entrepreneur est réputé être:

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## Articles de Convention

A5 Tableau des prix unitaires

(23/01/2002)

5.1 Il est convenu entre Sa Majesté et l'Entrepreneur que le tableau ci-après est le Tableau des prix unitaires pour le Contrat:

Colonne 1 Postes	Colonne 2 Catégorie de travail outillage ou de matériaux	Colonne 3 Unité de mesurage	Colonne 4 Quantité totale estimative	Colonne 5 Prix unitaire	Colonne 6 Prix total estimatif
		N/A			

5.2 Le Tableau des prix unitaires présenté au paragraphe A5.1 décrit la partie des travaux visée par l'Entente à prix unitaire.

5.3 La partie des travaux qui n'est pas décrite dans le Tableau des prix unitaires mentionné au paragraphe A5.2 est la partie des travaux visée par l'Entente à prix fixe.





**CONSEIL NATIONAL DE RECHERCHES DU CANADA**

**Projet pilote d'installation de chaudière à biomasse réalisé en  
conception-construction**

**Publication : Mai 2017**

## Table des matières

INTRODUCTION .....	4
1.1 Description du projet .....	4
1.2 Intention générale .....	4
2.0 Critères d'évaluation.....	6
2.1 Options.....	7
3 Spécifications du combustible .....	8
3.1 Stockage du combustible .....	8
4.0 CARACTÉRISTIQUES TECHNIQUES.....	8
4.1 Portée des travaux .....	8
4.1.2 Introduction .....	9
4.2 Responsabilités du propriétaire (SPAC) .....	9
4.3 Responsabilités de l'entrepreneur.....	10
4.3.1 Généralités .....	11
4.3.2 Équipements nouveaux.....	12
4.3.3 Contrat de combustible .....	12
4.3.4 Modification à la centrale existante .....	13
4.3.5 Travaux mécaniques .....	13
4.3.6 Travaux électriques.....	13
4.3.7 Travaux relatifs aux systèmes d'instrumentation et de commande .....	14
4.3.8 Travaux d'ossature.....	14
4.3.9 Raccordement aux services publics .....	14
4.3.10 Comptage et détecteurs Pour Surveiller les Paramètres Opérationnels.....	14
4.3.11 Mise à l'essai, démarrage et mise en service .....	15
4.3.12 Transfert final au propriétaire .....	16
4.3.13 Services accessoires et étude technique .....	16
4.4 Exclusions à la portée des travaux de l'entrepreneur .....	16
4.5 Services associés au projet .....	16
5.0 Critères de conception.....	18
5.1 Conditions de base.....	18
5.2 Exploitation de l'installation de chaudière existante pendant la construction .....	19
5.3 Réglementation des émissions .....	19
5.4 Lois, normes et codes .....	19

5.5 Dessins et données .....	20
5.6 Essais/garantie de performance .....	20
5.6.2 Essai d'acceptation définitive .....	20
5.6.3 Essai de performance et garantie de performance .....	21
5.6.7 Responsabilités après la mise en service .....	22
5.7 Gestion du projet .....	23
5.8 Calendrier du projet .....	24
6.0 ASPECTS COMMERCIAUX .....	24
6.1 Assurances .....	24
6.2 Permis, taxes .....	26
6.3 État du site .....	26
6.4 Exécution des travaux .....	27
6.5 Acceptation des travaux .....	28
6.6 Paiements .....	28
Tableau A – LISTE DE CONTRÔLE DES EXIGENCES OBLIGATOIRES.....	29
Tableau B – EXIGENCES COTÉES .....	31

**Spécifications fonctionnelles**

## INTRODUCTION

Services publics et Approvisionnement Canada (SPAC) s'est engagé, dans le cadre du Programme d'acquisition de services énergétiques (PASE), à se préparer à la création d'un système énergétique de quartier qui est basé sur l'énergie renouvelable et contribuera à des gains d'efficacité de quartier grâce à l'utilisation de la chaleur rejetée par les sources de déchets municipales et industrielles. À cette fin, SPAC souhaite entreprendre des projets pilotes évolutifs pour démontrer comment l'énergie renouvelable et la récupération de la chaleur dans les quartiers peuvent faire partie intégrante d'un plan de système énergétique étendu réduisant au minimum les émissions de GES en provenance des centrales de chauffage et de refroidissement dans le secteur de la capitale nationale.

### 1.1 Description du projet

Le Conseil national de recherches du Canada (CNRC) sollicite, au nom de SPAC, une proposition pour une solution clé en main (conception-construction) en vue de l'étude technique détaillée, de la conception, de la construction et de la mise en service d'une (1) chaudière à biomasse préfabriquée à la Centrale de chauffage et de refroidissement des Buttes de la Confédération, sise au 501, chemin Heron Road, Ottawa (Ontario) K1V 1A7. La capacité de la puissance thermique de la chaudière à biomasse préfabriquée doit être 1,5 MW. La proposition doit inclure une solution de conception et de construction, un contrat pour l'équipement et l'approvisionnement de combustible ainsi que les directives techniques et les emplacements pour la mise en place de la chaudière et des accessoires et paquet de maintenance. Les emplacements recommandés sont limités et indiqués sur les dessins annexés. D'autres emplacements peuvent être recommandés et présentés comme option de rechange uniquement.

### 1.2 Intention générale

Le CNRC envisage de retenir les services d'un entrepreneur de conception-construction pour la conception (de la conception schématique à l'étape des dessins de construction/dossier de soumission), la construction et la mise en service d'une installation de chaudière à biomasse à l'actuelle Centrale de chauffage et de refroidissement des Buttes de la Confédération. L'entrepreneur sera également responsable de tous les raccordements de la nouvelle chaudière à biomasse aux collecteurs d'alimentation et de reprise du système de chauffage à l'eau chaude de la centrale. Des contrats connexes pour le combustible et la maintenance sont inclus dans la portée des travaux.

L'entrepreneur doit supposer, pour la préparation de sa soumission, que les raccords à robinet et à capuchon aux collecteurs d'alimentation et de reprise du système de chauffage à l'eau chaude existant ne seront pas fournis par SPAC et ne seront pas prêts à être raccordés par l'entrepreneur. L'entrepreneur doit fournir à ses frais les nouveaux raccords à robinet aux collecteurs principaux d'alimentation et de reprise existants. Les nouveaux raccords doivent être fournis conformément aux lignes directrices standards relatives à la tuyauterie/robinetterie de la Centrale des Buttes de la Confédération. L'emplacement exact des nouveaux raccords aux collecteurs principaux d'alimentation et de reprise doit être coordonné par l'entrepreneur avec le personnel d'exploitation de la centrale, mais ne doit pas, de manière générale, gêner le fonctionnement quotidien normal non plus que les activités d'entretien et de maintenance de

routine de la centrale. L'entrepreneur ne sera pas responsable de l'arrêt, de la vidange, de la mise à l'air libre, du remplissage, etc. du système de chauffage existant, nécessaires pour lui permettre de réaliser le travail de mise en place des nouveaux raccords. L'entrepreneur doit fournir au CNRC/SPAC et au personnel d'exploitation de la centrale un préavis d'au moins deux semaines pour toutes les révisions requises aux installations techniques existantes et à l'état du site.

La présente demande de propositions vise à solliciter les soumissions d'entrepreneurs qualifiés qui possèdent de l'expérience démontrée dans la bonne exécution de projets similaires sur une base clé en main. L'entrepreneur choisi devra concevoir, construire, mettre en service, tester et transférer une installation entièrement opérationnelle prête à être exploitée commercialement sur une base continue au plus tard le 31 mars 2018.

Installer à la Centrale de chauffage et de refroidissement des Buttes de la Confédération une chaudière appropriée (1,5 MW de puissance thermique ou 150 BHP) conformant à le règlement d'Ontario 1/17 (REAS) et qui utilise comme combustible des copeaux de bois classés par double criblage répondant aux critères stricts spécifiés pour ce qui est de la teneur en humidité et du diamètre. L'installation doit aussi comprendre un système de stockage et d'alimentation en biocombustible (copeaux de bois) largement automatisé conformant à REAS, une installation de comptage et détection pour évaluer le performance énergétique du système et les émissions de GES, un système complet d'évacuation des gaz de combustion de la chaudière et un système de tuyauterie d'alimentation et de reprise de l'eau chaude entre la nouvelle chaudière et les collecteurs principaux d'alimentation et de reprise de la centrale.

Un taux de variation du débit et l'allure minimale de 3:1 (30%) est nécessaire pour que la chaudière à biomasse soit compatible REAS pour l'opération de charge partielle

Il est souhaitable d'incorporer une conception écoénergétique et faibles émissions. Le prix des éléments, comme un système de récupération de la chaleur des gaz de combustion, des entraînements à vitesse variable, Recirculation des gaz de combustion, épurateurs / filtres de gaz de combustion, précipitateur électrostatique / sacs filtrants etc., doivent être indiqués séparément, le cas échéant.

L'installation de chaudière doit être un système aussi automatisé que possible, qui suit les règlements de chauffage automatique comme décrit dans EN 303-5 (2012) conformant à le REAS pour minimizer les interventions d'opérateur.

La portée des travaux inclut également l'achat, la mise en place et la mise en service de compteurs et de détecteurs visant à satisfaire aux critères environnementaux et de certification des chaudières, ainsi qu'aux exigence de déclaration au ministère de l'Environnement (MEO) et au ministère de l'Environnement et du Changement climatique (MECC) REAS, et à permettre une mesure et une vérification adéquates de la performance. Les exigences détaillées de mesure et de vérification ainsi que de production de données sont incluses dans une pièce jointe intitulée « Mesure et vérification des gains d'efficacité et du rendement de la chaudière ».

Le CNRC/SPAC exige que du personnel et des sous-traitants en électricité, en mécanique, en structures et autres domaines pertinents soient utilisés dans ce projet. La soumission de l'entrepreneur doit inclure des renseignements détaillés sur les sous-traitants et leur expérience.

Les services des sous-traitants seront requis pendant toute la durée du projet, y compris lors des réunions périodiques de projet et des études sur place.

Les renseignements qui doivent être inclus dans les soumissions sont les suivants :

1. une description des compétences et de l'expérience de l'équipe de conception, y compris l'identification des entreprises sous-traitantes (architecte, mécanique, etc.);
2. un résumé des projets comparables menés à bien par la firme de l'entrepreneur au cours des cinq dernières années, avec des références pour les projets importants;
3. la relation organisationnelle proposée entre l'équipe de l'entrepreneur, les sous-traitant et le CNRC/SPAC;
4. Calendrier détaillé du projet, y compris les jalons et les examens de conception
5. le prix maximal garanti et la déclaration des coûts réels, avec une ventilation des coûts incluant les coûts architecturaux, structuraux, mécaniques et électriques, et le coût des équipements majeurs, de la maintenance et des contrats d'approvisionnement en combustible. Le contrat de carburant et de maintenance doit être de deux ans, avec des options de prix à trois, quatre et cinq ans.
6. compréhension du projet et stratégie de mise en œuvre;
7. description complète du projet avec les systèmes proposés;
8. L'habileté de se conformer aux exigences REAS telles que définies dans le Règlement de l'Ontario 1/17
9. Références et expérience;
10. Valeur du marché.

Pour être considérées par le CNRC et SPAC, les propositions doivent complètement satisfaire aux EXIGENCES OBLIGATOIRES précisées à l'annexe A et doivent inclure la section/page à laquelle il est fait renvoi. Toute proposition qui n'indique pas clairement que toutes les exigences obligatoires ont été satisfaites ne sera pas considérée plus avant.

Les soumissions doivent contenir des renseignements précis sur le programme de formation offert en vertu de ce marché, notamment le nombre de jours de formation, les sujets abordés et le matériel pédagogique. Un minimum de trois sessions de formation complètes distinctes doivent être conçu pour un groupe de dix (10) participants, constitué des employés d'exploitation et de maintenance du CNRC et de SPAC.

## 2.0 Critères d'évaluation

L'évaluation des soumissions clé en main prendra en considération les services de conception et de construction requis pour mener à bien la conception et la construction du Projet pilote d'installation de chaudière à biomasse à la Centrale de chauffage et de refroidissement des Buttes de la Confédération, les idées et la volonté du soumissionnaire d'abaisser le coût en capital et d'optimiser la disponibilité du système, et la structure de l'organisation de gestion du projet et de construction du soumissionnaire.

La sélection des soumissions sera minimalement basée sur les critères suivants :

1. **EXPÉRIENCE** – La mesure dans laquelle l'entrepreneur, les sous-traitants et le personnel clé ont mené à bien des projets similaires.

2. **APPROCHE TECHNIQUE et CONFORMITÉ ENVIRONNEMENTALE** – Sur la base de la description du projet et des systèmes proposés accompagnée des commentaires/clarifications et des dessins préliminaires ou types soumis par le proposant, la mesure dans laquelle les systèmes proposés sont susceptibles de fournir un service fiable, et une exploitation et une maintenance faciles. Il est également souhaitable de concevoir un système qui, en partie ou en totalité, pourrait représenter une installation de plus grande envergure. Le système doit être conforme avec les exigences MECC REAS.

3. **COÛT** – Tous les coûts, sur la base de l'échéancier proposé, seront considérés dans l'évaluation du rapport coût-efficacité des différentes soumissions.

3. Considérations additionnelles :

- a. Innovation de la technologie – mise en œuvre d'une technologie alignée sur la vision de SPAC pour un combustible et un système de distribution de la chaleur sûrs, fiables et viables qui réduiront les émissions de GES et amélioreront la performance environnementale du gouvernement du Canada.
- b. Approvisionnement en combustible local pour soutenir la collectivité desservie par le projet. L'utilisation de ressources locales et recyclées réduit l'impact environnemental.
- c. Faibles émissions de produit, y compris les odeurs et le bruit, impact environnemental minimal.
- d. Viabilité de la technologie, y compris pour le combustible et les ressources en matière de distribution.

Pour se qualifier pour le processus de cotation, les propositions doivent complètement satisfaire aux EXIGENCES COTÉES fournies à l'annexe B et doivent inclure la section/page à laquelle il est fait renvoi dans la proposition du soumissionnaire.

La méthode de sélection sera basée sur le soumissionnaire offrant la proposition avec le plus haut pointage.

## 2.1 Options

Les entrepreneurs peuvent inclure :

1. des commentaires sur la conception préliminaire;
2. des croquis proposant différents équipements mécaniques majeurs et/ou emplacements, configurations et orientations des composantes;
3. des stratégies de conception écoénergétique et faibles émissions comme la récupération de la chaleur des gaz de combustion, l'utilisation d'entraînements à vitesse variable, Recirculation des gaz de combustion, épurateurs / filtres à gaz, etc.;
4. un coût de rechange pour la livraison accélérée de l'équipement;
5. toute autre option que l'entrepreneur juge avoir de la valeur pour le projet et estime que le CNRC/SPAC aurait avantage à étudier et prendre en considération.

**Toutes les enquêtes / questions doivent être reçues au plus tard par le lundi 10 Juillet 2017 à 14:00.**



Le propriétaire ne sera pas tenu d'accepter la soumission la plus basse non plus que toute autre soumission. Le propriétaire peut rejeter toutes les soumissions sans s'exposer à des réclamations pour dommages ou pertes de la part de tout soumissionnaire.

### 3 Spécifications du combustible

L'entrepreneur doit localiser une source d'approvisionnement sûre, fiable et économique en copeaux de bois classés par double criblage qui répond aux spécifications de carburant de la classe B1 comme décrit dans CAN / CSA-ISO 17225 les puces de bois classés partie 4. L'entrepreneur va aussi conclure un approvisionnement de deux ans incluant le stockage et la livraison, avec une option tarifée de renouvellement aux années trois, quatre et cinq. Le contrat d'approvisionnement en combustible doit préciser le montant par GJ de rendement de la chaudière en plus du coût par volume livré de copeaux de bois, ainsi qu'un ajustement du prix pour tenir compte d'une variation du volume de combustible sur une base annuelle.

Pour chaque livraison, le fournisseur du combustible doit indiquer la teneur en humidité du chargement (voir la section 4.3.3 – Contrat de combustible).

L'entrepreneur doit également fournir le matériel nécessaire pour réaliser des échantillonnages à l'interne et offrira la formation connexe aux opérateurs de la centrale de SPAC afin de mesurer la teneur en humidité du combustible.

L'entrepreneur doit localiser une source d'approvisionnement et fournira des copeaux de bois classés conformes à la norme ISO 17225 et REAS, partie 4, Classes de plaquettes de bois, détaillé dans attachement 5, de dimensions P31 ou P45. Les autres propriétés exigées comprennent une teneur en humidité maximale de 45% par poids (quand humide) et une teneur en cendre du poids  $\leq 3\%$  (quand sèche).

#### 3.1 Stockage du combustible

L'entrepreneur doit concevoir une méthode sécuritaire et conformant à REAS, fiable et économique de fourniture, de livraison, de stockage et de manutention du biocombustible. Les emplacements disponibles pour le stockage sont indiqués sur les dessins préliminaire, inclus sous forme de pièces jointes dans la présente DDP, et peuvent être modifiés au besoin. Une installation de stockage couverte est exigée car les piles de copeaux non protégées ne sont pas permises à la Centrale de chauffage et de refroidissement des Buttes de la Confédération.

La capacité de l'installation de stockage des copeaux de bois doit être suffisante pour assurer le fonctionnement à plein régime de la chaudière pendant au moins trois jours à une puissance maximale continue de la chaudière.

## 4.0 CARACTÉRISTIQUES TECHNIQUES

### 4.1 Portée des travaux

#### 4.1.2 Introduction

Cet énoncé des travaux sert à solliciter une soumission à livre ouvert à limite maximale pour les études de conception-construction, l'achat, la conception, la construction, la mise à l'essai, le démarrage, la mise en service et l'entretien d'une chaudière à biomasse dans le cadre d'un projet pilote. La chaudière doit être conforme à REAS, avoir une puissance thermique à capacité de 1,5 MW et être installée à la Centrale de chauffage et de refroidissement des Buttes de la Confédération.

La présente section vise à définir les exigences techniques minimales du CNRC/SPAC (le propriétaire). Ce document n'est pas destiné à servir de fondement pour la conception détaillée. L'information qu'il renferme doit être utilisée seulement comme une aide pour la préparation de la soumission de l'entrepreneur et non comme documentation détaillée. Le propriétaire rejette toute responsabilité pour les erreurs ou les omissions qui peuvent être contenues aux présentes. Les techniques et les méthodes de conception, d'ingénierie et de construction utilisées doivent être conformes aux lois, aux codes, aux normes, aux règlements et aux règles de l'art les plus récents. L'équipement acheté pour le projet doit avoir un historique d'utilisation démontrée d'au moins deux ans dans des applications similaires. Les prototypes non éprouvés ne sont pas acceptables et ne doivent pas être fournis.

Les solutions de rechange sont les bienvenues si elles fournissent des avantages économiques et techniques démontrés. L'entrepreneur doit soumettre des solutions de rechange recommandées au propriétaire pour considération.

Voir la partie Pièces jointes et les sections ci-dessous pour la définition des limites de la portée des travaux de l'entrepreneur.

#### 4.2 Responsabilités du propriétaire (SPAC)

Le propriétaire doit fournir ce qui suit.

##### *Services*

- Les collecteurs d'alimentation et de reprise de l'eau chaude situés au sous-sol de la centrale (les raccords aux collecteurs principaux à partir de la nouvelle chaudière doivent être faits par l'entrepreneur).
- L'eau sanitaire (entrée seulement; les raccords nécessaires doivent être faits par l'entrepreneur).
- Le service électrique (entrée seulement, les connexions doivent être faites par l'entrepreneur).

##### *Construction et mise en service*

- Le chantier de construction y compris les aires de dépôt et l'accès au chantier et depuis le chantier pour l'entrepreneur et ses sous-traitants et fournisseurs, en vue de l'exécution des travaux.
- Tous les consommables de fonctionnement, comme les produits chimiques, les lubrifiants, les filtres, les lampes, etc. après la mise en service et les essais initiaux.
- Le personnel d'exploitation qualifié pour assister l'entrepreneur avec le démarrage, la mise en service et la mise à l'essai de l'installation et de son équipement.
- Les dépenses de projet additionnelles découlant de la découverte et de l'enlèvement sûr de l'amiante par des spécialistes qualifiés de l'élimination de l'amiante. (La coordination avec les spécialistes de l'élimination de l'amiante doit être assurée par l'entrepreneur.)

#### *Documents et rapports*

- Prendre les arrangements et payer pour l'étude du terrain (au besoin). Les rapports d'étude des sols et les résultats géotechniques seront fournis à l'entrepreneur.

#### 4.3 Responsabilités de l'entrepreneur

L'entrepreneur doit concevoir, spécifier, fournir, assembler, ériger, mettre en place, démarrer, tester et mettre en service (à moins d'indication contraire) une installation de chaudière complète y compris sans toutefois y être limité les éléments et les systèmes énumérés ci-après :

Toutes les responsabilités incomberont à l'entrepreneur, à l'exception des éléments spécifiquement identifiés en section 4.1.

Le présent document est destiné à servir de spécifications fonctionnelles/portée des travaux pour la conception-construction clé en main, mais n'est pas destiné à servir de base pour la conception détaillée. L'information aux présentes sera utilisée seulement comme une aide dans la préparation de la soumission de l'entrepreneur et non comme documentation de conception. Cette information requise doit être vérifiée par l'entrepreneur au moyen de visites du site. Le propriétaire rejette toute responsabilité pour les erreurs ou omissions contenues aux présentes. L'entrepreneur doit confirmer l'adéquation de tous les services, y compris la pression, la température, la grosseur de tuyau et le matériau de toutes les tuyauteries auxquelles des raccordements sont effectués, avant le début de la conception technique détaillée et de la construction. En cas de conflit dans l'information ou avec les lois et les règlements locaux, ou si un service auquel un raccordement doit être effectué est jugé ne pas convenir, l'entrepreneur doit porter la chose immédiatement à l'attention du propriétaire pour examen.

Les critères de conception du système proposé sont définis aux présentes. La responsabilité de la conception détaillée, à l'intérieur de ces points limites, incombe entièrement à l'entrepreneur. Celui-ci doit étudier, comprendre et confirmer toute l'information fournie dans la présente DDP.

Les sous-sections qui suivent définissent de façon générale les principaux aspects du travail que doit réaliser l'entrepreneur.

#### 4.3.1 Généralités

L'entrepreneur doit s'acquitter des obligations suivantes.

- Fournir la totalité de la main-d'œuvre, de la supervision et des services, l'orientation technique, les outils, l'équipement et les consommables requis pour la réception, le déchargement, l'entreposage, la protection, la mise à l'essai, le démarrage, la mise en place et l'érection de l'équipement qui doit être fourni par l'entrepreneur conformément aux présentes.
- Fournir et mettre en place tous les éléments, les accessoires, les dispositifs et les systèmes supplémentaires, auxiliaires ou divers nécessaires à une mise en place complète et opérationnelle en conformité avec le contrat.
- Fournir la documentation technique en fonction des besoins en vue de la soumission des formulaires de demande et des dessins d'accompagnement (soumis par l'entrepreneur), ainsi que pour soutenir les applications incitatives locales.
- Avoir la responsabilité exclusive des méthodes, des moyens, des techniques et des procédés de conception et de construction, ainsi que de l'établissement des mesures de sécurité et la conformité à celles-ci.
- Veiller à la manutention et à l'entreposage complets et sûrs de tous les matériels et équipements, y compris l'équipement de construction, incluant (sans toutefois y être limité) l'inspection, la relance, l'expédition, le déchargement, la réception, la protection, le dédouanement et les réclamations.
- Fournir tous les matériaux, l'équipement, les fournitures, les services publics et les installations de construction temporaires requis par l'entrepreneur pour l'exécution des travaux.
- Demande d'approbation de la conformité environnementale (air et bruit) pour le nouveau système de chaudière. Il n'existe aucune approbation pour le moment. L'entrepreneur fournira toute la documentation au soutien de la demande qui sera soumise par SPAC.
- Être responsable de l'obtention de tous les permis de construction et certificats d'occupation appropriés, et de tous les dommages, les amendes et les pénalités qui peuvent découler (y compris sans toutefois y être limité ceux que le propriétaire paie et devient responsable de payer) de la non-conformité à toute exigence du projet, autres que les dommages, amendes et pénalités découlant d'une action ou d'une omission du propriétaire.

- Être responsable de l'obtention de la certification qui satisfait à la réglementation en application de la *Loi sur les normes techniques et la sécurité (TSSA)* pour une nouvelle installation complète
- Effectuer l'interconnexion de la nouvelle chaudière et des systèmes existants d'alimentation et de reprise de l'eau chaude, de distribution électrique, d'instrumentation et de commande de la centrale et d'autres installations de services publics.
- Élaborer et fournir un échéancier de cheminement critique pour l'exécution des travaux. Cet échéancier doit être mis à jour et remis chaque mois au propriétaire.
- Publier un rapport d'avancement mensuel décrivant de façon raisonnablement détaillée tous les progrès accomplis depuis le dernier rapport d'avancement.
- Contracter toutes les assurances requises (voir la section 6.1).
- Coordonner les travaux avec les spécialistes de l'élimination de l'amiante au besoin. Ces spécialistes doivent être embauchés par le propriétaire, qui défraiera les coûts d'élimination de l'amiante.

#### 4.3.2 Équipements nouveaux

Les principaux composants de la nouvelle installation de chaudière sont les suivants :

- une (1) chaudière à biomasse conforme aux normes REAS (puissance thermique 1,5 MW) ainsi que l'équipement et les systèmes auxiliaires, y compris sans toutefois y être limité :
  - une installation de stockage et d'alimentation en biocombustible (copeaux de bois) largement automatisée;
  - une installation de comptage appropriée pour évaluer l'efficacité énergétique et les émissions de GES;
  - un système complet d'évacuation des gaz de combustion de la chaudière;
  - un système de distribution et de reprise de l'eau de chauffage entre la nouvelle chaudière et les collecteurs principaux d'alimentation et de reprise de la centrale;
- un contrat de livraison et d'approvisionnement en combustible;
- un contrat de maintenance de l'équipement.

#### 4.3.3 Contrat de combustible

L'entrepreneur doit localiser une source d'approvisionnement en biocombustible conforme aux normes REAS sûre, fiable et économique, et conclure un contrat de deux ans pour le coût, le calendrier, le stockage et la livraison, avec une option tarifée de renouvellement aux années trois, quatre et cinq.

Le contrat de combustible doit aussi spécifier le montant par GJ de rendement de la chaudière en plus du coût par volume livré.

Avec chaque livraison, le fournisseur du combustible doit inclure l'analyse suivante de la composition du combustible pour chaque envoi :

- Teneur en humidité

Le fournisseur de carburant effectuera périodiquement des analyses exhaustive du carburant sur une base trimestrielle dans une livraison qui comprendra les éléments suivants;

- Teneur en humidité
- Valeur calorifique (chauffage élevé et chauffage faible)
- Distribution granulométrique
- Cendre
- Composants de cendres

L'entrepreneur doit s'assurer que le plan et les procédures de gestion du combustible de bois sont établis et conformes à le REAS.

#### 4.3.4 Modification à la centrale existante

Il est prévu que la nouvelle chaudière, ainsi que l'équipement et les systèmes auxiliaires, sera installée dans la centrale existante, approximativement aux emplacements montrés sur les dessins préliminaires de la DDP fournis dans les pièces jointes au présent document. D'autres emplacements peuvent toutefois être proposés par l'entrepreneur pour examen et considération par le CNRC/SPAC et le personnel d'exploitation de la centrale. La mise en place finale de la nouvelle chaudière et de l'équipement auxiliaire ne doit pas gêner les activités quotidiennes normales d'entretien et de maintenance opérationnels et de routine de la centrale.

#### 4.3.5 Travaux mécaniques

Tous les tuyaux, les robinets et les composants de spécialité nécessaires pour installer et raccorder les nouveaux équipements et systèmes à l'installation existante doivent être fournis par l'entrepreneur à moins d'indication contraire dans le présent document.

#### 4.3.6 Travaux électriques

Tous les services électriques, y compris le câblage, la distribution et les composants électriques principaux et de spécialité, requis pour desservir l'équipement et les systèmes mécaniques nouveaux doivent être raccordés au système d'alimentation électrique existant et à l'installation de distribution d'électricité de la centrale, et être fournis par l'entrepreneur à moins d'indication contraire dans le présent document.

#### 4.3.7 Travaux relatifs aux systèmes d'instrumentation et de commande

Tous les systèmes d'instrumentation et de commande nécessaires ainsi que les composants connexes pour le nouvel équipement, y compris l'intégration de l'équipement et des systèmes nouveaux aux systèmes existants de la centrale, doivent être fournis par l'entrepreneur à moins d'indication contraire dans le présent document.

#### 4.3.8 Travaux d'ossature

Tous les travaux de modification de la centrale (y compris les travaux de démolition, de découpage, de ragréage, de carottage et de reconstruction, de construction de nouveaux socles d'aménagement et de supports en acier de charpente, etc.) en préparation du processus de construction et de la mise en place finale de l'équipement et des systèmes nouveaux fournis dans le cadre du présent projet doivent être exécutés par l'entrepreneur à moins d'indication contraire dans le présent document.

#### 4.3.9 Raccordement aux services publics

Les raccordements aux services publics doivent être faits par l'entrepreneur de la façon décrite ci-dessous.

Les services fournis à la nouvelle chaudière à partir de l'intérieur de la centrale qui doivent être conçus et installés par l'entrepreneur incluent les suivants :

- eau froide sanitaire
- tuyaux d'évacuation et évènements
- commandes et instrumentation
- service électrique

L'entrepreneur doit prévoir suffisamment de temps pour compiler ou préparer les résultats ou les rapports d'essai visant à établir les caractéristiques techniques et la qualité des services susmentionnés avant de commencer l'étude technique détaillée.

#### 4.3.10 Comptage et détecteurs Pour Surveiller les Paramètres Opérationnels

Il incombe à l'entrepreneur de satisfaire à toutes les exigences de mesure et de vérification, et de se conformer aux exigences de conformité environnementale et de certification de la chaudière.

La mesure et les capteurs doivent être évalués séparément

- 1.) Mesures relatives aux gaz de combustion
  - Émissions de gaz de combustion (concentrations)
    - Oxygène (requis sous REAS)
    - Dioxyde de carbone
    - Monoxyde de carbone
  - Humidité

- Température (requis sous REAS)
- Débit volumétrique

- 2.) Comptage de la consommation d'électricité pour la chaudière et l'équipement auxiliaire
- 3.) Comptage de la consommation d'eau (débit volumétrique et température d'entrée/sortie) (requis par REAS)
- 4.) Moniteur de niveau de fonctionnement du ventilateur à tirage induit (requis sous REAS)
- 5.) Connexion à distance (requis sous REAS)

L'entrepreneur est responsable de la mise en place, de la mise en service et de l'intégration des compteurs et des détecteurs. Le travail de raccordement et de correspondance avec la base de données de comptage de SPAC devra faire l'objet d'un contrat à fournisseur exclusif attribué à R&R Automation à titre de sous-traitant.

L'entrepreneur doit assurer que les exigences relatives à la conservation des données pour la collection de l'information et la retention des paramètres de surveillance des processus soient conformes à le REAS.

Les détails additionnels relatifs au comptage sont inclus dans la pièce jointe « Mesure et vérification ».

#### 4.3.11 Mise à l'essai, démarrage et mise en service

Toutes les procédures d'essai et de mise en service requises pour fournir à SPAC un système sûr et efficace doivent être exécutées par l'entrepreneur à moins d'indication contraire dans le présent document.

Avant la pleine acceptation de l'équipement et des systèmes nouveaux par le propriétaire, l'entrepreneur doit s'acquitter de ce qui suit.

- Procéder à l'essai hydrostatique, au nettoyage chimique, au rinçage, à la vidange et au séchage des tuyauteries après l'érection. L'entrepreneur est responsable de la fourniture et de l'enlèvement de tous les produits chimiques utilisés au cours de ce processus de nettoyage, conformément à la réglementation locale.
- Fournir tout le personnel, l'équipement et les matériels nécessaires au démarrage et à la mise à l'essai de l'installation.
- Mettre en service et mettre à l'essai l'équipement et les systèmes nouveaux. L'entrepreneur sera responsable de la fourniture et de l'utilisation de la totalité de l'équipement, des produits chimiques et des services utilisés dans la mise en service et la mise à l'essai, conformément à la réglementation locale. Tous les coûts pour des postes autres que le combustible et l'exploitation encourus dans l'exécution de l'essai de performance, y compris sans toutefois y être limité, la maintenance de l'équipement, les pièces consommables, l'équipement d'essai spécial, etc. sont uniquement la responsabilité de l'entrepreneur.
- Fournir tous les consommables d'exploitation, comme les produits chimiques, les lubrifiants, les filtres, les lampes, etc. jusqu'à l'acceptation par le propriétaire. Lorsque l'installation est acceptée par le propriétaire, l'entrepreneur doit charger ou



recharger complètement tous les consommables d'exploitation afin de fournir au propriétaire une installation pleinement chargée à l'achèvement des travaux.

- Préparer les procédures pour l'essai de 24 heures et l'essai de 14 jours, et superviser les essais.

#### 4.3.12 Transfert final au propriétaire

- Fournir des instructions au personnel du propriétaire pour l'exploitation et la maintenance.
- Fournir des manuels d'exploitation et de maintenance.
- Fournir au propriétaire la documentation complète sur le démarrage de l'installation, y compris la documentation sur la mise à l'essai des systèmes et de l'équipement, et d'autres documents connexes.
- Fournir au propriétaire un minimum de trois (3) sessions de formation complètes distinctes sur l'exploitation et la maintenance de l'équipement et des systèmes nouveaux. SPAC se réserve le droit de faire un enregistrement ou une vidéo de la formation.

#### 4.3.13 Services accessoires et étude technique

L'entrepreneur doit fournir les éléments suivants :

- Rapport de dimensionnement qui doit être approuvé par le propriétaire avant le début de l'étude technique détaillée.
- Jeu de dessins complet, y compris les dessins d'après exécution de l'installation terminée.
- Cahier d'enregistrement de l'installation, y compris des listes de la totalité de l'équipement, des robinets, des canalisations, de l'instrumentation et des câbles.
- Totalité des permis de construction fédéraux, provinciaux et locaux, obtenus aux frais de l'entrepreneur nécessaires pour la construction du projet conformément au contrat. Le CNRC/SPAC fournira l'aide nécessaire pour obtenir ces permis.

#### 4.4 Exclusions à la portée des travaux de l'entrepreneur

À l'heure actuelle, les éléments suivants sont exclus de la portée des travaux de l'entrepreneur concepteur-constructeur :

- modification au plan d'emplacement existant, au besoin, avec la municipalité locale;

#### 4.5 Services associés au projet

Dans ses efforts pour accomplir ces tâches, l'entrepreneur concepteur-constructeur doit s'acquitter minimalement des services associés au projet suivants :

- critères de conception, spécifications, dessins de construction mécaniques;
- critères de conception, spécifications, dessins de construction relatifs à l'installation électrique, à l'instrumentation et aux commandes;
- secrétaire de projet et contrôle des documents;
- ingénierie, gestion de projet, conformité aux codes;
- achat de l'équipement majeur et mineur (à moins d'indication contraire), préparation des bons de commande;
- appels d'offres, évaluation et sélection des sous-traitants spécialisés;
- gestion de la construction, y compris la coordination des sous-traitants en construction;
- transport de l'équipement et des matériels (livraison, assurance, dédouanement, courtage, c.-à-d. importateur attitré).
- inspection de l'équipement acheté aux locaux du fournisseur;
- relancement de tous les achats;
- ordonnancement du projet;
- comptabilité du projet, facturation;
- coordination des raccordements de l'installation avec les systèmes électriques et mécaniques existants du propriétaire;
- configuration du système de commande;
- mise en service de la totalité de l'équipement et des systèmes nouveaux;
- essai de performance/acceptation;
- garanties de performance à la date de démarrage;
- assurance de responsabilité civile contre les erreurs et les omissions de conception-construction;
- service après mise en service et travaux relatifs aux garanties, ainsi que pièces de rechange;
- préparation, soumission, obtention et relancement de tous les permis de construction;
- programme de formation complet pour le personnel du propriétaire;
- coordination de la sécurité;

- toute la correspondance et les réunions avec le propriétaire et d'autres parties;
- contrat de maintenance;
- manuels d'exploitation et de maintenance, dessins d'après exécution.

L'entrepreneur doit embaucher et gérer tous les sous-traitants spécialisés en fonction des besoins pour mener à bien la portée des travaux, comme :

1. critères, spécifications, dessins de construction des installations mécaniques, électriques, de commande et de génie civil, de l'instrumentation et de l'acier de charpente, ingénieurs conseils.
2. essais d'air et de bruit après la mise en service pour vérifier la conformité au permis;
3. calcul des contraintes exercées sur la tuyauterie.

## 5.0 Critères de conception

### 5.1 Conditions de base

La nouvelle chaudière doit au moins être certifiée ASME (ou l'équivalent).

La nouvelle chaudière et l'équipement et les systèmes accessoires doivent être entièrement automatisés dans toute la mesure du possible.

La performance de l'installation doit être basée sur les conditions d'exploitation suivantes.

La nouvelle chaudière doit être conçue et choisie de façon à offrir les services suivants à la Centrale de chauffage et de refroidissement :

- Les températures d'alimentation et de reprise de l'eau chaude actuelles à la centrale sont de 145 °C et 110 °C respectivement. La nouvelle chaudière doit être conçue et choisie de façon à atteindre ces températures.
- Le système de chauffage de la centrale effectuera la transition vers des températures d'alimentation et de reprise de l'eau chaude de 95 °C et 65 °C respectivement dans le futur. La nouvelle chaudière doit être conçue et choisie de façon à pouvoir facilement faire la transition vers ces températures. Toutes les modifications à la conception, à l'équipement et aux systèmes qui sont requises pour satisfaire les nouvelles températures d'alimentation et de reprise de l'eau chaude doivent être incluses dans la présente portée des travaux. Les travaux nécessaires devraient être requis dans les cinq ans de la signature du contrat. Ils doivent être tarifés séparément.
- Les courbes de performance opérationnelle de la chaudière tant pour les températures d'alimentation et de reprise de l'eau chaude de 145 °C/110 °C que de 95 °C/65 °C doivent être fournies pour la chaudière proposée.

Les caractéristiques et/ou l'équipement du bâtiment existants qui devront être utilisés avec l'installation de chaudière incluent :

- les ouvertures existantes au travers de la dalle de plancher du deuxième étage et du toit qui devront être utilisées pour la cheminée de la chaudière.

La pression de fonctionnement du système est comprise entre 125 psi et 135 psi

## 5.2 Exploitation de l'installation de chaudière existante pendant la construction

Les chaudières existantes de la Centrale de chauffage et de refroidissement doivent demeurer opérationnelles tout au long de la construction des nouvelles installations pilotes. Tout arrêt nécessaire pour l'exécution des raccordements doit être indiqué explicitement dans la soumission de conception-construction.

L'entrepreneur devra aviser le propriétaire de tout écart par rapport à ce calendrier d'arrêt au moins vingt et un (21) jours avant l'arrêt requis. La durée de toute interruption ne doit pas dépasser douze (12) heures. Les exigences minimales en matière d'avis et les durées de fermeture maximales peuvent varier dépendant du temp de l'année de la fermeture. Tous les arrêts se feront après les heures et le fin de semaine.

## 5.3 Réglementation des émissions

Les seuils d'émissions atmosphériques et de bruit sont définis dans le règlement d'Ontario 1/17 et les publications réglementaires REAS et MECC associés.

Les émissions de la chaudière à biomasse doivent être égales ou inférieures aux limites établies dans les lois, les normes et les codes indiqués à la section 5.4

## 5.4 Lois, normes et codes

La chaudière à biomasse doit être conçue conformément à la norme ASME – Boiler and Pressure Vessel Code, Section I, et EN 303-5 (2012) pour le chauffage automatique et porter un numéro d'enregistrement de la CSA.

Comme l'exige le ministère de l'Environnement et du Changement climatique (MECC), la chaudière à biomasse doit être conforme à le règlement d'Ontario 1/17 et le REAS. Le système retenu doit satisfaire aux exigences énoncées dans le REAS pour obtenir l'autorisation environnementale. Outre les exigences physiques de conception, les conditions comprennent des mesures continues et la mise à l'essai de l'installation.

Les travaux doivent être conformes aux lois, aux normes et aux codes applicables des autorités et des organisations techniques énumérées ci-après par leur titre complet et abrégé, et des autres autorités et organisations qui peuvent être énumérées ou mentionnées ailleurs dans les présents documents d'appel d'offres et documents contractuels.

La procédure de mise en œuvre des exigences susmentionnées est la suivante :

(a) L'entrepreneur doit baser sa soumission sur les lois, les normes et les codes, y compris ceux qui sont mentionnés dans les présents documents d'appel d'offres et documents contractuels, en vigueur au moment de la présentation de la soumission.

b) L'entrepreneur et le propriétaire devront, tout au long de la durée du contrat, porter à l'attention de l'un l'autre toute révision à ces lois, normes et codes subséquente à la présentation de la soumission de l'entrepreneur qui pourrait mériter une adoption.

c) Nonobstant la fourniture de toute norme ou tout code applicables aux travaux, l'entrepreneur et ses sous-traitants seront responsables de toutes les inspections et tous les essais nécessaires pour satisfaire aux exigences du contrat.

## 5.5 Dessins et données

Les dessins et les données préliminaires suivants ont été inclus dans les pièces jointes afin de mieux définir le projet et les systèmes :

Dessins de conception préliminaire de la DDP.

Cette information sera utilisée seulement pour aider à la préparation de la soumission de l'entrepreneur et non comme documentation de conception. Cette information sera vérifiée par le soumissionnaire. Le propriétaire rejette toutes responsabilités pour les erreurs ou les omissions qui pourraient y être contenues.

## 5.6 Essais/garantie de performance

L'entrepreneur devra procéder à deux (2) essais :

- (a) test fonctionnel;
- (b) test de performance.

La soumission doit indiquer la durée maximale qui doit être autorisée entre l'adjudication d'un contrat et chacun des deux (2) essais. Le test d'installation compatible REAS doit être inclus dans ces procédures d'essai.

### 5.6.1 Test Fonctionnel

Le test fonctionnel doit démontrer la capacité du système à fonctionner en permanence pendant une période de quatorze (14) jours consécutifs et pendant cette période (et tout en respectant toutes les conditions environnementales), distribuer de l'eau chaude à des chutes de pression et de température acceptables.

### 5.6.2 Essai d'acceptation définitive

Le test de performance doit démontrer la capacité du système à effectuer, à la note maximale continue, pour une période de 48 heures consécutives

Le test de performance de 48 heures peut être exécuté en même temps que le test fonctionnel de 14 jours s'il existe une charge suffisante au moment du test fonctionnel,

Pour le test fonctionnel et de performance :

L'état de fonctionnement des sous-systèmes doit être surveillé et enregistré par le Représentation du propriétaire. Les fiches de données d'origine sont la propriété du propriétaire, des copies doivent être fournies à l'entrepreneur pour ses dossiers.

Les procédures et les configurations d'exploitation normales de l'usine doivent être utilisées pendant le test. Cette exigence signifie que pendant le test, les sous-systèmes redondants ne doivent pas fonctionner simultanément et que seul le personnel d'exploitation et d'entretien normal doit fonctionner et entretenir l'installation. Seul le contingent normal de pièces de rechange sera disponible.

L'entrepreneur doit préparer et soumettre au propriétaire au moins soixante (60) jours avant la date prévue de chaque essai, une description détaillée des procédures d'essai, y compris le format du rapport de test proposé pour examen et approbation.

Le contractant doit préparer et soumettre au propriétaire un rapport d'essai détaillé, y compris les fiches de données d'essai et les résultats calculés.

Tous les coûts non liés aux carburants et autres que les coûts engagés dans l'exécution du test de performance, y compris, mais sans s'y limiter, la maintenance de l'équipement, les consommables, les équipements d'essai spéciaux, etc., sont de la seule responsabilité de l'entrepreneur.

Immédiatement après l'achèvement (avec ou sans succès) du test de performance (ou tout retour de ce test), l'entrepreneur doit informer le propriétaire par écrit des défauts et / ou des lacunes dans l'installation qui ont été découverts ou ont eu lieu pendant le test de performance.

Le propriétaire doit aviser sans délai l'Entrepreneur par écrit des défauts et / ou des lacunes dans l'installation que le personnel du CNRC / SPAC a noté ou déterminé à partir des rapports de test. Si le contractant est informé de tels défauts et / ou manquements, le contractant doit immédiatement commencer et compléter rapidement les mesures correctives pour éliminer ces défauts et / ou défauts (y compris le remplacement de toute pièce défectueuse au seul coût et frais de l'entrepreneur).

Le contractant doit alors notifier par écrit par écrit au CNRC / SPAC que des mesures correctives ont été complétées et préciser dans cette notification la date à laquelle l'installation doit être prête pour que l'essai de performance (ou une partie de celle-ci) soit relancé par le contractant où les défauts ou les déficiences sont de nature à justifier la réévaluation.

Après approbation par le CNRC / SPAC, l'entrepreneur doit réévaluer rapidement le Test de performance, avec le personnel du CNRC / SPAC en présence, et conseiller NRC / SPAC par écrit de tout vice supplémentaire et / ou des lacunes supplémentaires qui doivent être corrigés par l'Entrepreneur comme condition à l'achèvement de l'installation.

En plus de ce qui précède, le CNRC / SPAC doit informer rapidement l'Entrepreneur des défauts ou des lacunes persistants qui ont été notés dans le procès-verbal.

### 5.6.3 Essai de performance et garantie de performance

L'achèvement substantiel du projet de la Facilité sera réputé d'avoir eu lieu lorsque tous les événements suivants se sont produits:

- a) L'installation de la nouvelle usine de chaudières de la Facilité a réussi à le test d'acceptation finale et le test d'installation et un test d'installation compatible REAS.
- b) L'Entrepreneur a notifié au Propriétaire par écrit que l'Entrepreneur ne connaît pas de défauts et / ou de lacunes liés à l'installation de la nouvelle Chaudière dans la Facilité qui affecte les performances de la nouvelle installation de Chaudière.
- c) L'Entrepreneur a satisfait à toutes les exigences du Propriétaire pour corriger les défauts et / ou les lacunes liés à l'installation de la nouvelle usine de chaudière dans la Facilité qui ont pu être identifiés lors des essais de performance.
- d) Le propriétaire a reçu tous les dessins construits de la nouvelle installation d'installation de la chaudière, les données d'essai et les autres informations techniques requises par le présent Contrat pour que le propriétaire exploite et maintienne la nouvelle installation d'installation de la chaudière.
- e) Le propriétaire a reçu tous les manuels et les manuels d'instructions nécessaires pour l'installation nouvelle usine de chaudière, l'installation de manière sûre et efficace.
- f) Tous les outils spéciaux et les pièces détachées achetés par l'Entrepreneur conformément aux présentes ont été livrés au Propriétaire.
- g) Tout le personnel, les fournitures, l'équipement, les déchets, les ordures et les installations temporaires de l'entrepreneur et des sous-traitants ont été retirés du chantier.
- h) Le propriétaire a reçu de l'entrepreneur (i) toute renonciation aux privilèges et réclamations relatifs aux travaux qui n'avaient pas été livrés par l'entrepreneur et (ii) un certificat final de renonciation à tous les privilèges et réclamations de l'entrepreneur, des sous-traitants et des fournisseurs au travail ont été obtenus par l'entrepreneur et livrés au CNRC / SPAC.
- i) L'entrepreneur a effectué toutes les autres dispositions, le cas échéant, et a livré tous les éléments requis par le contrat d'une manière raisonnablement satisfaisante pour le propriétaire.
- j) Le propriétaire a reçu de l'entrepreneur une copie signée d'un certificat d'achèvement, un tel certificat d'achèvement pour être sous forme et substance satisfaisante pour le propriétaire.

#### 5.6.7 Responsabilités après la mise en service

À la suite de l'achèvement substantiel de l'installation, l'entrepreneur sera responsable des points suivants

- (a) audit des émissions atmosphériques postérieures à la mise en service visant à vérifier les émissions d'air au besoin;

(b) formation complémentaire des opérateurs en fonction des besoins.

## 5.7 Gestion du projet

Au cours des travaux, l'entrepreneur devra soumettre au CNRC/SPAC pour examen et approbation des copies électroniques des dessins/spécifications/calendriers ou autres données, y compris les dessins d'après exécution produits par l'entrepreneur, les fournisseurs ou les sous-traitants. La liste ci-dessous représente les exigences de base du propriétaire et ce dernier se réserve le droit d'augmenter ou de réduire les catégories énumérées.

1. Plans du site
2. Dessins de l'acier de charpente
3. Dessins des bâtiments/intérieurs
4. Schémas P et I
5. Liste des robinets
6. Liste des éléments de spécialité
7. Dessins de la tuyauterie
8. Dessins de disposition générale
9. Liste des équipements, majeurs et mineurs
10. Dessins du réservoir
11. Schémas unifilaires
12. Fiches techniques des moteurs
13. Agencement du réseau électrique et détails
14. Liste de l'équipement électrique
15. Dessins et listes de commandes et d'instruments
16. Détails de l'isolation
17. Détails de la peinture
18. Spécifications de l'équipement, pour l'équipement majeur acheté par l'entrepreneur
19. Dessins des fournisseurs
20. Catalogues d'équipement
21. Instructions d'érection
22. Manuel des opérations
23. Manuels d'instructions
24. Manuels et listes des pièces de rechange
25. Manuels de maintenance
26. Cahier d'enregistrement de l'installation
27. Rapports d'avancement mensuels
28. Calendrier des travaux techniques et de la construction
29. Normes
30. Méthodes de soudage
31. Calculs (à la demande du propriétaire)

Le matériel remis au propriétaire par l'entrepreneur « POUR EXAMEN » doit être retourné à l'entrepreneur au plus tard cinq (5) jours ouvrables après sa réception. Le propriétaire peut demander du temps additionnel pour cet examen et l'entrepreneur doit le lui accorder du moment que son calendrier de mise en place ne sera pas retardé. Les calculs et les listes (conduites, robinets, etc.) préparés par l'entrepreneur seront revus par le propriétaire, mais ne seront pas approuvés. (**Note** : Les approbations requises par le CNRC/SPAC ou d'autres parties sont assujetties aux calendriers d'approbation, qui peuvent être différents du calendrier



ci-dessus. Avant de commencer l'érection de tout bâtiment ou acier d'armature du béton, l'entrepreneur doit soumettre quatre (4) copies des dessins détaillés d'assemblage de l'acier pour consignation seulement. Ces dessins doivent être examinés par le propriétaire, mais pas approuvés, et seront conservés en dossier dans les bureaux du propriétaire.

Tous les dessins soumis au CNRC/SPAC par l'entrepreneur seront identifiés au moyen des renseignements suivants :

- (a) le nom du propriétaire
- (b) la désignation de l'installation
- (c) le numéro du contrat
- (d) le numéro de la spécification, le cas échéant
- (e) le nom de l'entrepreneur
- (f) le numéro de dessin de l'entrepreneur

Tous les changements aux dessins doivent être clairement marqués par l'entrepreneur, être identifiés au moyen d'une description complète dans le bloc révision et porter un numéro de révision.

Une (1) copie de tous les matériels remis au propriétaire par l'entrepreneur « POUR EXAMEN » doit être retournée à l'entrepreneur avec l'inscription « EXAMINÉ », « EXAMINÉ TEL QUE NOTÉ » ou « RÉVISER COMME INDIQUÉ ».

À l'achèvement des travaux et comme condition de l'acceptation opérationnelle, l'entrepreneur doit fournir au propriétaire tous les dessins, les spécifications, les manuels d'exploitation, les manuels d'instructions, les manuels de maintenance, les manuels de pièces de rechange, les manuels de calcul, et les listes. Ces données doivent être classées, assemblées et catégorisées avant d'être soumises au propriétaire, et doivent être dans une condition en permettant une utilisation facile par le personnel de l'ingénierie, des opérations et de la maintenance du propriétaire.

## 5.8 Calendrier du projet

L'entrepreneur doit terminer tous les travaux, y compris un essai de performance réussi, au plus tard le 31 mars 2018.

## 6.0 ASPECTS COMMERCIAUX

### 6.1 Assurances

Le CNRC/SPAC peut fournir un programme d'assurance contrôlé par le propriétaire qui inclut une couverture pour les risques du constructeur et la responsabilité globale de chantier. Advenant que le CNRC/SPAC décide de ne pas contracter la couverture d'assurance mentionnée, l'entrepreneur sélectionné pourra fournir une assurance pendant la durée du

contrat pour protéger le propriétaire de toutes les réclamations découlant de poursuites relatives aux travaux exécutés en vertu du présent contrat. L'entrepreneur devra fournir :

- (a) une assurance globale de chantier
  - limites de responsabilité en cas de dommages corporels et de dommages matériels d'au moins 10 000 000 \$/10 000 000 \$;
- (b) une assurance contre les accidents du travail
  - 1 000 000 \$ par accident.
- (c) une assurance automobile
  - Couverture en cas de dommages corporels causés par une automobile possédée, louée et non possédée au montant de 2 000 000 \$/2 000 000 \$
  - dommages matériels au montant de 500 000 \$.
- (d) une assurance responsabilité civile générale
  - Limites de responsabilité en cas de dommages corporels et de dommages matériels d'au moins 5 000 000 \$/5 000 000 \$
- (e) une assurance tous risques des constructeurs
  - Le montant de la police d'assurance doit être au moins égal au montant du contrat adjugé pour couvrir les risques pour la propriété et l'équipement, et d'au moins 5 000 000 \$ pour couvrir la responsabilité civile
- (f) une assurance responsabilité professionnelle contre les erreurs et les omissions
  - La moins élevée des valeurs suivantes, soit 1 000 000 \$ ou 2,5 fois la valeur des contrats des sous-traitants, par occurrence

• **Assurance contre les accidents de travail**

Avant le début des travaux et avant de recevoir un paiement à l'achèvement des travaux, l'entrepreneur doit fournir une preuve de sa conformité aux exigences de la Province en ce qui a trait à l'assurance contre les accidents de travail, y compris les paiements dus ensuite.

En tout temps pendant la durée du contrat, l'entrepreneur doit fournir une telle preuve de conformité à la demande du propriétaire.

• **Assurance globale de chantier, assurance tous risques des constructeurs, assurance automobile et assurance responsabilité professionnelle**

Dans le cas où le propriétaire n'obtient pas l'assurance globale de chantier et l'assurance tous risques des constructeurs, l'entrepreneur doit présenter au propriétaire, dans les sept (7) jours précédant le début du projet, une preuve que les couvertures d'assurance requises en vertu des clauses 3.3c (a), (b), (d) et (e) sont en vigueur et satisfont aux exigences énoncées à la clause 3.3 couvrant les travaux, la propriété, l'équipement de l'entrepreneur et la responsabilité civile. L'entrepreneur doit payer pour toutes les assurances.

• **Autres assurances**

L'entrepreneur doit présenter au propriétaire, dans les sept (7) jours de l'adjudication du contrat, une copie d'une police d'assurance « tous risques » couvrant les travaux préparatoires, les risques pour les biens, l'équipement de l'entrepreneur et la responsabilité civile. Cette police d'assurance doit être payée par l'entrepreneur.

Lorsque l'entrepreneur doit obtenir toutes les assurances requises aux clauses 3.3 a),b),d) et e), il doit se conformer aux exigences suivantes :

- (a) la police doit demeurer en vigueur jusqu'à l'approbation définitive des travaux;
- (b) si l'entrepreneur faillit à payer la prime, le propriétaire peut la payer et en déduire le coût des montants dus à l'entrepreneur;
- (c) l'assuré désigné doit être tant le propriétaire que l'entrepreneur;
- (d) il ne doit pas y avoir de franchise pour les réclamations faites par le propriétaire;
- (e) les dommages à la suite de séismes et d'inondations doivent être couverts;
- (f) en cas d'annulation, un avis écrit doit être envoyé au propriétaire par courrier recommandé au moins trente (30) jours avant la date d'effet de l'annulation;
- (g) le montant de la police d'assurance tous risques des constructeurs doit être au moins égal au montant du contrat adjudgé pour couvrir les risques pour la propriété et l'équipement et d'au moins 1 000 000 \$ pour couvrir la responsabilité civile.

## 6.2 Permis, taxes

L'entrepreneur doit obtenir à ses frais tous les permis, licences, certifications, approbations, etc., qui comprend l'obtention, l'achèvement et la soumission de tous les documents requis pour l'exécution des travaux avant le début de ceux-ci..

L'entrepreneur doit assumer le coût de toutes les taxes fédérales, provinciales et municipales.

## 6.3 État du site

### • **Entraves à la circulation**

Les entraves à la circulation doivent être gérées de la façon spécifiée dans le contrat ou la lettre d'intention. Toute autre mesure en cas d'entrave à la circulation nécessitera l'approbation du propriétaire.

### • **Production**

L'installation de chauffage central et les équipements existants doivent rester en service 24/7 pendant la durée du contrat de construction

### • **Manutention et élimination des matériels**

Les chemins d'accès et de sortie pour la manutention et l'élimination des matériels seront indiqués aux soumissionnaires pendant la visite du site. Les soumissionnaires doivent fournir leur propre équipement, qui doit être adapté au parcours indiqué par le propriétaire.

### • **Panneaux indicateurs**

Des panneaux indicateurs appropriés doivent être érigés par l'entrepreneur pour la protection et la sécurité des travailleurs et des autres personnes.

### • **Nettoyage**

L'entrepreneur doit en tout temps garder le site propre, ordonné, et exempt d'une accumulation de débris et de déchets.

### • **Fournir une zone de répartition pour les travailleurs**

L'entrepreneur est responsable de fournir une zone de repos et des toilettes pour les travailleurs.

L'entrepreneur doit laisser le site dans un état de propreté approuvé par l'ingénieur.

- **Sécurité**

L'entrepreneur doit se conformer à tous les règlements de sécurité applicables, y compris les exigences de sécurité des usines.

## 6.4 Exécution des travaux

- **Début**

Après la signature du contrat ou sur réception d'une lettre d'intention, l'entrepreneur doit suivre le calendrier de travail spécifié. Tous les travaux, à l'exception des fermetures, doivent être déroulés du lundi au vendredi, entre 7 heures et 16 heures. Tous les fermetures se produiront après les heures de travail

- **Inspection des travaux**

L'entrepreneur doit coopérer avec l'ingénieur afin de permettre une inspection complète aux fins d'approbation des travaux.

Aucun travail ni aucune partie de travail ne doivent être remblayés ou dissimulés avant qu'une inspection appropriée ait eu lieu.

- **Travail défaillant**

Les travaux défaillants doivent être démolis et refaits aux frais de l'entrepreneur. Les travaux défaillants incluent les travaux mal exécutés et les travaux non conformes aux plans et devis.

- **Responsabilité de l'entrepreneur**

La supervision des travaux, ainsi que l'approbation et l'acceptation des travaux, ne libèrent pas l'entrepreneur de ses responsabilités et obligations de fournir des matériels et une exécution des travaux conformes aux plans et devis.

- **Protection des travaux**

Dans l'exécution des travaux et jusqu'à leur acceptation définitive, l'entrepreneur a la stricte obligation de protéger tous les travaux existants et terminés, et doit prendre toutes les mesures pour assurer la sécurité des personnes.

L'entrepreneur est l'unique responsable de toutes les méthodes de démolition et de construction qu'il utilise.

- **Dessins « d'après exécution »**

L'entrepreneur doit conserver un registre de toutes les modifications aux plans et devis originaux apportées sur le site.

- **Modification et ajout aux travaux**

Des modifications ou des ajouts aux travaux peuvent être effectués. Dans ce cas, l'entrepreneur est tenu de se conformer aux instructions écrites connexes et doit aviser le propriétaire par écrit de toute modification de prix.

Les changements de prix doivent être en accord avec les changements dans la portée des travaux et la tarification originale.

Aucun changement de prix ne sera accepté par le propriétaire pour une modification ou un ajout aux travaux à moins qu'un tel changement corresponde à une demande écrite du propriétaire.

## 6.5 Acceptation des travaux

### • **Acceptation temporaire**

Sur notification par l'entrepreneur, l'ingénieur peut inspecter les travaux afin de s'assurer que les travaux effectués à ce jour sont en accord avec les plans et devis.

Après avoir été avisé par l'entrepreneur, l'ingénieur procédera à l'acceptation temporaire des travaux afin de déterminer si les travaux ont été exécutés conformément aux plans et devis.

Si les travaux réalisés jusqu'à ce jour ne sont pas approuvés, l'entrepreneur doit promptement apporter les corrections prescrites et demander une seconde inspection.

### • **Garantie**

L'entrepreneur doit fournir une garantie conforme aux exigences du CNRC/SPAC.

### • **Acceptation définitive**

Avant la date d'expiration de la garantie, une nouvelle inspection doit être réalisée en compagnie de l'entrepreneur. Si tous les travaux sont jugés satisfaisants, un certificat d'acceptation définitive doit être émis par l'ingénieur.

Dans le cas contraire, l'entrepreneur doit être avisé de toutes les déficiences restantes à corriger. L'acceptation définitive doit être accordée seulement après que des mesures correctives auront été prises.

## 6.6 Paiements

Les paiements seront effectués conformément aux conditions stipulées au contrat et/ou sur le bon de commande.

## Tableau A – LISTE DE CONTRÔLE DES EXIGENCES OBLIGATOIRES

Pour être considérées par le CNRC et SPAC, les propositions doivent satisfaire aux exigences obligatoires qui suivent et doivent inclure la section/page à laquelle il est fait renvoi dans la proposition du soumissionnaire. Toute proposition qui faillit à indiquer clairement que toutes les exigences obligatoires ont été satisfaites ne sera pas considérée plus avant.

**Tableau A1 : Liste de contrôle des exigences obligatoires**

Numéro de référence de l'exigence	Référence à l'Énoncé des travaux	Exigences obligatoires	Conforme (Oui/Non)	Section/page dans la proposition du soumissionnaire
M1	1.2, 4.3.2	Chaudière d'une capacité d'environ 1,5 MW de puissance thermique		
M2	1.2 (item 5) 4.3.2	Proposition de maintenance de l'équipement avec des options tarifées à 3, 4 et 5 ans.		
M3	4.3.3	Proposition de contrat de combustible de deux ans (\$/GJ eau chaude) avec avec des options tarifées à 3, 4 et 5 ans.		
M4	3.0	Vérification de la conformité du combustible aux spécifications		
M5	3.1	Le stock de combustible soutient trois (3) jours de fonctionnement continu		
M6	1.2	Taux de variation du débit minimal de 3 :1. Charge partiel minimum de 30% est requis par le REAS.		
M7	4.3.10	Exigences relatives au comptage et aux détecteurs qui sont évalués séparément		
M8	1.2, 4.3.12	Programme de formation		
M9	5.1	Coût et conception des modifications pour des températures d'alimentation et de reprise de 95/65 °C		
M10	5.1	Courbe de performance pour des températures d'alimentation et de reprise de 145/110 °C et 95/65 °C		
M11	1.2, 5.3, 5.4	Détails soulignant comment l'entrepreneur satisfera à l'ACE et à la réglementation sur les		

Numéro de référence de l'exigence	Référence à l'Énoncé des travaux	Exigences obligatoires	Conforme (Oui/Non)	Section/page dans la proposition du soumissionnaire
		émissions		
M12	5.8	Horaire détaillé pour tous les travaux complétés, incluant un test de performance par Mars 2018		

### Tableau A2: Optional Items Checklist

Liste des articles additionnels qui improuvera la valeur du contrat. Cela peut être inclut sure une page séparée si nécessaire.

Numéro de référence de l'exigence	Référence à l'Énoncé des travaux	éléments facultatifs	Inclu (Oui/Non)	Section/page dans la proposition du soumissionnaire
O1	1.2	Efficacité énergétique (optionnel)		

## Tableau B – EXIGENCES COTÉES

Afin de se qualifier pour le processus de cotation, les propositions doivent satisfaire aux exigences cotées suivantes et doivent inclure la section/page à laquelle il est fait renvoi dans la proposition du soumissionnaire.

Numéro de référence de l'exigence	Critère	Évaluation	Points	Section/page dans la proposition du soumissionnaire	Évaluation totale
<b>Expérience</b>					<b>20</b>
R1	Nombre de projets similaires exécutés entre 2007 et 2017	Un (1) pt par projet fructueux en Ontario, un demi-point (0,5) pour les autres provinces, un quart de point (0,25) pour l'international, à concurrence d'un max, de cinq (5) pts	Max (5) pts		
R2	Nombre de projets d'envergure similaire exécutés dans un cadre similaire (centrale) entre 2007 et 2017	Un (1) pt par projet fructueux d'envergure similaire et un (1) pt par installation, à concurrence d'un max. de cinq (5) pts	Max (5) pts		
R3	Historique de collaboration et de partenariat avec des sous-traitants entre	Deux (2) pts par projet fructueux avec un partenaire/concepteur principal et un	Max (5) pts		



Numéro de référence de l'exigence	Critère	Évaluation	Points	Section/page dans la proposition du soumissionnaire	Évaluation totale
	2007 et 2017	(1) pt par entrepreneur électrique/mécanique, max. de cinq (5) pts			
R4	Expérience dans la conclusion et la gestion de contrats de biocombustible (GJ/année)	Un demi-point (0,5) par contrat de combustible de rechange (pas de puces de bois gradées), un (1) pt par contrat d'approvisionnement en copeaux de bois, max. de cinq (5) pts	Max (5) pts		
<b>Approche technique</b>					<b>35</b>
R5	Fiabilité	Fiabilité éprouvée (un (1) pt par année d'exploitation commerciale éprouvée), max. de cinq (5) pts	Max (5) pts		
R6	Facilité de maintenance	Ensemble complet qui est évalué par le temps d'arrêt le plus bas pour la maintenance planifiée (5 points), le prochain temps	Max (5) pts		

Numéro de référence de l'exigence	Critère	Évaluation	Points	Section/page dans la proposition du soumissionnaire	Évaluation totale
		d'arrêt le plus bas (4 points), etc.			
R7	Performance	Points pour une performance de sortie thermique supérieure à 80%. 1 point par 1% d'efficacité de chaudière supérieur à 80% à MCR. Maximum de dix (10) points	Max (10) pts		
R8	Conception et calendrier (10)	Une conception qui s'intègre bien avec l'installation en termes d'espace et d'accès, permet à l'opérateur de s'appuyer pour une installation à plus grande échelle (maximum 15 points)	Max (15) pts		
<b>Coût</b>					<b>20</b>
R9		Entretien (maximum de cinq (5) points) et Contrats de carburant (maximum de dix	Max (15) pts		

Numéro de référence de l'exigence	Critère	Évaluation	Points	Section/page dans la proposition du soumissionnaire	Évaluation totale
		(10) points). Coûts évalués sur cinq (5) ans de prix contractuels.  Maximum de points pour le coût le plus bas, 50% pour le prochain coût le plus bas, 25% pour le troisième coût le plus bas, 12,5% pour le quatrième plus bas			
<b>R10</b>		Coût total installé (max 15 points) avec 15 points pour l'offre la plus basse, 7,5 points pour le deuxième plus bas, 3,75 pts pour le troisième, 2 pts pour le 4ème.	Max (15) pts		
<b>Considérations additionnelles</b> (pondérées également) :					<b>20</b>
R11	Innovation de la technologie	Pour ressembler étroitement aux installations à plus grande échelle en ce qui concerne la manutention du carburant, le stockage du	Max (7.5) pts		

Numéro de référence de l'exigence	Critère	Évaluation	Points	Section/page dans la proposition du soumissionnaire	Évaluation totale
		carburant, la maintenance, l'exploitation, les performances supérieures. Jusqu'à un (1) point pour chaque élément jusqu'à un maximum de 7,5 points			
R12	Contrat de combustible – coût et utilisation de ressources locales	Des services supplémentaires qui minimiseront les interventions de l'opérateur jusqu'à un (1) point par service à un maximum de deux (2) points. Pour la distance de livraison: 5,5 points pour la livraison dans les 250 km, 2,5 points pour la livraison dans les 500 km et 1 point pour la livraison dans un radius de 1000 km.	Max (7.5) pts		
<b>Total</b>					<b>100</b>

## Spécifications fonctionelles

### TABLE OF CONTENTS

	<b>Pages</b>
<b>Division 00 - PROCUREMENT AND CONTRACTING REQUIREMENTS</b>	
Section 00 01 10 - Table of Contents .....	2
<b>Division 01 - GENERAL REQUIREMENTS</b>	
Section 01 14 00 - Work Restrictions .....	2
Section 01 32 16 - Construction Progress Schedule - Critical Path Method (CPM) .....	2
Section 01 35 29 - Health And Safety Requirements .....	3
Section 01 45 00 - Quality Control .....	2
Section 01 52 00 - Construction Facilities .....	3
Section 01 56 00 - Temporary Barriers And Enclosures .....	2
Section 01 61 00 - Common Product Requirements .....	3
Section 01 74 11 – Cleaning .....	2
Section 01 74 21 - Construction/Demolition Waste Management And Disposal .....	5
Section 01 77 00 - Closeout Procedures .....	2
Section 01 78 00 - Closeout Submittals .....	8
Section 01 79 00 - Demonstration and Training .....	2
Section 01 91 13 - General Commissioning (CX) Requirements .....	9
<b>Division 03 - CONCRETE</b>	
Section 03 10 00 - Concrete Forming and Accessories .....	3
Section 03 20 00 - Concrete Reinforcing .....	3
Section 03 30 00 - Cast-in-Place Concrete .....	5
<b>Division 05 – METALS</b>	
Section 05 12 23 - Structural Steel for Buildings .....	4
Section 05 50 00 - Metal Fabrications .....	2
Section 05 51 29 - Metal Stairs and Ladders .....	3
<b>Division 07 - THERMAL AND MOISTURE PROTECTION</b>	
Section 07 62 00 - Sheet Metal Flashing and Trim .....	2
Section 07 81 00 - Applied Fireproofing .....	2
Section 07 84 00 - Fire Stopping .....	2
<b>Division 21 - FIRE SUPPRESSION</b>	
Section 21 05 01 - Common Work Results for Mechanical .....	3
Section 21 07 16 - Thermal Insulation For Equipment .....	6
Section 21 07 19 - Thermal Insulation for Piping .....	7

**Division 22 - PLUMBING**

Section 22 05 00 - Common Work Results for Plumbing .....	3
Section 22 11 16 - Domestic Water Piping .....	5
Section 22 13 17 - Drainage Waste and Vent Piping - Cast Iron and Copper .....	2
Section 22 15 00 - Boilers, Instrumentation and General Service Compressed Air Systems .....	5
Section 22 42 01 - Plumbing Specialties and Accessories .....	5

**Division 23 - HEATING, VENTILATING AND AIR CONDITIONING (HVAC)**

Section 23 05 00 - Common Work Results for HVAC .....	3
Section 23 05 05 - Installation of Pipework .....	6
Section 23 05 13 - Common Motor Requirements for HVAC Equipment .....	3
Section 23 05 16 - Expansion Fittings and Loops for HVAC Piping .....	4
Section 23 05 17 - Pipe Welding .....	4
Section 23 05 19.01 - Thermometers and Pressure Gauges - Piping Systems .....	2
Section 23 05 23.01 - Valves - Bronze .....	4
Section 23 05 23.03 - Valves - Cast Steel .....	5
Section 23 05 23.05 - Butterfly Valves .....	3
Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment .....	5
Section 23 05 48 - Vibration and Seismic Controls for HVAC Piping and Equipment .....	4
Section 23 05 53.01 - Mechanical Identification .....	6
Section 23 05 93 - Testing, Adjusting and Balancing for HVAC .....	4
Section 23 08 01 - Performance Verification Mechanical Piping Systems .....	2
Section 23 08 02 - Cleaning and Start-up of Mechanical Piping Systems .....	2
Section 23 09 33 - Electric and Electronic Control System for HVAC .....	1
Section 23 11 23 - Facility Natural Gas Piping .....	4
Section 23 21 13.02 - Hydronic Systems: Steel .....	5
Section 23 21 14 - Hydronic Specialties .....	3
Section 23 51 00 – Breeching, Chimneys and Stacks .....	2
Section 23 52 00 – Heating Boilers .....	4

**END OF TABLE**

**Part 1            General**

**1.1                ACCESS AND EGRESS**

- .1 Design, construct and maintain temporary "access to" and "egress from" work areas, including stairs, runways, ramps or ladders and scaffolding, independent of finished surfaces and in accordance with relevant municipal, provincial and other regulations.

**1.2                USE OF SITE AND FACILITIES**

- .1 Execute work with least possible interference or disturbance to normal use of premises. Make arrangements with Departmental Representative to facilitate work as stated.
- .2 Maintain existing services to building and provide for personnel and vehicle access.
- .3 Where security is reduced by work provide temporary means to maintain security.
- .4 Closures: protect work temporarily until permanent enclosures are completed.

**1.3                ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING**

- .1 Execute work with least possible interference or disturbance to building operations occupants, public and normal use of premises. Arrange with Departmental Representative to facilitate execution of work.

**1.4                HOURS OF WORK**

- .1 All work to be performed onsite during regular hours unless otherwise authorized by Departmental Representative in writing. Regular hours are 0700 hrs -1600 hrs Monday to Friday.

**1.5                EXISTING SERVICES**

- .1 Notify Departmental Representative and utility companies of intended interruption of services and obtain required permission.
- .2 Where Work involves breaking into or connecting to existing services, give Departmental Representative minimum of two weeks notice for necessary interruption of mechanical or electrical service throughout course of work. More extensive shutdowns will require more notification. Minimize duration of interruptions. Carry out work at times as directed by governing authorities with minimum disturbance to pedestrian vehicular traffic and tenant operations.
- .3 Provide alternative routes for personnel, pedestrian and vehicular traffic.
- .4 Establish location and extent of service lines in area of work before starting Work. Notify Departmental Representative of findings.
- .5 Submit schedule as part of Construction Progress Schedule Section 01 32 16 to obtain approval from Departmental Representative for any shut-down or closure of active

service or facility including heating, power and communications services. Adhere to approved Construction Progress Schedule and provide notice to affected parties.

- .6 Provide temporary services to maintain critical building and tenant systems.
- .7 Provide adequate bridging over trenches which cross sidewalks or roads to permit normal traffic.
- .8 Where unknown services are encountered, immediately advise Departmental Representative and confirm findings in writing.
- .9 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.
- .10 Record locations of maintained, re-routed and abandoned service lines.
- .11 Construct barriers in accordance with Section 01 56 00 – Temporary Barriers and Enclosures.

**1.6 SPECIAL REQUIREMENTS**

- .1 Ensure that the Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.
- .2 Keep within limits of work and avenues of ingress and egress.

**1.7 BUILDING SMOKING ENVIRONMENT**

- .1 Comply with smoking restrictions. Smoking is not allowed

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**



## **Part 1 General**

### **1.1 SYSTEM DESCRIPTION**

- .1 Construction Progress Schedule (Project Time Management): describes processes required to ensure timely completion of Project. These processes ensure that various elements of Project are properly co-ordinated. It consists of planning, time estimating, scheduling, progress monitoring and control.
- .2 Planning: this is most basic function of management, that of determining presentation of action and is essential.
  - .1 It involves focusing on objective consideration of future, and integrating forward thinking with analysis; therefore, in planning, implicit assumptions are made about future so that action can be taken today.
  - .2 Planning and scheduling facilitates accomplishment of objectives and should be considered continuous interactive process involving planning, review, scheduling, analysis, monitoring and reporting.
- .3 Ensure that planning process is iterative and results in generally top-down processing with more detail being developed as planning progresses, and decisions concerning options and alternatives are made. This implies progressively more reliability of scheduling data. Detail Project schedule is used for analysis and progress monitoring.
- .4 Ensure project schedule efficiencies through monitoring.
  - .1 When activities begin on time and are performed according to estimated durations without interruptions, original Critical Path will remain accurate. Changes and delays will however, create an essential need for continual monitoring of Project activities.
  - .2 Monitor progress of Project in detail to ensure integrity of Critical Path, by comparing actual completions of individual activities with their scheduled completions, and review progress of activities that has started but are not yet completed.
  - .3 Monitoring should be done sufficiently often so that causes of delays are immediately identified and removed if possible.
- .5 Project monitoring and reporting: as Project progresses, keep team aware of changes to schedule, and possible consequences. In addition to Bar Charts and CPM networks, use narrative reports to provide advice on seriousness of difficulties and measures to overcome them.
  - .1 Narrative reporting begins with statement on general status of Project followed by summarization of delays, potential problems, corrective measures and Project status criticality.

### **1.2 CPM REQUIREMENTS**

- .1 Ensure Master Plan and Detail Schedule are practical and remain within specified Contract duration.

- .2 Allow for and show Master Plan and Detail Schedule adverse weather conditions normally anticipated. Specified Contract duration has been predicated assuming normal amount of adverse weather conditions.
- .3 Provide necessary crews and manpower to meet schedule requirements for performing Work within specified Contract duration. Simultaneous use of multiple crews on multiple fronts on multiple critical paths may be required.

### **1.3 QUALITY ASSURANCE**

- .1 Use experienced personnel, fully qualified in planning and scheduling to provide services from start of the design–build process, through construction to Final Certificate, Commissioning and handover of the project to the Departmental Representative.

### **1.4 PROJECT MEETING**

- .1 Meet with Departmental Representative within 7 working days of Award of Contract date, to establish Work requirements and approach to project .

### **1.5 WORK BREAKDOWN STRUCTURE (WBS)**

- .1 Prepare project Work Breakdown Structure (WBS) within 14 calender days of Award of Contract date. Develop WBS through at least five levels: Project, stage, element, sub-element and work package.

### **1.6 PROGRESS MONITORING AND REPORTING**

- .1 On ongoing basis, Detail Schedule on job site must show "Progress to Date". Arrange participation on and off site of subcontractors and suppliers, as, and when necessary, for purpose of network planning, scheduling, updating and progress monitoring.
- .2 Update and reissue project Work Breakdown Structure and relevant coding structures as project develops and changes.
- .3 Monitor and report Work Progress as per Section 00 40 00 Project Management Guidelines.

## **Part 2 Products**

### **2.1 NOT USED**

- .1 Not used.

## **Part 3 Execution**

### **3.1 NOT USED**

- .1 Not used.

**END OF SECTION**

**Part 1            General**

**1.1                SECTION INCLUDES**

- .1        Health and safety considerations required to ensure that PSPC shows due diligence towards health and safety on construction sites, and meets the requirements laid out in PSPC/RPB Departmental Policy DP 073 - Occupational Health and Safety - Construction.

**1.2                REFERENCES**

- .1        Province of Ontario
  - .1        Occupational Health and Safety Act and Regulations for Construction Projects. R.S.O (1990 amended 213/91), April 2009 Edition.

**1.3                SUBMITTALS**

- .1        Submit site-specific Health and Safety Plan to Departmental Representative: Within 7 days after date of Award of Contract and prior to commencement of Work. Health and Safety Plan must include:
  - .1        Results of site specific safety hazard assessment.
  - .2        Results of safety and health risk or hazard analysis for site tasks and operations.
- .2        Submit 1 copy of Contractor's work site health and safety inspection reports to Departmental Representative weekly.
- .3        Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.
- .4        Submit copies of incident and accident reports.
- .5        On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.

**1.4                FILING OF NOTICE**

- .1        File Notice of Project with Provincial authorities prior to beginning of Work.

**1.5                SAFETY ASSESSMENT**

- .1        Perform site specific safety hazard assessment related to project.

**1.6                MEETINGS**

- .1        Schedule and administer Health and Safety meeting with Departmental Representative prior to commencement of Work.

**1.7 GENERAL REQUIREMENTS**

- .1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.
- .2 Departmental Representative may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns.

**1.8 RESPONSIBILITY**

- .1 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.
- .2 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

**1.9 COMPLIANCE REQUIREMENTS**

- .1 Comply with Ontario Occupational Health and Safety Act and Regulations for Construction Projects.

**1.10 UNFORSEEN HAZARDS**

- .1 When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of Province having jurisdiction and advise Departmental Representative verbally and in writing.

**1.11 HEALTH AND SAFETY CO-ORDINATOR**

- .1 Employ and assign to Work, competent and authorized representative as Health and Safety Co-ordinator. Health and Safety Co-ordinator must:
  - .1 Have working knowledge of occupational safety and health regulations.
  - .2 Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work.
  - .3 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan.

**1.12 POSTING OF DOCUMENTS**

- .1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Province having jurisdiction.

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**1.13 CORRECTION OF NON-COMPLIANCE**

- .1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Departmental Representative.
- .2 Provide Departmental Representative with written report of action taken to correct non-compliance of health and safety issues identified.
- .3 Departmental Representative may stop Work if non-compliance of health and safety regulations is not corrected.

**1.14 BLASTING**

- .1 Blasting or other use of explosives is not permitted without prior review by Departmental Representative.

**1.15 POWDER ACTUATED DEVICES**

- .1 Use powder actuated devices only after receipt of review from Departmental Representative.

**1.16 WORK STOPPAGE**

- .1 Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not used.

**END OF SECTION**

**Part 1            General**

**1.1                RELATED SECTIONS**

- .1            Section 00 40 00 – Project Management Guidelines
- .2            Section 01 78 00 – Closeout Submittals

**1.2                INDEPENDENT INSPECTION AGENCIES**

- .1            Engage Independent Inspection/Testing Agencies for purpose of inspecting and/or testing portions of Work.
- .2            Provide equipment required for executing inspection and testing by appointed agencies.
- .3            If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities. Pay costs for retesting and re-inspection.

**1.3                ACCESS TO WORK**

- .1            Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.
- .2            Co-operate to provide reasonable facilities for such access.

**1.4                REJECTED WORK**

- .1            Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.
- .2            Make good other Contractor's work damaged by such removals or replacements promptly.

**1.5                REPORTS**

- .1            Submit 4 copies of inspection and test reports to Departmental Representative when requested.
- .2            Provide copies to subcontractor of work being inspected or tested, manufacturer or fabricator of material being inspected or tested.
- .3            Submit quality control reports per section 01 78 00 Closeout Submittals.

**Part 2            Products**

**2.1                NOT USED**

.1                Not Used.

**Part 3            Execution**

**3.1                NOT USED**

.1                Not Used.

**END OF SECTION**

**Part 1            General**

**1.1                INSTALLATION AND REMOVAL**

- .1    Prepare site plan indicating proposed location and dimensions of area to be fenced and used by the Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation.
- .2    Identify areas which have to be gravelled to prevent tracking of mud.
- .3    Indicate use of supplemental or other staging area.
- .4    Provide construction facilities in order to execute work expeditiously.
- .5    Remove from site all such work after use.

**1.2                SCAFFOLDING**

- .1    Scaffolding in accordance with CAN/CSA-S269.2.
- .2    Provide and maintain scaffolding, ramps, ladders swing staging, platforms and temporary stairs.

**1.3                HOISTING**

- .1    Provide, operate and maintain hoists required for moving of workers, materials and equipment. Make financial arrangements with Subcontractors for their use of hoists.
- .2    Hoists to be operated by qualified operator.

**1.4                SITE STORAGE/LOADING**

- .1    Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.
- .2    Do not load or permit to load any part of Work with weight or force that will endanger Work.

**1.5                CONSTRUCTION PARKING**

- .1    A maximum of 2 parking spaces will be permitted on site provided it does not disrupt performance of Work or normal operations of PSPC Plant.
- .2    Provide and maintain adequate access to project site and access to loading areas for normal Plant operations.

**1.6                SECURITY**

- .1    Provide if required and pay for responsible security personnel to guard site and contents of site after working hours and during holidays.



## **1.7 OFFICES**

- .1 Provide office heated to 21 degrees C, lighted 750 lx and ventilated, of sufficient size to accommodate site meetings and furnished with drawing laydown table.
- .2 Provide marked and fully stocked first-aid case in a readily available location.
- .3 Subcontractors to provide their own offices as necessary. Direct location of these offices.

## **1.8 EQUIPMENT, TOOL AND MATERIALS STORAGE**

- .1 Provide and maintain, in clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.
- .2 Locate materials not required to be stored in weatherproof sheds on site in manner to cause least interference with work activities.

## **1.9 SANITARY FACILITIES**

- .1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances, keep facilities clean.

## **1.10 CONSTRUCTION SIGNAGE**

- .1 No signs or advertisements, other than warning signs, are permitted on site.
- .2 Signs and notices for safety and instruction in both official languages Graphic symbols to CAN/CSA-Z321.
- .3 Maintain approved signs and notices in good condition for duration of project, and dispose of off site on completion of project or earlier if directed by the Departmental Representative.

## **1.11 PROTECTION AND MAINTENANCE OF TRAFFIC**

- .1 Provide access and temporary relocated roads as necessary to maintain traffic.
- .2 Maintain and protect traffic on affected roads during construction period.
- .3 Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs.
- .4 Protect travelling public from damage to person and property.
- .5 Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.
- .6 Verify adequacy of existing roads and allowable load limit on these roads. Contractor is responsible for repair of damage to roads caused by construction operations.

- .7 Construct access and haul roads necessary constructed with suitable grades and widths; sharp curves, blind corners, and dangerous cross traffic shall be avoided.
- .8 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.
- .9 Dust control: adequate to ensure safe operation at all times.
- .10 Provide snow removal during period of Work.

**1.12 CLEAN-UP**

- .1 Clean dirt or mud tracked onto paved or surfaced roadways.
- .2 Store materials resulting from demolition activities that are salvageable.
- .3 Stack stored new or salvaged material not in construction facilities.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**END OF SECTION**

**Part 1            General**

**1.1                REFERENCES**

- .1        Canadian General Standards Board (CGSB)
  - .1        CGSB 1.59-97, Alkyd Exterior Gloss Enamel.
  - .2        CAN/CGSB 1.189-00, Exterior Alkyd Primer for Wood.
- .2        Canadian Standards Association (CSA International)
  - .1        CSA-O121-M1978(R2003), Douglas Fir Plywood.
- .3        Public Works Government Services Canada (PWGSC) Standard Acquisition Clauses and Conditions (SACC)-ID: R0202D, Title: General Conditions 'C', In Effect as Of: May 14, 2004.

**1.2                INSTALLATION AND REMOVAL**

- .1        Provide temporary controls in order to execute Work expeditiously.
- .2        Remove from site all such work after use.

**1.3                GUARD RAILS AND BARRICADES**

- .1        Provide secure, rigid guard rails and barricades around deep excavations, open shafts, open stair wells, open edges of floors and roofs.
- .2        Provide as required by governing authorities.

**1.4                WEATHER ENCLOSURES**

- .1        Provide weather tight closures to unfinished door and window openings, tops of shafts and other openings in floors and roofs.
- .2        Close off floor areas where walls are not finished; seal off other openings; enclose building interior work for temporary heat.
- .3        Design enclosures to withstand wind pressure and snow loading.

**1.5                DUST TIGHT SCREENS**

- .1        Provide dust tight screens and insulated partitions to localize dust generating activities, and for protection of workers, finished areas of Work and public.
- .2        Maintain and relocate protection until such work is complete.

**1.6                ACCESS TO SITE**

- .1        Provide and maintain access roads, sidewalk crossings, bicycle paths, ramps and construction runways as may be required for access to Work, and for normal operation of the NRC Plant, West Rideau Falls Dam and the construction zone along Sussex Drive.

**1.7                PUBLIC TRAFFIC FLOW**

- .1 Provide and maintain competent signal flag operators, traffic signals, barricades and flares, lights, or lanterns as required to perform Work and protect public.

**1.8 FIRE ROUTES**

- .1 Maintain access to property including overhead clearances for use by emergency response vehicles.

**1.9 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY**

- .1 Protect surrounding private and public property from damage during performance of Work.
- .2 Be responsible for damage incurred.

**1.10 PROTECTION OF BUILDING FINISHES**

- .1 Provide protection for finished and partially finished building finishes and equipment during performance of Work.
- .2 Provide necessary screens, covers, and hoardings.
- .3 Confirm with Departmental Representative locations and installation schedule 3 days prior to installation.
- .4 Be responsible for damage incurred due to lack of or improper protection.

**1.11 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

**Part 1            General**

**1.1                REFERENCES**

- .1        Within text of each specifications section, reference may be made to reference standards. Conform to these reference standards, in whole or in part as specifically requested in specifications.

**1.2                QUALITY**

- .1        Products, materials, equipment and articles incorporated in Work shall be new, not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.
- .2        Procurement policy is to acquire, in cost effective manner, items containing highest percentage of recycled and recovered materials practicable consistent with maintaining satisfactory levels of competition. Make reasonable efforts to use recycled and recovered materials and in otherwise utilizing recycled and recovered materials in execution of work.
- .3        Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.
- .4        Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.
- .5        Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

**1.3                STORAGE, HANDLING AND PROTECTION**

- .1        Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.
- .2        Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.
- .3        Touch-up damaged factory finished surfaces to Departmental Representative's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

**1.4                TRANSPORTATION**

- .1        Pay costs of transportation of products required in performance of Work.

**1.5 MANUFACTURER'S INSTRUCTIONS**

- .1 Unless otherwise indicated in specifications, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.
- .2 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Departmental Representative to require removal and re-installation at no increase in Contract Price or Contract Time.

**1.6 QUALITY OF WORK**

- .1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Departmental Representative if required Work is such as to make it impractical to produce required results.
- .2 Do not employ anyone unskilled in their required duties.
- .3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Departmental Representative, whose decision is final.

**1.7 CO-ORDINATION**

- .1 Ensure co-operation of workers in laying out Work. Maintain efficient and continuous supervision.
- .2 Be responsible for coordination and placement of openings, sleeves and accessories.

**1.8 REMEDIAL WORK**

- .1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Co-ordinate adjacent affected Work as required.
- .2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

**1.9 FASTENINGS**

- .1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.
- .2 Prevent electrolytic action between dissimilar metals and materials.
- .3 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.
- .4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.

- .5 Keep exposed fastenings to a minimum, space evenly and install neatly.
- .6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

**1.10 FASTENINGS - EQUIPMENT**

- .1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.
- .2 Use heavy hexagon heads, semi-finished unless otherwise specified. Use No. 304 stainless steel for exterior areas.
- .3 Bolts may not project more than one diameter beyond nuts.
- .4 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.

**1.11 PROTECTION OF WORK IN PROGRESS**

- .1 Prevent overloading of parts of building. Do not cut, drill or sleeve load bearing structural member, unless specifically indicated without written approval of Departmental Representative.

**1.12 EXISTING UTILITIES**

- .1 When breaking into or connecting to existing services or utilities, execute Work at times directed by local governing authorities, with minimum of disturbance to Work, and/or building occupants and pedestrian and vehicular traffic.
- .2 Protect, relocate or maintain existing active services. When services are encountered, cap off in manner approved by authority having jurisdiction. Stake and record location of capped service.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

**Part 1            General**

**1.1                PROJECT CLEANLINESS**

- .1      Maintain Work in tidy condition, free from accumulation of waste products and debris.
- .2      Remove waste materials from site at daily regularly scheduled times. Do not burn waste materials on site.
- .3      Clear snow and ice from work site, remove from site.
- .4      Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .5      Provide on-site containers for collection of waste materials and debris.
- .6      Dispose of waste materials and debris off site.
- .7      Clean interior areas prior to start of finishing work, and maintain areas free of dust and other contaminants during finishing operations.
- .8      Store volatile waste in covered metal containers, and remove from premises at end of each working day.
- .9      Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
- .10     Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- .11     Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

**1.2                FINAL CLEANING**

- .1      When Work is Substantially Completed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
- .2      Remove waste products and debris, and leave Work clean and suitable for occupancy.
- .3      Clean and polish glass, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, and mechanical and electrical fixtures. Replace broken, scratched or disfigured glass.
- .4      Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, walls and floors.
- .5      Clean lighting reflectors, lenses, and other lighting surfaces.
- .6      Vacuum clean and dust building interiors, behind grilles, louvres and screens.



- .7 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.
- .8 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.
- .9 Remove dirt and other disfiguration from exterior surfaces.
- .10 Clean and sweep roofs, gutters, areaways, and sunken wells.
- .11 Sweep and wash clean paved areas.
- .12 Clean equipment and fixtures to sanitary condition; clean or replace filters of mechanical equipment.
- .13 Clean roofs, downspouts, and drainage systems.
- .14 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.
- .15 Remove snow and ice from access to building.

**1.3 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

**Part 1       References**

- 1.1**    .1    Ontario Ministry of the Environment O.Reg 102/94 and O.reg 103/94

**Part 2       General**

**2.1        WASTE MANAGEMENT GOALS**

- .1    Prior to start of Work conduct meeting with Departmental Representative to review and discuss PSPC's Waste Management Plan and Goals.
- .2    Follow all provisions of Real Property Services (RPS) Construction, Renovation, and Demolition (CRD) Non-hazardous Solid Waste Management Protocol. Submit monthly reports to Departmental Representative.
- .3    PSPC's Waste Management Goal: 75 percent of total Project Waste to be diverted from landfill sites. Provide Departmental Representative documentation certifying that waste management, recycling, reuse of recyclable and reusable materials have been extensively practiced.
- .4    Accomplish maximum control of solid construction waste.
- .5    Preserve environment and prevent pollution and environment damage.

**2.2        DEFINITIONS**

- .1    Class III: non-hazardous waste - construction renovation and demolition waste.
- .2    Demolition Waste Audit (DWA): relates to actual waste generated from project.
- .3    Inert Fill: inert waste - exclusively asphalt and concrete.
- .4    Materials Source Separation Program (MSSP): consists of series of ongoing activities to separate reusable and recyclable waste material into material categories from other types of waste at point of generation.
- .5    Recyclable: ability of product or material to be recovered at end of its life cycle and re-manufactured into new product for reuse.
- .6    Recycle: process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.
- .7    Recycling: process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using in altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
- .8    Reuse: repeated use of product in same form but not necessarily for same purpose. Reuse includes:

- .1 Salvaging reusable materials from re-modelling projects, before demolition stage, for resale, reuse on current project or for storage for use on future projects.
- .2 Returning reusable items including pallets or unused products to vendors.
- .9 Salvage: removal of structural and non-structural materials from deconstruction/disassembly projects for purpose of reuse or recycling.
- .10 Separate Condition: refers to waste sorted into individual types.
- .11 Source Separation: acts of keeping different types of waste materials separate beginning from first time they became waste.
- .12 Waste Audit (WA): detailed inventory of materials in building. Involves quantifying by volume/weight amounts of materials and wastes generated during construction, demolition, deconstruction, or renovation project. Indicates quantities of reuse, recycling and landfill. Refer to Schedule A.
- .13 Waste Management Co-ordinator (WMC): contractor representative responsible for supervising waste management activities as well as coordinating related, required submittal and reporting requirements.
- .14 Waste Reduction Workplan (WRW): written report which addresses opportunities for reduction, reuse, or recycling of materials. Refer to Schedule B. WRW is based on information acquired from WA (Schedule A).

### **2.3 DOCUMENTS**

- .1 Maintain at job site, one copy of following documents:
  - .1 Waste Audit.
  - .2 Waste Reduction Workplan.
  - .3 Material Source Separation Plan.
  - .4 Schedules A, B, C completed for project.

### **2.4 SUBMITTALS**

- .1 Prepare and submit following prior to project start-up.
  - .1 Submit 2 copies of completed Waste Audit (WA): Schedule A.
  - .2 Submit 2 copies of completed Waste Reduction Workplan (WRW): Schedule B.
  - .3 Submit 2 copies of completed Demolition Waste Audit (DWA): Schedule C.
  - .4 Submit 2 copies of Materials Source Separation Program (MSSP) description.
- .2 Submit monthly reports documenting quantities of waste removed from site for reuse, recycle and landfill.
- .3 Submit before final payment summary of waste materials salvaged for reuse, recycling or disposal by project using deconstruction/disassembly material audit form.

## **2.5 WASTE AUDIT (WA)**

- .1 Conduct WA prior to project start-up.
- .2 Prepare WA: Schedule A.
- .3 Record, on WA - Schedule A, extent to which materials or products used consist of recycled or reused materials or products.

## **2.6 WASTE REDUCTION WORKPLAN (WRW)**

- .1 Prepare WRW prior to project start-up.
- .2 WRW should include but not limited to:
  - .1 Destination of materials listed.
  - .2 Deconstruction/disassembly techniques and sequencing.
  - .3 Schedule for deconstruction/disassembly.
  - .4 Location.
  - .5 Security.
  - .6 Protection.
  - .7 Clear labelling of storage areas.
  - .8 Details on materials handling and removal procedures.
  - .9 Quantities for materials to be salvaged for reuse or recycled and materials sent to landfill.
- .3 Structure WRW to prioritize actions and follow 3R's hierarchy, with Reduction as first priority, followed by Reuse, then Recycle.
- .4 Describe management of waste.
- .5 Identify opportunities for reduction, reuse, and recycling of materials. Based on information acquired from WA.
- .6 Post WRW or summary where workers at site are able to review content.
- .7 Set realistic goals for waste reduction, recognize existing barriers and develop strategies to overcome these barriers.
- .8 Monitor and report on waste reduction by documenting total volume and cost of actual waste removed from project.

## **2.7 MATERIALS SOURCE SEPARATION PROGRAM (MSSP)**

- .1 Provide on-site facilities for collection, handling, and storage of anticipated quantities of reusable and recyclable materials.
- .2 Provide containers to deposit reusable and recyclable materials.

- .3 Locate containers in locations, to facilitate deposit of materials without hindering daily operations.
- .4 Locate separated materials in areas which minimize material damage.
- .5 Collect, handle, store on-site, and transport off-site, salvaged materials in separate condition.
  - .1 Transport to approved and authorized recycling facility to users of material for recycling.
  - .2 Collect, handle, store on-site, and transport off-site, salvaged materials in combined

## **2.8 DISPOSAL OF WASTES**

- .1 Do not bury rubbish or waste materials.
- .2 Do not dispose of waste volatile materials mineral spirits oil paint thinner into waterways, storm, or sanitary sewers.

## **Part 3 Products**

### **3.1 NOT USED**

- .1 Not Used.

## **Part 4 Execution**

### **4.1 SELECTIVE DEMOLITION**

- .1 Reuse of Building Elements: this project is intended to result in end of project rates for reuse of building elements as follows:
  - .1 Building Structure and Shell: 100 percent.
  - .2 Interior Non-Shell Elements: 50 percent.

### **4.2 APPLICATION**

- .1 Do Work in compliance with WRW.
- .2 Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.

### **4.3 DIVERSION OF MATERIALS**

- .1 Separate materials from general waste stream and stockpile in separate piles or containers, consistent with applicable fire regulations.
  - .1 Mark containers or stockpile areas.
- .2 On-site sale of salvaged recovered reusable recyclable materials is not permitted.

END OF SECTION

**Part 1            General**

**1.1                ADMINISTRATIVE REQUIREMENTS**

- .1    Acceptance of Work Procedures:
  - .1    Contractor's Inspection: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
    - .1    Notify Departmental Representative in writing of satisfactory completion of Contractor's inspection.
    - .2    Request Departmental Representative's inspection.
  - .2    Departmental Representative's Inspection:
    - .1    Departmental Representative and Contractor to inspect Work and identify defects and deficiencies.
    - .2    Contractor to correct Work as directed.
  - .3    Completion Tasks: submit written certificates to Departmental Representative in English and French that tasks have been performed as follows:
    - .1    Work: completed and inspected for compliance with Contract Documents.
    - .2    Defects: corrected and deficiencies completed.
    - .3    Equipment and systems: tested, adjusted and balanced and fully operational.
    - .4    Certificates required by Boiler Inspection Branch, Fire Commissioner Utility companies: submitted.
    - .5    Operation of systems: demonstrated to Departmental Representative's personnel.
    - .6    Commissioning of mechanical systems: completed in accordance with 01 91 13 - General Commissioning (Cx) Requirements and copies of final Commissioning Report submitted to Departmental Representative.
    - .7    Storage tank inspection documentation, registration, forms, decommissioning and removal in accordance with CEPA 1999 SOR/2008-197.
    - .8    Work: complete and ready for final inspection.
  - .4    Final Inspection:
    - .1    When completion tasks are done, request final inspection of Work by Departmental Representative.
    - .2    When Work is incomplete according to Departmental Representative, complete outstanding items and request re-inspection.

**1.2                FINAL CLEANING**

- .1    Clean in accordance with Section 01 74 11 – Cleaning.
  - .1    Remove surplus materials, excess materials, rubbish, tools and equipment.
- .2    Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

**Part 2            Products**

**2.1                NOT USED**

.1                Not Used.

**Part 3            Execution**

**3.1                NOT USED**

.1                Not Used.

**END OF SECTION**



**Part 1            General**

**1.1                REFERENCES**

- .1            Canadian Environmental Protection Act (CEPA)
  - .1            SOR/2008-197, Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations.

**1.2                ADMINISTRATIVE REQUIREMENTS**

- .1            Pre-warranty Meeting:
  - .1            Convene meeting one week prior to contract completion with Contractor's representative and Departmental Representative to:
    - .1            Verify Project requirements.
    - .2            Review manufacturer's installation instructions and warranty requirements.
  - .2            Departmental Representative to establish communication procedures for:
    - .1            Notifying construction warranty defects.
    - .2            Determine priorities for type of defects.
    - .3            Determine reasonable response time.
  - .3            Contact information for bonded and licensed company for warranty work action: provide name, telephone number and address of company authorized for construction warranty work action.
  - .4            Ensure contact is located within local service area of warranted construction, is continuously available, and is responsive to inquiries for warranty work action.

**1.3                ACTION AND INFORMATIONAL SUBMITTALS**

- .1            Two weeks prior to Substantial Performance of the Work, submit to the Departmental Representative, four final copies of operating and maintenance manuals in English and French.
- .2            Provide evidence, if requested, for type, source and quality of products supplied.

**1.4                FORMAT**

- .1            Organize data as instructional manual.
- .2            Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.
- .3            When multiple binders are used correlate data into related consistent groupings.
  - .1            Identify contents of each binder on spine.
- .4            Cover: identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.

- .5 Arrange content by systems, process flow, under Section numbers and sequence of Table of Contents.
- .6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
- .7 Text: manufacturer's printed data, or typewritten data.
- .8 Drawings: provide with reinforced punched binder tab.
  - .1 Bind in with text; fold larger drawings to size of text pages.
- .9 Provide 1:1 scaled CAD files in dwg format on CD-ROM or DVD.

## **1.5 CONTENTS - PROJECT RECORD DOCUMENTS**

- .1 Table of Contents for Each Volume: provide title of project;
  - .1 Date of submission; names.
  - .2 Addresses, and telephone numbers of Contractor with name of responsible parties.
  - .3 Schedule of products and systems, indexed to content of volume.
- .2 For each product or system:
  - .1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.
- .3 Product Data: mark each sheet to identify specific products and component parts, and data applicable to installation; delete inapplicable information.
- .4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.
- .5 Typewritten Text: as required to supplement product data.
  - .1 Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 - Quality Control.
- .6 Training: refer to Section 01 79 00 - Demonstration and Training.
- .7 CRD Waste management report and plan.

## **1.6 AS -BUILT DOCUMENTS AND SAMPLES**

- .1 Maintain, in addition to requirements in General Conditions, at site for Departmental Representative one record copy of:
  - .1 Project manual and addendums
  - .2 Contractor's proposal
  - .3 Specifications and drawings as prepared by Contractor's design engineers and consultants.
  - .4 Construction drawings.
  - .5 Change Orders and other modifications to Contract.

- .6 Reviewed shop drawings, product data, and samples.
- .7 Field test records.
- .8 Inspection certificates.
- .9 Manufacturer's certificates.
- .10 Geotechnical reports
- .2 Store record documents and samples in field office apart from documents used for construction.
  - .1 Provide files, racks, and secure storage.
- .3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual.
  - .1 Label each document "PROJECT RECORD" in neat, large, printed letters.
- .4 Maintain record documents in clean, dry and legible condition.
  - .1 Do not use record documents for construction purposes.
- .5 Keep record documents and samples available for inspection by Departmental Representative.

## **1.7 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS**

- .1 Record information on set of black line opaque drawings, and in copy of Project Manual.
- .2 Use felt tip marking pens, maintaining separate colours for each major system, for recording information.
- .3 Record information concurrently with construction progress.
  - .1 Do not conceal Work until required information is recorded.
- .4 Contract Drawings and shop drawings: mark each item to record actual construction, including:
  - .1 Measured depths of elements of foundation in relation to finish first floor datum.
  - .2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
  - .3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
  - .4 Field changes of dimension and detail.
  - .5 Details not on original Contract Drawings.
  - .6 References to related shop drawings and modifications.
- .5 Specifications: mark each item to record actual construction, including:
  - .1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
- .6 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.

- .7 Provide digital photos, if requested, for site records.

## **1.8 FINAL SURVEY**

- .1 Submit final site survey certificate in accordance with Section 01 71 00 - Examination and Preparation, confirming elevations and locations of completed Work.

## **1.9 EQUIPMENT AND SYSTEMS**

- .1 For each item of equipment and each system include description of unit or system, and component parts.
  - .1 Give function, normal operation characteristics and limiting conditions.
  - .2 Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.
- .2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.
- .3 Include installed colour coded wiring diagrams.
- .4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences.
  - .1 Include regulation, control, stopping, shut-down, and emergency instructions.
  - .2 Include summer, winter, and any special operating instructions.
- .5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- .6 Provide servicing and lubrication schedule, and list of lubricants required.
- .7 Include manufacturer's printed operation and maintenance instructions.
- .8 Include sequence of operation by controls manufacturer.
- .9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- .10 Provide installed control diagrams by controls manufacturer.
- .11 Provide Contractor's co-ordination drawings, with installed colour coded piping diagrams.
- .12 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- .13 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- .14 Include test and balancing reports as specified in Section 01 45 00 - Quality Control and 01 91 13 - General Commissioning (Cx) Requirements.

- .15 Storage tank inspection documentation, registration, forms, decommissioning and removal in accordance with CEPA 1999 SOR/2008-197.
- .16 Registration and identification requirements as defined by storage tank regulations SOC 2008-197 and PWGSC storage tank management program.
- .17 Additional requirements: as specified in individual specification sections.

## **1.10 MATERIALS AND FINISHES**

- .1 Building products, applied materials, and finishes: include product data, with catalogue number, size, composition, and colour and texture designations.
  - .1 Provide information for re-ordering custom manufactured products.
- .2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- .3 Moisture-protection and weather-exposed products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- .4 Additional requirements: as specified in individual specifications sections.

## **1.11 MAINTENANCE MATERIALS**

- .1 Spare Parts:
  - .1 Provide spare parts, in quantities specified in individual specification sections.
  - .2 Provide items of same manufacture and quality as items in Work.
  - .3 Deliver to location as directed; place and store.
  - .4 Receive and catalogue items.
    - .1 Submit inventory listing to Departmental Representative.
    - .2 Include approved listings in Maintenance Manual.
  - .5 Obtain receipt for delivered products and submit prior to final payment.
- .2 Extra Stock Materials:
  - .1 Provide maintenance and extra materials, in quantities specified in individual specification sections.
  - .2 Provide items of same manufacture and quality as items in Work.
  - .3 Deliver to site location as directed; place and store.
  - .4 Receive and catalogue items.
    - .1 Submit inventory listing to Departmental Representative.
    - .2 Include approved listings in Maintenance Manual.
  - .5 Obtain receipt for delivered products and submit prior to final payment.
- .3 Special Tools:
  - .1 Provide special tools, in quantities specified in individual specification section.
  - .2 Provide items with tags identifying their associated function and equipment.

- .3 Deliver to site location as directed; place and store.
- .4 Receive and catalogue items.
  - .1 Submit inventory listing to Departmental Representative.
  - .2 Include approved listings in Maintenance Manual.

**1.12 DELIVERY, STORAGE AND HANDLING**

- .1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.
- .2 Store in original and undamaged condition with manufacturer's seal and labels intact.
- .3 Store components subject to damage from weather in weatherproof enclosures.
- .4 Store paints and freezable materials in a heated and ventilated room.
- .5 Remove and replace damaged products at own expense and for review by Departmental Representative.

**1.13 WARRANTIES AND BONDS**

- .1 Develop warranty management plan to contain information relevant to Warranties.
- .2 Submit warranty management plan, 30 days before planned pre-warranty conference, to Departmental Representative for approval.
- .3 Warranty management plan to include required actions and documents to assure that Departmental Representative receives warranties to which it is entitled.
- .4 Provide plan in narrative form and contain sufficient detail to make it suitable for use by future maintenance and repair personnel.
- .5 Submit, warranty information made available during construction phase, to Departmental Representative for approval prior to each monthly pay estimate.
- .6 Assemble approved information in binder, submit upon acceptance of work and organize binder as follows:
  - .1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.
  - .2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.
  - .3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of applicable item of work.
  - .4 Verify that documents are in proper form, contain full information, and are notarized.
  - .5 Co-execute submittals when required.
  - .6 Retain warranties and bonds until time specified for submittal.
- .7 Except for items put into use with departmental representative permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.

- .8 Conduct joint 4 month and 9 month warranty inspection, measured from time of acceptance, by Departmental Representative.
- .9 Include information contained in warranty management plan as follows:
  - .1 Roles and responsibilities of personnel associated with warranty process, including points of contact and telephone numbers within the organizations of Contractors, subcontractors, manufacturers or suppliers involved.
  - .2 Listing and status of delivery of Certificates of Warranty for extended warranty items, to include roofs, HVAC balancing, pumps, motors, transformers, and commissioned systems such as fire protection, alarm systems, sprinkler systems.
  - .3 Provide list for each warranted equipment, item, feature of construction or system indicating:
    - .1 Name of item.
    - .2 Model and serial numbers.
    - .3 Location where installed.
    - .4 Name and phone numbers of manufacturers or suppliers.
    - .5 Names, addresses and telephone numbers of sources of spare parts.
    - .6 Warranties and terms of warranty: include one-year overall warranty of construction. Indicate items that have extended warranties and show separate warranty expiration dates.
    - .7 Cross-reference to warranty certificates as applicable.
    - .8 Starting point and duration of warranty period.
    - .9 Summary of maintenance procedures required to continue warranty in force.
    - .10 Cross-Reference to specific pertinent Operation and Maintenance manuals.
    - .11 Organization, names and phone numbers of persons to call for warranty service.
    - .12 Typical response time and repair time expected for various warranted equipment.
  - .4 Contractor's plans for attendance at 4 and 9 month post-construction warranty inspections.
  - .5 Procedure and status of tagging of equipment covered by extended warranties.
  - .6 Post copies of instructions near selected pieces of equipment where operation is critical for warranty and/or safety reasons.
- .10 Respond in timely manner to oral or written notification of required construction warranty repair work.
- .11 Written verification to follow oral instructions.
  - .1 Failure to respond will be cause for the Departmental Representative to proceed with action against Contractor.

#### **1.14 WARRANTY TAGS**

- .1 Tag, at time of installation, each warranted item. Provide durable, oil and water resistant tag approved by Departmental Representative.

- .2 Attach tags with copper wire and spray with waterproof silicone coating.
- .3 Leave date of acceptance until project is accepted for occupancy.
- .4 Indicate following information on tag:
  - .1 Type of product/material.
  - .2 Model number.
  - .3 Serial number.
  - .4 Contract number.
  - .5 Warranty period.
  - .6 Inspector's signature.
  - .7 Construction Contractor.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**



**Part 1            General**

**1.1                ADMINISTRATIVE REQUIREMENTS**

- .1        Demonstrate scheduled operation and maintenance of equipment and systems to Departmental Representative's personnel in both official languages two weeks prior to date of interim completion.
- .2        Departmental Representative: provide list of personnel to receive instructions, and coordinate their attendance at agreed-upon times.
- .3        Preparation:
  - .1        Verify conditions for demonstration and instructions comply with requirements.
  - .2        Verify designated personnel are present.
  - .3        Ensure equipment has been inspected and put into operation.
  - .4        Ensure testing, adjusting, and balancing has been performed in accordance with Section 01 91 13 - General Commissioning (Cx) Requirements. and equipment and systems are fully operational.
- .4        Demonstration and Instructions:
  - .1        Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, and maintenance of each item of equipment at agreed upon times, at the designated location.
  - .2        Instruct personnel in phases of operation and maintenance using operation and maintenance manuals as basis of instruction.
  - .3        Review contents of manual in detail to explain aspects of operation and maintenance.
  - .4        Prepare and insert additional data in operations and maintenance manuals when needed during instructions.
- .5        Time Allocated for Instructions: 3 sessions of 3 formal days

**1.2                ACTION AND INFORMATIONAL SUBMITTALS**

- .1        Submit to Departmental Representative schedule of time and date for demonstration of each item of equipment and each system two weeks prior to designated dates, for Departmental Representative's approval.
- .2        Submit reports within one week after completion of demonstration, that demonstration and instructions have been satisfactorily completed.
- .3        Give time and date of each demonstration, with list of persons present.
- .4        Provide copies of completed operation and maintenance manuals for use in demonstrations and instructions.

**1.3 QUALITY ASSURANCE**

- .1 When specified in individual Sections requiring manufacturer to provide authorized representative to demonstrate operation of equipment and systems:
  - .1 Instruct Departmental Representative's personnel.
  - .2 Provide written report that demonstration and instructions have been completed.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

**Part 1            General**

**1.1                SUMMARY**

- .1    Section Includes:
  - .1        General requirements relating to commissioning of project's components and systems, specifying general requirements to PV of components, equipment, sub-systems, systems, and integrated systems.
- .2    Acronyms:
  - .1        AFD - Alternate Forms of Delivery, service provider.
  - .2        BMM - Building Management Manual.
  - .3        Cx - Commissioning.
  - .4        EMCS - Energy Monitoring and Control Systems.
  - .5        O&M - Operation and Maintenance.
  - .6        PI - Product Information.
  - .7        PV - Performance Verification.
  - .8        TAB - Testing, Adjusting and Balancing.

**1.2                GENERAL**

- .1    Cx is a planned program of tests, procedures and checks carried out systematically on systems and integrated systems of the finished Project. Cx is performed after systems and integrated systems are completely installed, functional and Performance Verification responsibilities have been completed and approved. Objectives:
  - .1        Verify installed equipment, systems and integrated systems operate in accordance with contract documents and design criteria and intent.
  - .2        Ensure appropriate documentation is compiled into the BMM.
  - .3        Effectively train O&M staff.
- .2    Contractor conducts Cx process, operating equipment and systems, troubleshooting and making adjustments as required.
  - .1        Systems to be operated at full capacity under various modes to determine if they function correctly and consistently at peak efficiency. Systems to be interactively with each other as intended in accordance with Contract Documents and design criteria.
  - .2        During these checks, adjustments to be made to enhance performance to meet environmental or user requirements.
- .3    Design Criteria: meet Project functional and operational requirements.

**1.3                COMMISSIONING OVERVIEW**

- .1    Section 01 91 13 – General Commissioning (Cx) Requirements.
- .2    Cx to be a line item of Contractor's cost breakdown.

- .3 Cx activities supplement field quality and testing procedures described in relevant technical sections.
- .4 Cx is conducted in concert with activities performed during each stage of project delivery. Cx identifies issues in Planning and Design stages which are addressed during Construction and Cx stages to ensure the built facility is constructed and proven to operate satisfactorily under weather, environmental and occupancy conditions to meet functional and operational requirements. Cx activities includes transfer of critical knowledge to facility operational personnel.
- .5 Departmental Representative will issue Interim Acceptance Certificate when:
  - .1 Completed Cx documentation has been received, reviewed for suitability and approved by Departmental Representative.
  - .2 Equipment, components and systems have been commissioned.
  - .3 O&M training has been completed.

#### **1.4 NON-CONFORMANCE TO PERFORMANCE VERIFICATION REQUIREMENTS**

- .1 Should equipment, system components, and associated controls be incorrectly installed or malfunction during Cx, correct deficiencies, re-verify equipment and components within the non-functional system, including related systems as deemed required by Departmental Representative to ensure effective performance.
- .2 Costs for corrective work, additional tests, inspections, to determine acceptability and proper performance of such items to be borne by Contractor. Above costs to be in form of progress payment reductions or hold-back assessments.

#### **1.5 PRE-CX REVIEW**

- .1 Before Construction:
  - .1 Review contract documents, confirm by writing to Departmental Representative.
    - .1 Adequacy of provisions for Cx.
    - .2 Aspects of design and installation pertinent to success of Cx.
- .2 During Construction:
  - .1 Co-ordinate provision, location and installation of provisions for Cx.
- .3 Before start of Cx:
  - .1 Have completed Cx Plan up-to-date.
  - .2 Ensure installation of related components, equipment, sub-systems, systems is complete.
  - .3 Fully understand Cx requirements and procedures.
  - .4 Have Cx documentation shelf-ready.
  - .5 Understand completely design criteria and intent and special features.
  - .6 Submit complete start-up documentation to Departmental Representative.
  - .7 Have Cx schedules up-to-date.

- .8 Ensure systems have been cleaned thoroughly.
- .9 Complete TAB procedures on systems, submit TAB reports to Departmental Representative for review.
- .10 Ensure "As-Built" system schematics are available.
- .4 Inform Departmental Representative in writing of discrepancies and deficiencies on finished works.

## **1.6 CONFLICTS**

- .1 Report conflicts between requirements of this section and other sections to Departmental Representative before start-up and obtain clarification.
- .2 Failure to report conflict and obtain clarification will result in application of most stringent requirement.

## **1.7 COMMISSIONING DOCUMENTATION**

- .1 Provide Cx documentation to Departmental Representative at various design stages.
- .2 Provide completed and approved Cx documentation to Departmental Representative.

## **1.8 COMMISSIONING SCHEDULE**

- .1 Provide detailed Cx schedule as part of Work schedule in accordance with Section 01 32 16 - Construction Progress Schedule - Critical Path Method (CPM).
- .2 Provide adequate time for Cx activities prescribed in technical sections and commissioning sections including:
  - .1 Approval of Cx reports.
  - .2 Verification of reported results.
  - .3 Repairs, retesting, re-commissioning, re-verification.
  - .4 Training.

## **1.9 COMMISSIONING MEETINGS**

- .1 Convene Cx meetings following project meetings: Section 00 40 00 Project Management Guidelines, and as specified herein.
- .2 Purpose: to resolve issues, monitor progress, identify deficiencies, relating to Cx.
- .3 Continue Cx meetings on regular basis until commissioning deliverables have been addressed.
- .4 At 66 % construction completion stage. Call a separate Cx scope meeting to review progress, discuss schedule of equipment start-up activities and prepare for Cx. Issues at meeting to include:
  - .1 Review duties and responsibilities of Contractor and the Contractor's subcontractors, addressing delays and potential problems.

- .2 Determine the degree of involvement of trades and manufacturer's representatives in the commissioning process.
- .5 Thereafter Cx meetings to be held until project completion and as required during equipment start-up and functional testing period.
- .6 Meeting will be chaired by Contractor's Cx Agent , who will record and distribute minutes.
- .7 Ensure subcontractors and relevant manufacturer representatives are present at 60% and subsequent Cx meetings and as required.

#### **1.10 STARTING AND TESTING**

- .1 Contractor assumes liabilities and costs for inspections. Including disassembly and re-assembly after approval, starting, testing and adjusting, including supply of testing equipment.

#### **1.11 WITNESSING OF STARTING AND TESTING**

- .1 Provide 14 days notice prior to commencement.
- .2 Departmental Representative to witness of start-up and testing.
- .3 Contractor's Cx Agent to be present at tests performed and documented by sub-trades, suppliers and equipment manufacturers.

#### **1.12 MANUFACTURER'S INVOLVEMENT**

- .1 Factory testing: manufacturer to:
  - .1 Coordinate time and location of testing.
  - .2 Provide testing documentation for review by Departmental Representative.
  - .3 Arrange for Departmental Representative to witness tests.
  - .4 Obtain written approval of test results and documentation from Departmental Representative before delivery to site.
- .2 Obtain manufacturers installation, start-up and operations instructions prior to start-up of components, equipment and systems and review with Departmental Representative.
  - .1 Compare completed installation with manufacturer's published data, record discrepancies, and review with manufacturer.
  - .2 Modify procedures detrimental to equipment performance and review same with manufacturer before start-up.
- .3 Integrity of warranties:
  - .1 Use manufacturer's trained start-up personnel where specified elsewhere in other divisions or required to maintain integrity of warranty.
  - .2 Verify with manufacturer that testing as specified will not void warranties.
- .4 Qualifications of manufacturer's personnel:

- .1 Experienced in design, installation and operation of equipment and systems.
- .2 Ability to interpret test results accurately.
- .3 To report results in clear, concise, logical manner.

### **1.13 PROCEDURES**

- .1 Verify that equipment and systems are complete, clean, and operating in normal and safe manner prior to conducting start-up, testing and Cx.
- .2 Conduct start-up and testing in following distinct phases:
  - .1 Included in delivery and installation:
    - .1 Verification of conformity to specification, approved shop drawings and completion of PI report forms.
    - .2 Visual inspection of quality of installation.
  - .2 Start-up: follow accepted start-up procedures.
  - .3 Operational testing: document equipment performance.
  - .4 System PV: include repetition of tests after correcting deficiencies.
  - .5 Post-substantial performance verification: to include fine-tuning.
- .3 Correct deficiencies and obtain approval from Departmental Representative after distinct phases have been completed and before commencing next phase.
- .4 Document require tests on approved PV forms.
- .5 Failure to follow accepted start-up procedures will result in re-evaluation of equipment by an independent testing agency selected by Departmental Representative. If results reveal that equipment start-up was not in accordance with requirements, and resulted in damage to equipment, implement following:
  - .1 Minor equipment/systems: implement corrective measures approved by Departmental Representative.
  - .2 Major equipment/systems: if evaluation report concludes that damage is minor, implement corrective measures approved by Departmental Representative.
  - .3 If evaluation report concludes that major damage has occurred, Departmental Representative shall reject equipment.
    - .1 Rejected equipment to be remove from site and replace with new.
    - .2 Subject new equipment/systems to specified start-up procedures.

### **1.14 START-UP DOCUMENTATION**

- .1 Assemble start-up documentation and submit to Departmental Representative for approval before commencement of commissioning.
- .2 Start-up documentation to include:
  - .1 Factory and on-site test certificates for specified equipment.
  - .2 Pre-start-up inspection reports.
  - .3 Signed installation/start-up check lists.
  - .4 Start-up reports,

- .5 Step-by-step description of complete start-up procedures, to permit Departmental Representative to repeat start-up at any time.

### **1.15 OPERATION AND MAINTENANCE OF EQUIPMENT AND SYSTEMS**

- .1 After start-up, operate and maintain equipment and systems as directed by equipment/system manufacturer.
- .2 With assistance of manufacturer develop written maintenance program and submit to Departmental Representative for approval before implementation.
- .3 Operate and maintain systems for length of time required for commissioning to be completed.
- .4 After completion of commissioning, operate and maintain systems until issuance of certificate of interim acceptance.

### **1.16 TEST RESULTS**

- .1 If start-up, testing and/or PV produce unacceptable results, repair, replace or repeat specified starting and/or PV procedures until acceptable results are achieved.
- .2 Provide manpower and materials, assume costs for re-commissioning.

### **1.17 START OF COMMISSIONING**

- .1 Notify Departmental Representative at least 21 days prior to start of Cx.
- .2 Start Cx after elements of building affecting start-up and performance verification of systems have been completed.

### **1.18 INSTRUMENTS / EQUIPMENT**

- .1 Submit to Departmental Representative for review and approval:
  - .1 Complete list of instruments proposed to be used.
  - .2 Listed data including, serial number, current calibration certificate, calibration date, calibration expiry date and calibration accuracy.
- .2 Provide the following equipment as required:
  - .1 2-way radios.
  - .2 Ladders.
  - .3 Equipment as required to complete work.

### **1.19 COMMISSIONING PERFORMANCE VERIFICATION**

- .1 Carry out Cx:
  - .1 Under actual operating conditions, over entire operating range, in all modes.
  - .2 On independent systems and interacting systems.
- .2 Cx procedures to be repeatable and reported results are to be verifiable.



- .3 Follow equipment manufacturer's operating instructions.
- .4 EMCS trending to be available as supporting documentation for performance verification.

## **1.20 WITNESSING COMMISSIONING**

- .1 Departmental Representative to witness activities and verify results.

## **1.21 AUTHORITIES HAVING JURISDICTION**

- .1 Where specified start-up, testing or commissioning procedures duplicate verification requirements of authority having jurisdiction, arrange for authority to witness procedures so as to avoid duplication of tests and to facilitate expedient acceptance of facility.
- .2 Obtain certificates of approval, acceptance and compliance with rules and regulation of authority having jurisdiction.
- .3 Provide copies to Departmental Representative within 5 days of test and with Cx report.

## **1.22 COMMISSIONING CONSTRAINTS**

- .1 Since access into secure or sensitive areas will be very difficult after occupancy it is necessary to complete Cx of occupancy, weather, and seasonal sensitive equipment and systems in these areas before issuance of the Interim Certificate, using, if necessary, simulated thermal loads.

## **1.23 EXTRAPOLATION OF RESULTS**

- .1 Where Cx of weather, occupancy, or seasonal-sensitive equipment or systems cannot be conducted under near-rated or near-design conditions, extrapolate part-load results to design conditions when approved by Departmental Representative in accordance with equipment manufacturer's instructions, using manufacturer's data, with manufacturer's assistance and using approved formulae.

## **1.24 EXTENT OF VERIFICATION**

- .1 Heating Plant areas:
  - .1 Provide manpower and instrumentation to verify up to 100 % of reported results.
- .2 Number and location to be at discretion of Departmental Representative.
- .3 Conduct tests repeated during verification under same conditions as original tests, using same test equipment, instrumentation.
- .4 Review and repeat commissioning of systems if inconsistencies found in more than 20 % of reported results.
- .5 Perform additional commissioning until results are acceptable to Departmental Representative.

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**1.25 REPEAT VERIFICATIONS**

- .1 Assume costs incurred by Departmental Representative for third and subsequent verifications where:
  - .1 Verification of reported results fail to receive Departmental Representative's approval.
  - .2 Repetition of second verification again fails to receive approval.
  - .3 Departmental Representative deems Contractor's request for second verification was premature.

**1.26 SUNDRY CHECKS AND ADJUSTMENTS**

- .1 Make adjustments and changes which become apparent as Cx proceeds.
- .2 Perform static and operational checks as applicable and as required.

**1.27 DEFICIENCIES, FAULTS, DEFECTS**

- .1 Correct deficiencies found during start-up and Cx to satisfaction of Departmental Representative.
- .2 Report problems, faults or defects affecting Cx to Departmental Representative in writing. Stop Cx until problems are rectified. Proceed with written approval from Departmental Representative.

**1.28 COMPLETION OF COMMISSIONING**

- .1 Upon completion of Cx leave systems in normal operating mode.
- .2 Except for warranty and seasonal verification activities specified in Cx specifications, complete Cx prior to issuance of Interim Certificate of Completion.
- .3 Cx to be considered complete when contract Cx deliverables have been submitted and accepted by Departmental Representative.

**1.29 ACTIVITIES UPON COMPLETION OF COMMISSIONING**

- .1 When changes are made to baseline components or system settings established during Cx process, provide updated Cx form for affected item.

**1.30 MAINTENANCE MATERIALS, SPARE PARTS, SPECIAL TOOLS**

- .1 Supply, deliver, and document maintenance materials, spare parts, and special tools as specified in contract.

**1.31 OCCUPANCY**

- .1 Cooperate fully with Departmental Representative during stages of acceptance and occupancy of facility.

**1.32 INSTALLED INSTRUMENTATION**

- .1 Use instruments installed under Contract for TAB and PV if:
  - .1 Accuracy complies with these specifications.
  - .2 Calibration certificates have been deposited with Departmental Representative.
- .2 Calibrated EMCS sensors may be used to obtain performance data provided that sensor calibration has been completed and accepted.

**1.33 PERFORMANCE VERIFICATION TOLERANCES**

- .1 Application tolerances:
  - .1 Specified range of acceptable deviations of measured values from specified values or specified design criteria. Except for special areas, to be within +/- 10 % of specified values.
- .2 Instrument accuracy tolerances:
  - .1 To be of higher order of magnitude than equipment or system being tested.
- .3 Measurement tolerances during verification:
  - .1 Unless otherwise specified actual values to be within +/- 2 % of recorded values.

**1.34 DEPARTMENTAL REPRESENTATIVE'S PERFORMANCE TESTING**

- .1 Performance testing of equipment or system by Departmental Representative will not relieve Contractor from compliance with specified start-up and testing procedures.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

**Part 1            General**

**1.1                RELATED SECTIONS**

- .1            03 20 00 – Concrete Reinforcing.
- .2            03 30 00 – Cast-in-Place Concrete.

**1.2                REFERENCES**

- .1            Use the latest applicable edition to the following references.
- .2            Canadian Standards Association (CSA International)
  - .1            CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/  
Methods of Test and Standard Practices for Concrete.
  - .2            CSA-O86S1, Supplement No. 1 to CAN/CSA-O86-01, Engineering Design in  
Wood.
  - .3            CSA O121, Douglas Fir Plywood.
  - .4            CSA O151, Canadian Softwood Plywood.
  - .5            CSA O153, Poplar Plywood.
  - .6            CAN/CSA-O325.0, Construction Sheathing.
  - .7            CSA O437 Series, Standards for OSB and Waferboard.
  - .8            CSA S269.1, Falsework for Construction Purposes.
  - .9            CAN/CSA-S269.3, Concrete Formwork, National Standard of Canada
- .3            Underwriters' Laboratories of Canada (ULC)
  - .1            CAN/ULC-S701, Standard for Thermal Insulation, Polystyrene, Boards and Pipe  
Covering.

**Part 2            Products**

**2.1                MATERIALS**

- .1            Formwork materials:
  - .1            For concrete without special architectural features, use wood and wood product  
formwork materials to CSA-O121, CAN/CSA-O86, CSA O437 Series, and  
CSA-O153.
  - .2            For concrete with special architectural features, use formwork materials to  
CSA-A23.1/A23.2.
- .2            Form ties:
  - .1            For concrete not designated 'Architectural', use removable or snap-off metal ties,  
fixed or adjustable length, free of devices leaving holes larger than 25 mm diameter  
in concrete surface.

- .2 For Architectural concrete, use snap ties complete with plastic cones and light grey concrete plugs.
- .3 Form release agent: non-toxic, biodegradable, low VOC.
- .4 Form stripping agent: colourless mineral oil, non-toxic, biodegradable, low VOC, free of kerosene.
- .5 Falsework materials: to CSA-S269.1.

### **Part 3 Execution**

#### **3.1 FABRICATION AND ERECTION**

- .1 Verify lines, levels and centres before proceeding with formwork/falsework and ensure dimensions agree with drawings.
- .2 Hand trim sides and bottoms and remove loose earth from earth forms before placing concrete.
- .3 Fabricate and erect falsework in accordance with CSA S269.1.
- .4 Do not place shores and mud sills on frozen ground.
- .5 Provide site drainage to prevent washout of soil supporting mud sills and shores.
- .6 Fabricate and erect formwork in accordance with CAN/CSA-S269.3 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CSA-A23.1/A23.2.
- .7 Align form joints and make watertight.
  - .1 Keep form joints to minimum.
- .8 Use 25 mm chamfer strips on external corners and/or 25 mm fillets at interior corners, joints, unless specified otherwise.
- .9 Line forms for following surfaces:
  - .1 Exposed faces of walls: do not stagger joints of form lining material and align joints to obtain uniform pattern.
  - .2 Secure lining taut to formwork to prevent folds.
  - .3 Pull down lining over edges of formwork panels.
  - .4 Ensure lining is new and not reused material.
  - .5 Ensure lining is dry and free of oil when concrete is poured.
  - .6 Application of form release agents on formwork surface is prohibited where drainage lining is used.
  - .7 If concrete surfaces require cleaning after form removal, use only pressurized water stream so as not to alter concrete's smooth finish.
- .10 Clean formwork in accordance with CSA-A23.1/A23.2, before placing concrete.

**3.2 REMOVAL AND RESHORING**

- .1 Leave formwork in place for minimum periods of time after placing concrete, as to requirements of CSA-A23.1/A23.2.
- .2 Re-use formwork and falsework subject to requirements of CSA-A23.1/A23.2.

**END OF SECTION**

**Part 1            General**

**1.1                RELATED SECTIONS**

- .1            03 10 00 – Concrete Forming and Accessories.
- .2            03 30 00 – Cast-in-place Concrete

**1.2                REFERENCES**

- .1            Use the latest applicable edition of the following references.
- .2            American Concrete Institute (ACI)
  - .1            SP-66, ACI Detailing Manual 2004.
    - .1            ACI 315, Details and Detailing of Concrete Reinforcement.
    - .2            ACI 315R, Manual of Engineering and Placing Drawings for Reinforced Concrete Structures.
  - .3            American Society for Testing and Materials International (ASTM)
    - .1            ASTM A143/A143M, Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.
    - .2            ASTM A185/A185M, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
    - .3            ASTM A497/A497M, Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete.
    - .4            ASTM A775/A775M, Standard Specification for Epoxy-Coated Reinforcing Steel Bars.
  - .4            Canadian Standards Association (CSA International)
    - .1            CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/ Methods of Test and Standard Practices for Concrete.
    - .2            CSA-A23.3, Design of Concrete Structures.
    - .3            CAN/CSA-G30.18, Billet-Steel Bars for Concrete Reinforcement, A National Standard of Canada.
    - .4            CSA-G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
    - .5            CAN/CSA-G164, Hot Dip Galvanizing of Irregularly Shaped Articles, A National Standard of Canada.
    - .6            CSA W186, Welding of Reinforcing Bars in Reinforced Concrete Construction.
- .3            American Society for Testing and Materials International (ASTM)
  - .1            ASTM A143/A143M, Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.
  - .2            ASTM A185/A185M, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
  - .3            ASTM A497/A497M, Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete.
  - .4            ASTM A775/A775M, Standard Specification for Epoxy-Coated Reinforcing Steel Bars.
- .4            Canadian Standards Association (CSA International)
  - .1            CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/ Methods of Test and Standard Practices for Concrete.
  - .2            CSA-A23.3, Design of Concrete Structures.
  - .3            CAN/CSA-G30.18, Billet-Steel Bars for Concrete Reinforcement, A National Standard of Canada.
  - .4            CSA-G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
  - .5            CAN/CSA-G164, Hot Dip Galvanizing of Irregularly Shaped Articles, A National Standard of Canada.
  - .6            CSA W186, Welding of Reinforcing Bars in Reinforced Concrete Construction.
- .5            Reinforcing Steel Institute of Canada (RSIC)
  - .1            RSIC, Reinforcing Steel Manual of Standard Practice.

**Part 2 Products**

**2.1 MATERIALS**

- .1 Reinforcing steel: billet steel, grade 400, deformed bars to CAN/CSA-G30.18, unless indicated otherwise.
- .2 Reinforcing steel: weldable low alloy steel deformed bars to CAN/CSA-G30.18.
- .3 Cold-drawn annealed steel wire ties: to ASTM A497/A497M.
- .4 Deformed steel wire for concrete reinforcement: to ASTM A497/A497M.
- .5 Welded steel wire fabric: to ASTM A185/A185M.
- .6 Welded deformed steel wire fabric: to ASTM A497/A497M.
- .7 Epoxy Coating of non-prestressed reinforcement: to ASTM A775/A775M.
- .8 Galvanizing of non-prestressed reinforcement: to CAN/CSA-G164, minimum zinc coating 610 g/m<sup>2</sup>.
- .9 Chairs, bolsters, bar supports, spacers: to CSA-A23.1/A23.2.
- .10 Plain round bars: to CSA-G40.20/G40.21.

**2.2 FABRICATION**

- .1 Fabricate reinforcing steel in accordance with CSA-A23.1/A23.2, ACI315, and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.
- .2 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.

**2.3 SOURCE QUALITY CONTROL**

- .1 Upon request, provide Departmental Representative with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum 4 weeks prior to beginning reinforcing work.

**Part 3 Execution**

**3.1 PREPARATION**

- .1 Galvanizing to include chromate treatment.
  - .1 Duration of treatment to be 1 hour per 25 mm of bar diameter.
- .2 Conduct bending tests to verify galvanized bar fragility in accordance with ASTM A143/A143M.



**3.2 PLACING REINFORCEMENT**

- .1 Place reinforcing steel as indicated on placing drawings and in accordance with CSA-A23.1/A23.2.
- .2 Use plain round bars as slip dowels in concrete.
  - .1 Paint portion of dowel intended to move within hardened concrete with one coat of asphalt paint.
  - .2 When paint is dry, apply thick even film of mineral lubricating grease.
- .3 Ensure cover to reinforcement is maintained during concrete pour.
- .4 Protect epoxy and paint coated portions of bars with covering during transportation and handling.

**3.3 FIELD TOUCH-UP**

- .1 Touch up damaged and cut ends of epoxy coated or galvanized reinforcing steel with compatible finish to provide continuous coating.

**END OF SECTION**

**Part 1            General**

**1.1                RELATED SECTIONS**

- .1            03 10 00 – Concrete Forming and Accessories.
- .2            03 20 00 – Concrete Reinforcing.

**1.2                REFERENCES**

- .1            Use the latest applicable edition to the following references.
- .2            American Society for Testing and Materials International (ASTM)
  - .1            ASTM C260, Standard Specification for Air-Entraining Admixtures for Concrete.
  - .2            ASTM C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
  - .3            ASTM C330, Standard Specification for Lightweight Aggregates for Structural Concrete.
  - .4            ASTM C494/C494M, Standard Specification for Chemical Admixtures for Concrete.
  - .5            ASTM C1017/C1017M, Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
  - .6            ASTM D412, Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension.
  - .7            ASTM D624, Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomer.
  - .8            ASTM D1751, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
  - .9            ASTM D1752, Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.
- .3            Canadian General Standards Board (CGSB)
  - .1            CAN/CGSB-37.2, Emulsified Asphalt, Mineral Colloid-Type, Unfilled, for Dampproofing and Waterproofing and for Roof Coatings.
  - .2            CAN/CGSB-51.34, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
- .4            Canadian Standards Association (CSA International)
  - .1            CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/ Methods of Test and Standard Practices for Concrete.
  - .2            CSA A283, Qualification Code for Concrete Testing Laboratories.
  - .3            CAN/CSA-A3000, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
    - .1            CSA-A3001, Cementitious Materials for Use in Concrete.

### **1.3 ACRONYMS AND TYPES**

- .1 Cement: hydraulic cement or blended hydraulic cement (XXb - where b denotes blended).
  - .1 Type GU or GUb – General use cement.
  - .2 Type MS or MSb – Moderate sulphate-resistant cement.
  - .3 Type MH or MHb – Moderate heat of hydration cement.
  - .4 Type HE or Heb – High early-strength cement.
  - .5 Type LH or LHb – Low heat of hydration cement.
  - .6 Type HS or HSb – High sulphate-resistant cement.
- .2 Fly ash:
  - .1 Type F – with CaO content less than 8%.
  - .2 Type CI – with CaO content ranging from 8 to 20%.
  - .3 Type CH – with CaO greater than 20%.
- .3 GGBFS – Ground, granulated blast-furnace slag.

### **1.4 DESIGN REQUIREMENTS**

- .1 In accordance with CSA-A23.1/A23.2.

### **1.5 DELIVERY, STORAGE AND HANDLING**

- .1 Concrete hauling time: maximum allowable time for concrete to be delivered to site of Work and discharged not to exceed 120 minutes after batching.
  - .1 Modifications to maximum time limit must be agreed to by laboratory representative and concrete producer as described in CSA A23.1/A23.2.
- .2 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2.
- .3 Waste Management and Disposal:
  - .1 Provide an appropriate area on the job site where concrete trucks can be safely washed.
  - .2 Unused admixtures and additive materials must not be disposed of into sewer systems, into lakes, streams, onto ground or in other location where it will pose health or environmental hazard.
  - .3 Prevent admixtures and additive materials from entering drinking water supplies or streams. Using appropriate safety precautions, collect liquid or solidify liquid with inert, noncombustible material and remove for disposal. Dispose of waste in accordance with applicable local, Provincial/Territorial and National regulations.

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 Cement: to CAN/CSA-A3001, Type GU.
- .2 Blended hydraulic cement: Type GU to CAN/CSA-A3001.

- .3 Supplementary cementing materials: with minimum 20% Type F, CI, CH fly ash replacement N, GGBFS, by mass of total cementitious materials to CAN/CSA-A3001.
- .4 Water: to CSA-A23.1.
- .5 Aggregates: to CAN/CSA-A23.1/A23.2.
- .6 Admixtures:
  - .1 Air entraining admixture: to ASTM C260.
  - .2 Chemical admixture: to ASTM C494 and ASTM C1017.
- .7 Curing compound: to CSA-A23.1/A23.2 white and ASTM C309, Type 1-chlorinated rubber or Type 1-D with fugitive dye.
- .8 Premoulded joint fillers:
  - .1 Bituminous impregnated fiber board: to ASTM D1751.
  - .2 Sponge rubber: to ASTM D1752, Type I.
  - .3 Cork: to ASTM D1752.

## **2.2 MIXES**

- .1 Performance Method for specifying concrete: to meet Contractor's Engineer's performance criteria in accordance with CAN/CSA-A23.1/A23.2.
  - .1 Ensure concrete supplier meets performance criteria as established below and provide verification of compliance.
  - .2 Provide concrete mix to meet following plastic state requirements, stipulated on drawings and specifications concerning the following items:
    - .1 Uniformity.
    - .2 Placeability.
    - .3 Workability.
    - .4 Finishability.
    - .5 Set time.
  - .3 Provide concrete mix to meet following hard state requirements, stipulated on drawings and specifications concerning the following items:
    - .1 Durability and class of exposure.
    - .2 Minimum compressive strength.
    - .3 Intended application.
    - .4 Volume stability.
    - .5 Surface texture.
    - .6 Geometrical requirements.
    - .7 Other special requirements.
  - .4 Provide quality management plan to ensure verification of concrete quality to specified performance.
  - .5 Concrete supplier's certification.

**Part 3 Execution**

**3.1 PREPARATION**

- .1 Place concrete reinforcing in accordance with Section 03 20 00 – Concrete Reinforcing.
- .2 During concreting operations:
  - .1 Development of cold joints not allowed.
  - .2 Ensure concrete delivery and handling facilitates placing with minimum of re-handling, and without damage to existing structure or Work.
- .3 Ensure reinforcement and inserts are not disturbed during concrete placement.
- .4 Prior to placing of concrete, obtain Contractor's Engineer's approval of proposed method for protection of concrete during placing and curing.
- .5 Protect previous Work from staining.
- .6 Clean and remove stains prior to application for concrete finishes.
- .7 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.
- .8 In locations where new concrete is dowelled to existing work, drill holes in existing concrete.
  - .1 Place steel dowels of deformed steel reinforcing bars and pack solidly with epoxy grout to anchor and hold dowels in positions as indicated.
- .9 Do not place load upon new concrete until authorized by Contractor's Engineer.

**3.2 CONSTRUCTION**

- .1 Do cast-in-place concrete work in accordance with CSA-A23.1/A23.2.
- .2 Sleeves and inserts:
  - .1 Do not eliminate or displace reinforcement to accommodate hardware.
  - .2 Check locations and sizes of sleeves and openings shown on drawings.
- .3 Anchor bolts:
  - .1 Set anchor bolts to templates under supervision of appropriate trade prior to placing concrete.
  - .2 Grout anchor bolts in preformed holes or holes drilled after concrete has set. Formed holes to be minimum 100 mm diameter. Drilled holes to be minimum 25 mm larger in diameter than bolts used to manufacturers' recommendations.
  - .3 Protect anchor bolt holes from water accumulations, snow and ice build-ups.
  - .4 Set bolts and fill holes with epoxy grout.
  - .5 Locate anchor bolts used in connection with expansion shoes, rollers and rockers with due regard to ambient temperature at time of erection.
- .4 Drainage holes and weep holes:

- .1 Form weep holes and drainage holes in accordance with Section 03 10 00 – Concrete Forming and Accessories. If wood forms are used, remove them after concrete has set.
- .2 Install weep hole tubes and drains as indicated.
- .5 Grout under base plates using procedures in accordance with manufacturer's recommendations which result in 100 % contact over grouted area.
- .6 Finishing and curing:
  - .1 Finish concrete in accordance with CSA-A23.1/A23.2.
  - .2 Use curing compounds compatible with applied finish on concrete surfaces. Applied finish on concrete. Provide written declaration that compounds used are compatible.
  - .3 Finish concrete floor to meet requirements of CSA-A23.1/A23.2.
  - .4 Provide screed finish unless otherwise indicated.
  - .5 Rub exposed sharp edges of concrete with carborundum to produce 3 mm radius edges unless otherwise indicated.
- .7 Dampproof membrane:
  - .1 Install dampproof membrane under concrete slabs-on-grade inside building.
  - .2 Lap dampproof membrane minimum 150 mm at joints and seal.
  - .3 Seal punctures in dampproof membrane before placing concrete.
  - .4 Use patching material at least 150 mm larger than puncture and seal.

### **3.3 SURFACE TOLERANCE**

- .1 Concrete tolerance in accordance with CSA-A23.1/A23.2 to tolerance schedule as indicated.

### **3.4 FIELD QUALITY CONTROL**

- .1 Site tests: conduct following tests and submit report to Contractor's Engineer.
  - .1 Concrete pours.
  - .2 Slump tests.
- .2 Inspection and testing of concrete and concrete materials will be carried out by testing laboratory for review in accordance with CSA-A23.1/A23.2.
  - .1 Ensure testing laboratory is certified in accordance with CSA A283.
- .3 Ensure test results are distributed for discussion at pre-pouring concrete meeting.
- .4 Non-Destructive Methods for Testing Concrete: in accordance with CSA-A23.1/A23.2.

### **3.5 VERIFICATION**

- .1 Quality Control Plan: ensure concrete supplier meets performance criteria of concrete, and provide verification of compliance.

**END OF SECTION**

**Part 1            General**

**1.1                REFERENCES**

- .1    Use the latest applicable edition of the following references.
- .2    ASTM International Inc.
  - .1    ASTM A36/A36M, Standard Specification for Carbon Structural Steel.
  - .2    ASTM A193/A193M, Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature or High-Pressure Service and Other Special Purpose Applications.
  - .3    ASTM A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
  - .4    ASTM A325, Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
  - .5    ASTM A325M, Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Minimum Tensile Strength, Metric.
  - .6    ASTM A490M, Standard Specification for High-Strength Steel Structural Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints, Metric.
- .3    Canadian General Standards Board (CGSB)
  - .1    CAN/CGSB-85.10, Protective Coatings for Metals.
- .4    Canadian Institute of Steel Construction (CISC)/Canadian Paint Manufacturers Association (CPMA).
  - .1    Handbook of the Canadian Institute of Steel Construction.
  - .2    CISC/CPMA Standard 2-75, Quick-Drying Primer for use on Structural Steel.
- .5    Canadian Standards Association (CSA International)
  - .1    CSA G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
  - .2    CAN/CSA-G164, Hot Dip Galvanizing of Irregularly Shaped Articles.
  - .3    CAN/CSA-S16, Limit States Design of Steel Structures.
  - .4    CAN/CSA-S136, North American Specifications for the Design of Cold Formed Steel Structural Members.
  - .5    CSA W47.1, Certification of Companies for Fusion Welding of Steel.
  - .6    CSA W48, Filler Metals and Allied Materials for Metal Arc Welding.
  - .7    CSA W55.3, Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.
  - .8    CSA W59, Welded Steel Construction (Metal Arc Welding).
- .6    Master Painters Institute
  - .1    MPI-INT 5.1, Structural Steel and Metal Fabrications.
  - .2    MPI-EXT 5.1, Structural Steel and Metal Fabrications.

- .7 The Society for Protective Coatings (SSPC) and National Association of Corrosion Engineers (NACE) International

.1 NACE No. 3/SSPC SP-6, Commercial Blast Cleaning.

## **Part 2 Products**

### **2.1 DESIGN REQUIREMENTS**

- .1 Design details and connections in accordance with requirements of CAN/CSA-S16 and CAN/CSA-S136 with CSA-S136.1 to resist forces, moments, shears and allow for movements indicated.
- .2 Shear connections:
- .1 Select framed beam shear connections from an industry accepted publication such as "Handbook of the Canadian Institute of Steel Construction" when connection for shear only (standard connection) is required.
- .2 Select or design connections to support reaction from maximum uniformly distributed load that can be safely supported by beam in bending, provided no point loads act on beam, when shears are not indicated.
- .3 For composite construction select or design minimum end connection to resist reaction resulting from factored movement resistance as tabulated in the "Handbook of the Canadian Institute of Steel Construction" assuming 100% shear connection with depth of steel deck and/or slab shown on drawings.
- .4 Submit sketches and design calculations stamped and signed by qualified professional engineer licensed in Province of Ontario, Canada for non standard connections.

### **2.2 MATERIALS**

- .1 Structural steel: to CSA-G40.20/G40.21, Grade as indicated and CAN/CSA-S136.
- .2 Anchor bolts: to CSA-G40.20/G40.21, Grade 300W.
- .3 High strength anchor bolts: to ASTM A193/A193M.
- .4 Bolts, nuts and washers: to ASTM A325.
- .5 Welding materials: to CSA W48 Series and CSA W59 and certified by Canadian Welding Bureau.
- .6 Shop paint primer: to CISC/CPMA2-75 solvent reducible alkyd, grey oxide.
- .7 Hot dip galvanizing: galvanize steel, where indicated, to CAN/CSA-G164, minimum zinc coating of  $600 \text{ g/m}^2$ .

### **2.3 FABRICATION**

- .1 Fabricate structural steel in accordance with CAN/CSA-S16 and in accordance with approved shop drawings.



- .2 Continuously seal members by continuous welds where indicated.

## **2.4 SHOP PAINTING**

- .1 Clean, prepare surfaces and shop prime structural steel in accordance with CAN/CSA-S16 except where members to be encased in concrete.
- .2 Clean members, remove loose mill scale, rust, oil, dirt and foreign matter. Prepare surface according to NACE No.3/SSPC-SP-6.
- .3 Apply one coat of primer in shop to steel surfaces to achieve minimum dry film thickness of 1.5 to 2.0 mils, except:
  - .1 Surfaces to be encased in concrete.
  - .2 Surfaces to receive field installed stud shear connections.
  - .3 Surfaces and edges to be field welded.
  - .4 Faying surfaces of slip-critical connections.
  - .5 Below grade surfaces in contact with soil.
- .4 Apply paint under cover, on dry surfaces when surface and air temperatures are above 5 degrees C.
- .5 Maintain dry condition and 5 degrees C minimum temperature until paint is thoroughly dry.
- .6 Strip paint from bolts, nuts, sharp edges and corners before prime coat is dry.

## **Part 3 Execution**

### **3.1 APPLICATION**

- .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

### **3.2 GENERAL**

- .1 Structural steel work: in accordance with CAN/CSA-S16.
- .2 Welding: in accordance with CSA W59.
- .3 Companies to be certified under Division 1 or 2.1 of CSA W47.1 for fusion welding of steel structures and/or CSA W55.3 for resistance welding of structural components.

### **3.3 CONNECTION TO EXISTING WORK**

- .1 Verify dimensions and condition of existing work, coordinate discrepancies and potential problem areas before commencing fabrication.

### **3.4 ERECTION**

- .1 Erect structural steel, in accordance with CAN/CSA-S16 and in accordance with approved erection drawings.

- .2 Field cutting or altering structural members: to approval of Contractor's Engineer.
- .3 Clean with mechanical brush and touch up shop primer to bolts, rivets, welds and burned or scratched surfaces at completion of erection.
- .4 Continuously seal members by continuous welds Grind smooth.

### **3.5 FIELD QUALITY CONTROL**

- .1 Submit test reports to Departmental Representative within 2 weeks of completion of inspection.

### **3.6 FIELD PAINTING**

- .1 Touch up damaged surfaces and surfaces without shop coat with primer to NACE No.3/SSPC-SP-6 except as specified otherwise. Apply in accordance: MPI Architectural Painting Specification Manual.

**END OF SECTION**

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**Part 1            General**

**1.1                REFERENCES**

- .1 American Society for Testing and Materials International, (ASTM)
  - .1 ASTM A53/A53M-02, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Stainless.
  - .2 ASTM A307-02, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- .2 Canadian Standards Association (CSA International)
  - .1 CAN/CSA-G40.20/G40.21-98, General Requirements for Rolled or Welded Structural Quality Steel.
  - .2 CAN/CSA-G164-M92(R1998), Hot Dip Galvanizing of Irregularly Shaped Articles.
  - .3 CAN/CSA-S16.1-01, Limit States Design of Steel Structures.
  - .4 CSA W48-01, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).
  - .5 CSA W59-1989(R2001), Welded Steel Construction (Metal Arc Welding) (Imperial Version).

**1.2                QUALITY ASSURANCE**

- .1 Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
- .2 Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

**Part 2            Products**

**2.1                MATERIALS**

- .1 Steel sections and plates: to CAN/CSA-G40.20/G40.21.
- .2 Steel pipe: to ASTM A53/A53M.
- .3 Welding materials: to CSA W59.
- .4 Welding electrodes: to CSA W48 Series.
- .5 Bolts and anchor bolts: to ASTM A307.
- .6 Grout: non-shrink, non-metallic, flowable, 15 MPa at 24 hours.

**2.2                FINISHES**

- .1 Galvanizing: hot dipped galvanizing with zinc coating  $600 \text{ g/m}^2$  to CAN/CSA-G164.

**2.3 SHOP PAINTING**

- .1 Apply one shop coat of primer to metal items, with exception of galvanized or concrete encased items.
- .2 Use primer unadulterated, as prepared by manufacturer. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7 degrees C.
- .3 Clean surfaces to be field welded; do not paint.

**Part 3 Execution**

**3.1 ERECTION**

- .1 Do welding work in accordance with CSA W59 unless specified otherwise.
- .2 Make field connections with bolts to CAN/CSA-S16.1, or weld.
- .3 Hand items over for casting into concrete or building into masonry to appropriate trades together with setting templates.
- .4 Touch-up galvanized surfaces with zinc rich primer where burned by field welding.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED SECTIONS**

- .1 Section 01 74 21 – Construction/Demolition Waste Management and Disposal.
- .2 Section 03 30 00 – Cast-in-Place Concrete.

**1.2 REFERENCES**

- .1 Use the latest applicable edition to the following references.
- .2 American National Standards Institute/National Association of Architectural Metal Manufacturers (ANSI/NAAMM)
  - .1 ANSI/NAAMM MBG531, Metal Bar Grating Manual.
- .3 American Society for Testing and Materials International, (ASTM)
  - .1 ASTM A53/A53M, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
  - .2 ASTM A307, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
  - .3 ASTM A325M, Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
- .4 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-1.40, Anti-corrosive Structural Steel Alkyd Primer.
  - .2 CAN/CGSB-1.181, Ready-Mixed Organic Zinc-Rich Coating.
  - .3 CAN/CSA-G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel.
  - .4 CAN/CSA-G164, Hot Dip Galvanizing of Irregularly Shaped Articles.
- .5 Canadian Standards Association (CSA International)
  - .1 CSA W59, Welded Steel Construction (Metal Arc Welding/Imperial Version).
- .6 National Association of Architectural Metal Manufactures (NAAMM)
  - .1 AMP 510, Metal Stair Manual.
- .7 Steel Structures Painting Council (SSPC), Systems and Specifications Manual, Volume 2.

**1.3 SYSTEM DESCRIPTION**

- .1 Design Requirements:
- .2 Design metal stair, balustrade and landing construction and connections to NBC vertical and horizontal live load requirements.
- .3 Detail and fabricate stairs to NAAMM Metal Stairs Manual.

**1.4 SUBMITTALS**

- .1 Shop Drawings
  - .1 Indicate construction details, sizes of steel sections and thickness of steel sheet.

- .2 Submit shop drawing bearing stamp of a qualified professional engineer registered in Province of Ontario.

## **1.5 QUALITY ASSURANCE**

- .1 Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
- .2 Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

## **1.6 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 – Construction/ Demolition Waste Management and Disposal.

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 Steel sections: to CAN/CSA-G40.20/G40.21 Grade 300 W for L and C sections
- .2 Steel plate: to CAN/CSA-G40.20/G40.21, Grade 300 W
- .3 Steel pipe: to ASTM A53/A53M, standard weight, schedule 40 seamless black.
- .4 Steel tubing: to CAN/CSA-G40.20/G40.21, Grade 350 W.
- .5 Metal bar grating: to ANSI/NAAMM MBG 531
- .6 Welding materials: to CSA W59.
- .7 Bolts: to ASTM A307.
- .8 High strength bolts: to ASTM A325M.

### **2.2 FABRICATION**

- .1 Fabricate to NAAMM, Metal Stair Manual.
- .2 Weld connections where possible, otherwise bolt connections. Countersink exposed fastenings, cut off bolts flush with nuts. Make exposed connections of same material, colour and finish as base material on which they occur.
- .3 Accurately form connections with exposed faces flush; mitres and joints tight. Make risers of equal height.
- .4 Grind or file exposed welds and steel sections smooth.
- .5 Shop fabricated stairs in sections as large and complete as practicable.

### **2.3 SHOP PAINTING**

- .1 Clean surfaces in accordance with Steel Structures Painting Council Manual Volume 2.
- .2 Apply one coat of shop primer except interior surfaces of pans.
- .3 Apply two coats of primer of different colours to parts inaccessible after final assembly.
- .4 Use primer as prepared by manufacturer without thinning or adding admixtures. Paint on dry surfaces, free from rust, scale, grease, do not paint when temperature is below 7 degrees C.

- .5 Do not paint surfaces to be field welded.

**Part 3 Execution**

**3.1 INSTALLATION OF STAIRS**

- .1 Install in accordance with NAAMM, Metal Stair Manual.
- .2 Install plumb and true in exact locations, using welded connections wherever possible to provide rigid structure. Provide anchor bolts, bolts and plates for connecting stairs to structure.
- .3 Hand items over for casting into concrete or building into masonry to appropriate trades together with setting templates.
- .4 Do welding work in accordance with CSA W59 unless specified otherwise.
- .5 Touch up shop primer to bolts, welds, and burned or scratched surfaces at completion of erection.

**3.2 CLEANING**

- .1 Perform cleaning as soon as possible after installation to remove construction and accumulated environmental dirt.
- .2 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

**END OF SECTION**

**Part 1            General**

**1.1                REFERENCES**

- .1 American Society for Testing and Materials International (ASTM)
  - .1 ASTM A606-04, Standard Specification for Steel, Sheet and Strip, High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, with Improved Atmospheric Corrosion Resistance.
  - .2 ASTM A653/A653M-07, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
  - .3 ASTM A792/A792M-06a, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
  - .4 ASTM B32-04, Standard Specification for Solder Metal.
  - .5 ASTM B370-03, Standard Specification for Copper Sheet and Strip for Building Construction.
  - .6 ASTM D523-89(1999), Standard Test Method for Specular Gloss.
  - .7 ASTM D822-01(2006), Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings.
- .2 Canadian Roofing Contractors Association (CRCA)
  - .1 Roofing Specifications Manual 1997.
- .3 Canadian Copper in Architecture Design Handbook
- .4 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type.
- .5 Canadian Standards Association (CSA International)
  - .1 CSA A123.3-05, Asphalt Saturated Organic Roofing Felt.

**Part 2            Products**

**2.1                SHEET METAL MATERIALS**

- .1 Copper sheet: to ASTM B370.
- .2 Zinc sheet: to ASTM A918-06
- .3 Zinc coated steel sheet: commercial quality to ASTM A653/A653M, with Z275 designation zinc coating.
- .4 Aluminum-zinc alloy coated steel sheet: to ASTM A792/A792M.
- .5 Stainless steel sheet: to ASTM A167 and ASTM A240/A240M.



**2.2 FABRICATION**

- .1 Fabricate metal flashings and other sheet metal work in accordance with applicable CRCA 'FL' series details and the Copper in Architecture Design Handbook.
- .2 Fabricate aluminum flashings and other sheet aluminum work in accordance with AAI-Aluminum Sheet Metal Work in Building Construction.

**2.3 METAL FLASHINGS**

- .1 Form exterior flashings, copings and fascias to profiles indicated of lead coated copper or zinc.

**Part 3 Execution**

**3.1 MANUFACTURER'S INSTRUCTIONS**

- .1 Compliance: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

**3.2 INSTALLATION**

- .1 Install sheet metal work in accordance with CRCA FL series details, Aluminum Sheet Metal Work in Building Construction and the Copper in Architecture Design Handbook. Use concealed fastenings except where approved before installation.

**END OF SECTION**

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**Part 1            General**

**1.1                RELATED SECTIONS**

- .1            Section 07 84 00 Firestopping

**1.2                REFERENCES**

- .1            Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1            Material Safety Data Sheets (MSDS).
- .2            Underwriter's Laboratories of Canada (ULC)
  - .1            CAN-ULC-S101-04, Standard Methods of fire Endurance Tests of Building Construction and Materials.
  - .2            CAN-ULC-S102-03, Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

**1.3                SUBMITTALS**

- .1            Quality assurance submittals: submit following in accordance with Section 01 45 00 - Quality Control, when requested.
  - .1            Test Reports:
    - .1            Submit product data including certified copies of test reports verifying fireproofing applied to substrate as constructed on project will meet or exceed requirements of Specification.
    - .2            Submit test results in accordance with CAN-ULC-S101 for fire endurance and CAN-ULC-S102 for surface burning characteristics.
    - .3            For assemblies not tested and rated, submit proposals based on related designs using accepted fireproofing design criteria.
  - .2            Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
  - .3            Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence and cleaning procedures.

**1.4                QUALITY ASSURANCE**

- .1            Qualifications:
  - .1            Installer: company person specializing in sprayed-on fireproofing and licenced/approved by manufacturer.

**Part 2            Products**

**2.1                MATERIALS**

- .1            Sprayed fireproofing: ULC certified cementitious or asbestos-free mineral fibre fireproofing qualified for use in ULC Designs specified and fungus resistant for 28 days.

- .2 Curing compound: type recommended by fireproofing manufacturer, qualified for use in ULC Designs specified.
- .3 Sealer: type recommended by fireproofing manufacturer, qualified for use in ULC Design specified.
  - .1 Colour: green
- .4 Fireproofing: minimum dry density and cohesion/adhesion properties as follows:
  - .1 Fireproofing for structural components concealed above ceiling, or within wall, chase, or furred space: minimum average applied dry density of 240 kg per cubic meter and cohesion/adhesion strength of 9.57 kPa.
  - .2 Fireproofing for exposed structural components, except where otherwise specified or indicated: minimum applied dry density of 350 kg per cubic meter and cohesion/adhesion strength of 20.83 kPa.
  - .3 Fireproofing for structural components located in mechanical rooms and storage areas: minimum applied dry density of 640 kg per cubic meter and cohesion/adhesion strength of 350 kPa.
  - .4 Ensure spray-applied fireproofing: does not crack, spall or delaminate under downward deflection conditions over 3 m clear span.
  - .5 Minimum compressive strength: 48 kPa.
  - .6 Spray-Applied fireproofing material: not contribute to corrosion of test panels.
  - .7 Dust removal: not exceed 0.25 gram per square meter.

### **Part 3 Execution**

#### **3.1 MANUFACTURER'S INSTRUCTIONS**

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

#### **3.2 FIELD QUALITY CONTROL**

- .1 Manufacturer's Field Services:
  - .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.
  - .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

**END OF SECTION**

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**Part 1            General**

**1.1                REFERENCES**

- .1    Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1        Material Safety Data Sheets (MSDS).
- .2    Underwriter's Laboratories of Canada (ULC)
  - .1        ULC-S115-1995, Fire Tests of Fire stop Systems.

**1.2                DEFINITIONS**

- .1    Fire Stop Material: device intended to close off opening or penetration during fire or materials that fill openings in wall or floor assembly where penetration is by cables, cable trays, conduits, ducts and pipes and poke-through termination devices, including electrical outlet boxes along with their means of support through wall or floor openings.
- .2    Single Component Fire Stop System: fire stop material that has Listed Systems Design and is used individually without use of high temperature insulation or other materials to create fire stop system.
- .3    Multiple Component Fire Stop System: exact group of fire stop materials that are identified within Listed Systems Design to create on site fire stop system.
- .4    Tightly Fitted; (ref: NBC Part 3.1.9.1.1 and 9.10.9.6.1): penetrating items that are cast in place in buildings of noncombustible construction or have "0" annular space in buildings of combustible construction.
  - .1        Words "tightly fitted" should ensure that integrity of fire separation is such that it prevents passage of smoke and hot gases to unexposed side of fire separation.

**1.3                SUBMITTALS**

- .1    Quality assurance submittals: submit following in accordance with Section 01 45 00 - Quality Control, when requested.
  - .1        Test reports: in accordance with CAN-ULC-S101 for fire endurance and CAN-ULC-S102 for surface burning characteristics.
    - .1            Submit certified test reports from approved independent testing laboratories, indicating compliance of applied fire stopping with specifications for specified performance characteristics and physical properties.
  - .2        Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
  - .3        Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures.

**1.4                QUALITY ASSURANCE**

- .1    Qualifications:

- .1 Installer: company specializing in fire stopping installations and licenced/approved by manufacturer.

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 Fire stopping and smoke seal systems: in accordance with CAN-ULC-S115.
  - .1 Asbestos-free materials and systems capable of maintaining effective barrier against flame, smoke and gases in compliance with requirements of CAN-ULC-S115 and not to exceed opening sizes for which they are intended.
- .2 Service penetration assemblies: systems tested to CAN-ULC-S115.
- .3 Service penetration fire stop components: certified by test laboratory to CAN-ULC-S115.
- .4 Fire-resistance rating of installed fire stopping assembly in accordance with NBC.
- .5 Fire stopping and smoke seals at openings intended for ease of re-entry such as cables: elastomeric seal.
- .6 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal.
- .7 Primers: to manufacturer's recommendation for specific material, substrate, and end use.
- .8 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.
- .9 Damming and backup materials, supports and anchoring devices: to manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.
- .10 Sealants for vertical joints: non-sagging.

## **Part 3 Execution**

### **3.1 MANUFACTURER'S INSTRUCTIONS**

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

**END OF SECTION**

**Part 1            General**

**1.1                RELATED SECTIONS**

- .1        01 35 43 - Health and Safety Requirements.
- .2        01 45 00 - Quality Control.
- .3        01 74 21 - Construction/Demolition Waste Management And Disposal.
- .4        01 78 00 - Closeout Submittals.
- .5        23 05 93 - Testing, Adjusting and Balancing for HVAC.

**1.2                SUBMITTALS**

- .1        Closeout Submittals:
  - .1        Provide operation and maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
  - .2        Operation and maintenance manual approved by, and final copies deposited with, Departmental Representative before final inspection.
  - .3        Operation data to include:
    - .1        Control schematics for systems including environmental controls.
    - .2        Description of systems and their controls.
    - .3        Description of operation of systems at various loads together with reset schedules and seasonal variances.
    - .4        Operation instruction for systems and component.
    - .5        Description of actions to be taken in event of equipment failure.
    - .6        Valves schedule and flow diagram.
    - .7        Colour coding chart.
  - .4        Maintenance data to include:
    - .1        Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.
    - .2        Data to include schedules of tasks, frequency, tools required and task time.
  - .5        Performance data to include:
    - .1        Equipment manufacturer's performance datasheets with point of operation as left after commissioning is complete.
    - .2        Equipment performance verification test results.
    - .3        Special performance data as specified.
    - .4        Testing, adjusting and balancing reports as specified in Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.

- .6 Approvals:
  - .1 Submit two (2) copies of draft Operation and Maintenance Manual to Departmental Representative for approval. Submission of individual data will not be accepted unless directed by Departmental Representative.
  - .2 Make changes as required and re-submit as directed by Departmental Representative.
- .7 Additional data:
  - .1 Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.
- .8 Submit copies of as-built drawings for inclusion in final TAB report.

### **1.3 QUALITY ASSURANCE**

- .1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.
- .2 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29 - Health and Safety Requirements.

### **1.4 MAINTENANCE**

- .1 Furnish spare parts in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Provide one (1) set of special tools required to service equipment as recommended by manufacturers and in accordance with Section 01 78 00 - Closeout Submittals.

## **Part 2 Execution**

### **2.1 PAINTING REPAIRS AND RESTORATION**

- .1 Prime and touch up marred finished paintwork to match original.
- .2 Restore to new condition, finishes which have been damaged.

### **2.2 CLEANING**

- .1 Clean interior and exterior of all systems including strainers

### **2.3 DEMONSTRATION**

- .1 Trial usage to apply to all equipment and systems.
- .2 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.

- .3 Use operation and maintenance manual, as-built drawings, and audio visual aids as part of instruction materials.
- .4 Instruction duration time requirements as specified in appropriate sections.

**2.4 PROTECTION**

- .1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

**END OF SECTION**



**Part 1            General**

**1.1                RELATED SECTIONS**

- .1            01 35 29 - Health and Safety Requirements.
- .2            01 61 00 - Common Product Requirements.
- .3            01 74 11 – Cleaning.
- .4            01 74 21 - Construction/Demolition Waste Management and Disposal.

**1.2                REFERENCES**

Use the latest applicable edition of the following references.

- .1            American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)
  - .1            ANSI/ASHRAE 90.1-SI Edition, Energy Standard for Buildings except Low-Rise Residential Buildings.
- .2            ASTM International Inc.
  - .1            ASTM C335, Standard Test Method for Steady State Heat Transfer Properties of Horizontal Pipe Insulation.
  - .2            ASTM C449/C449M, Standard Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement.
  - .3            ASTM C533, Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation.
  - .4            ASTM C547, Standard Specification for Mineral Fiber Pipe Insulation.
  - .5            ASTM C553, Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
  - .6            ASTM C612, Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
  - .7            ASTM C795, Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.
  - .8            ASTM C921, Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.
- .3            Canadian General Standards Board (CGSB)
  - .1            CGSB 51-GP-52MA, Vapour Barrier, Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.
  - .2            CAN/CGSB 51.53, Poly (Vinyl Chloride) Jacketing Sheet, for Insulated Pipes, Vessels and Round Ducts.
- .4            Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1            Material Safety Data Sheets (MSDS).

- .5 South Coast Air Quality Management District (SCAQMD), California State
  - .1 SCAQMD Rule 1168, Adhesive and Sealant Applications.
- .6 Thermal Insulation Association of Canada (TIAC)
  - .1 National Insulation Standards.
- .7 Underwriters Laboratories of Canada (ULC)
  - .1 CAN/ULC-S102, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

### **1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Product Data:
  - .1 Provide manufacturer's printed product literature and datasheets for insulation and adhesives include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Samples:
  - .1 Provide for approval by Contractor's Engineer: complete assembly of each type of insulation system, insulation, coating, and adhesive proposed.
    - .1 Mount sample on 12 mm plywood board.
    - .2 Affix typewritten label beneath sample indicating service.
- .3 Manufacturer's Instructions:
  - .1 Include procedures to be used and installation standards to be achieved.

## **Part 2 Products**

### **2.1 FIRE AND SMOKE RATING**

- .1 Fire and smoke ratings to CAN/ULC-S102:
  - .1 Maximum flame spread rating: 25.
  - .2 Maximum smoke developed rating: 50.

### **2.2 INSULATION**

- .1 Mineral fibre: includes glass fibre, rock wool, slag wool.
- .2 Thermal conductivity ("k" factor) not to exceed specified values at 24 degrees C mean temperature when tested in accordance with ASTM C335.
- .3 TIAC Code A-1: rigid moulded mineral fibre without factory applied vapour retarder jacket.
  - .1 Mineral fibre: ASTM C547.
  - .2 Maximum "k" factor: ASTM C547.
- .4 TIAC Code A-3: rigid moulded mineral fibre with factory applied vapour retarder jacket.

- .1 Mineral fibre: ASTM C547.
- .2 Jacket: to CGSB 51-GP-52MA.
- .3 Maximum "k" factor: ASTM C547.
- .5 TIAC Code C-1: rigid mineral fibre board, unfaced.
  - .1 Mineral fibre: ASTM C612.
  - .2 Maximum "k" factor: ASTM C612.
- .6 TIAC Code C-4: rigid mineral fibre board faced with factory applied vapour retarder jacket.
  - .1 Mineral fibre: ASTM C612.
  - .2 Jacket: to CGSB 51-GP-52MA.
  - .3 Maximum "k" factor: ASTM C612.
- .7 TIAC Code C-2: mineral fibre blanket unfaced or faced with factory applied vapour retarder jacket (as scheduled in PART 3 of this section).
  - .1 Mineral fibre: ASTM C553.
  - .2 Jacket: to CGSB 51-GP-52MA.
  - .3 Maximum "k" factor: ASTM C553.
- .8 TIAC Code A.6: flexible unicellular tubular elastomer.
  - .1 Insulation: with vapour retarder jacket.
  - .2 Jacket: to CGSB 51-GP-52MA.
  - .3 Maximum "k" factor.
  - .4 Certified by manufacturer free of potential stress corrosion cracking corrodents.
- .9 TIAC Code A-2: rigid moulded calcium silicate in sections and blocks, and with special shapes to suit project requirements.
  - .1 Insulation: ASTM C533.
  - .2 Maximum "k" factor: ASTM C533.
  - .3 Design to permit periodic removal and re-installation.

## **2.3 CEMENT**

- .1 Thermal insulating and finish
  - .1 To: ASTM C449/C449M.
  - .2 Hydraulic setting or Air drying on mineral wool, to ASTM C449.

## **2.4 JACKETS**

- .1 Aluminum:
  - .1 To ASTM B209.
  - .2 Thickness: 0.50 mm sheet.
  - .3 Finish: smooth.
  - .4 Joining: longitudinal and circumferential slip joints with 50 mm laps.

- .5 Fittings: 0.5 mm thick die-shaped fitting covers with factory-attached protective liner.
- .6 Metal jacket banding and mechanical seals: stainless steel, 19 mm wide, 0.5mm thick at 300 mm spacing.

## **2.5 INSULATION SECUREMENTS**

- .1 Tape: self-adhesive, aluminum, reinforced, 50 mm wide minimum.
- .2 Contact adhesive: quick setting.
  - .1 Maximum VOC limit 250 g/L to SCAQMD Rule 1168 and GSES GS-36.
- .3 Canvas adhesive: washable.
  - .1 Maximum VOC limit 80 g/L to SCAQMD Rule 1168 and GSES GS-36.
- .4 Tie wire: 1.5 mm diameter stainless steel.
- .5 Bands: Stainless steel, 19 mm wide, 0.5 mm thick.
- .6 Facing: 25 mm galvanized steel hexagonal wire mesh on both faces of insulation.
- .7 Fasteners: 4 mm diameter pins with 35 mm diameter clips. Length of pin to suit thickness of insulation.

## **2.6 VAPOUR RETARDER LAP ADHESIVE**

- .1 Water based, fire retardant type, compatible with insulation.
  - .1 Maximum VOC limit 80 g/L to SCAQMD Rule 1168 and GSES GS-36.

## **2.7 INDOOR VAPOUR RETARDER FINISH**

- .1 Vinyl emulsion type acrylic, compatible with insulation.

## **2.8 OUTDOOR VAPOUR RETARDER MASTIC**

- .1 Vinyl emulsion type acrylic, compatible with insulation.
- .2 Reinforcing fabric: Fibrous glass, untreated 305 g/m<sup>2</sup>.

## **Part 3 Execution**

### **3.1 APPLICATION**

- .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

### **3.2 PRE- INSTALLATION REQUIREMENTS**

- .1 Pressure testing of equipment and adjacent piping systems complete, witnessed and certified.
- .2 Surfaces clean, dry, free from foreign material.

### **3.3 INSTALLATION**

- .1 Install in accordance with TIAC National Standards
  - .1 Hot equipment: To TIAC code 1503-H.
  - .2 Cold equipment: to TIAC code 1503-C.
- .2 Elastomeric Insulation: to remain dry. Overlaps to manufacturer's instructions. Joints tight and sealed properly.
- .3 Provide vapour retarder as recommended by manufacturer.
- .4 Apply materials in accordance with insulation and equipment manufacturer's instructions and this specification.
- .5 Use two layers with staggered joints when required nominal wall thickness exceeds 75 mm.
- .6 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.
  - .1 Hangers, supports outside vapour retarder jacket.
- .7 Supports, Hangers:
  - .1 Apply high compressive strength insulation, suitable for service, at oversized saddles and shoes where insulation saddles have not been provided.

### **3.4 REMOVABLE, PRE-FABRICATED, INSULATION AND ENCLOSURES**

- .1 Application: At expansion joints, valves, primary flow measuring elements flanges and unions at equipment.
- .2 Installation to permit movement of expansion joint and to permit periodic removal and replacement without damage to adjacent insulation.

### **3.5 EQUIPMENT INSULATION SCHEDULES**

- .1 Includes valves, valve bonnets, strainers, flanges and fittings unless otherwise specified.
- .2 Hot Equipment:
  - .1 TIAC code A-1 with mechanical fastenings or wire or bands and 13 mm cement reinforced with one layer of reinforcing mesh.
  - .2 Thicknesses:
    - Heat exchangers 50 mm

- .3 Breechings:
  - .1 TIAC code A-2 with 25 mm air gap, mechanical fastenings and 13 mm cement reinforced with one layer of reinforcing mesh.
- .4 Finishes:
  - .1 Equipment in mechanical rooms: TIAC code CEF/1 with jacket.
  - .2 Equipment elsewhere: TIAC code CEF/2 with 13 mm cement jacket.

### **3.6 CLEANING**

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.

**END OF SECTION**

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**Part 1            General**

**1.1                SUMMARY**

- .1 Section Includes:
  - .1 Thermal insulation for piping and piping accessories in commercial type applications.
  - .2 Sustainable requirements for construction and verification.
- .3 Related Sections:
  - .1 01 35 29 - Health and Safety Requirements.
  - .2 01 61 00 - Common Product Requirements.
  - .3 01 74 11 – Cleaning.
  - .4 01 74 21 - Construction/Demolition Waste Management and Disposal.

**1.2                REFERENCES**

Use the latest applicable edition of the following references.

- .1 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)
  - .1 ASHRAE Standard 90.1, Energy Standard for Buildings Except Low-Rise Residential Buildings (IESNA co-sponsored; ANSI approved; Continuous Maintenance Standard).
- .2 American Society for Testing and Materials International (ASTM)
  - .1 ASTM B209M, Standard Specification for Aluminum and Aluminum Alloy Sheet and Plate [Metric].
  - .2 ASTM C335, Standard Test Method for Steady State Heat Transfer Properties of Horizontal Pipe Insulation.
  - .3 ASTM C411, Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.
  - .4 ASTM C449/C449M, Standard Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement.
  - .5 ASTM C533, Calcium Silicate Block and Pipe Thermal Insulation.
  - .6 ASTM C547, Mineral Fiber Pipe Insulation.
  - .7 ASTM C795, Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.
  - .8 ASTM C921, Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.
- .3 Canadian General Standards Board (CGSB)
  - .1 CGSB 51-GP-52Ma, Vapour Barrier, Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.

- .2 CAN/CGSB-51.53, Poly (Vinyl Chloride) Jacketting Sheet, for Insulated Pipes, Vessels and Round Ducts
- .4 Department of Justice Canada (Jus)
  - .1 Canadian Environmental Assessment Act (CEAA), c. 37.
  - .2 Canadian Environmental Protection Act (CEPA), c. 33.
  - .3 Transportation of Dangerous Goods Act (TDGA), c. 34.
- .5 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .6 Manufacturer's Trade Associations
  - .1 Thermal Insulation Association of Canada (TIAC): National Insulation Standards.
- .7 Underwriters' Laboratories of Canada (ULC)
  - .1 CAN/ULC-S102, Surface Burning Characteristics of Building Materials and Assemblies.
  - .2 CAN/ULC-S701, Thermal Insulation, Polystyrene, Boards and Pipe Covering.
  - .3 CAN/ULC-S702, Thermal Insulation, Mineral Fibre, for Buildings
  - .4 CAN/ULC-S702.2, Thermal Insulation, Mineral Fibre, for Buildings, Part 2: Application Guidelines.

### **1.3 DEFINITIONS**

- .1 For purposes of this section:
  - .1 "CONCEALED" - insulated mechanical services in suspended ceilings and non-accessible chases and furred-in spaces.
  - .2 "EXPOSED" - will mean "not concealed" as specified.
- .2 TIAC ss:
  - .1 CRF: Code Rectangular Finish.
  - .2 CPF: Code Piping Finish.

### **1.4 SUBMITTALS**

- .1 Product Data:
  - .1 Submit manufacturer's printed product literature, specifications and datasheet. Include product characteristics, performance criteria, and limitations.
- .2 Quality assurance submittals:
  - .1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
  - .2 Instructions: submit manufacturer's installation instructions.
    - .1 Contractor will make available one (1) copy of systems supplier's installation instructions.



## **1.5 QUALITY ASSURANCE**

- .1 Health and Safety:
  - .1 Do construction occupational health and safety in accordance with Section 01 35 29 - Health and Safety Requirements.

## **1.6 DELIVERY, STORAGE AND HANDLING**

- .1 Storage and Protection:
  - .1 Protect from weather, construction traffic.
  - .2 Protect against damage.
  - .3 Store at temperatures and conditions required by manufacturer.

## **Part 2 Products**

### **2.1 Application**

- .1 For use on indoor piping only.

### **2.2 FIRE AND SMOKE RATING**

- .1 In accordance with CAN/ULC-S102.
  - .1 Maximum flame spread rating: 25.
  - .2 Maximum smoke developed rating: 50.

### **2.3 INSULATION**

- .1 Mineral fibre specified includes glass fibre, rock wool, slag wool.
- .2 Thermal conductivity ("k" factor) not to exceed specified values at 24 degrees C mean temperature when tested in accordance with ASTM C335.
- .3 TIAC Code A-1: rigid moulded mineral fibre without factory applied vapour retarder jacket.
  - .1 Mineral fibre: to CAN/ULC-S702 and ASTM C547.
  - .2 Maximum "k" factor: to CAN/ULC-S702.
- .4 TIAC Code A-3: rigid moulded mineral fibre with factory applied vapour retarder jacket.
  - .1 Mineral fibre: to CAN/ULC-S702 and ASTM C547.
  - .2 Jacket: to CGSB 51-GP-52Ma.
  - .3 Maximum "k" factor: to CAN/ULC-S702 and ASTM C547.
- .5 TIAC Code C-2: mineral fibre blanket faced without factory applied vapour retarder jacket (as scheduled in PART 3 of this section).
  - .1 Mineral fibre: to CAN/ULC-S702 and ASTM C547.
  - .2 Jacket: to CGSB 51-GP-52Ma.

- .3 Maximum "k" factor: to CAN/ULC-S702 and ASTM C547.
- .6 TIAC Code A-2: rigid moulded calcium silicate in sections and blocks, and with special shapes to suit project requirements.
  - .1 Insulation: to ASTM C533.
  - .2 Design to permit periodic removal and re-installation.
- 2.4 INSULATION SECUREMENT**
  - .1 Tape: self-adhesive, aluminum, reinforced, 50 mm wide minimum.
  - .2 Contact adhesive: quick setting.
  - .3 Canvas adhesive: washable.
  - .4 Tie wire: 1.5 mm diameter stainless steel.
  - .5 Bands: stainless steel, 19 mm wide, 0.5 mm thick.
- 2.5 CEMENT**
  - .1 Thermal insulating and finishing cement:
    - .1 Air drying on mineral wool, to ASTM C449/C449M.
- 2.6 VAPOUR RETARDER LAP ADHESIVE**
  - .1 Water based, fire retardant type, compatible with insulation.
- 2.7 INDOOR VAPOUR RETARDER FINISH**
  - .1 Vinyl emulsion type acrylic, compatible with insulation.
- 2.8 JACKETS.**
  - .1 Aluminum:
    - .1 To ASTM B209.
    - .2 Thickness: 0.50 mm sheet.
    - .3 Finish: stucco embossed.
    - .4 Joining: longitudinal and circumferential slip joints with 50 mm laps.
    - .5 Fittings: 0.5 mm thick die-shaped fitting covers with factory-attached protective liner.
    - .6 Metal jacket banding and mechanical seals: stainless steel, 19 mm wide, 0.5 mm thick at 300 mm spacing.

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**Part 3 Execution**

**3.1 MANUFACTURER'S INSTRUCTIONS**

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

**3.2 PRE-INSTALLATION REQUIREMENT**

- .1 Pressure testing of piping systems and adjacent equipment to be complete, witnessed and certified.
- .2 Surfaces clean, dry, free from foreign material.

**3.3 INSTALLATION**

- .1 Install in accordance with TIAC National Standards.
- .2 Apply materials in accordance with manufacturers instructions and this specification.
- .3 Use two layers with staggered joints when required nominal wall thickness exceeds 75 mm.
- .4 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.
  - .1 Install hangers, supports outside vapour retarder jacket.
- .5 Supports, Hangers:
  - .1 Apply high compressive strength insulation, suitable for service, at oversized saddles and shoes where insulation saddles have not been provided.

**3.4 REMOVABLE, PRE-FABRICATED, INSULATION AND ENCLOSURES**

- .1 Application: at expansion joints, valves, primary flow measuring elements, flanges and unions at equipment.
- .2 Design: to permit movement of expansion joint and to permit periodic removal and replacement without damage to adjacent insulation.
- .3 Insulation:
  - .1 Insulation, fastenings and finishes: same as system.
  - .2 Jacket: aluminum.

**3.5 INSTALLATION OF ELASTOMERIC INSULATION**

- .1 Insulation to remain dry. Overlap to manufacturer's instructions. Ensure tight joints.
- .2 Provide vapour retarder as recommended by manufacturer.

**3.6 PIPING INSULATION SCHEDULES**

- .1 Includes valves, valve bonnets, strainers, flanges and fittings unless otherwise specified.
- .2 TIAC Code: A-1.
  - .1 Securements: SS bands at 300 mm on centre.
  - .2 Seals: lap seal adhesive, lagging adhesive.
  - .3 Installation: TIAC Code 1501-H.
- .3 TIAC Code: A-3.
  - .1 Securements: SS bands at 300 mm on centre.
  - .2 Seals: VR lap seal adhesive, VR lagging adhesive.
  - .3 Installation: TIAC Code: 1501-C.
- .4 TIAC Code: C-2 without vapour retarder jacket.
  - .1 Insulation securements: SS bands at 300 mm on centre.
  - .2 Seals: lap seal adhesive, lagging adhesive.
  - .3 Installation: TIAC Code: 1501-C.
- .5 TIAC Code: A-2.
  - .1 Insulation securements: SS bands at 300 mm on centre.
  - .2 Seals: lap seal adhesive, lagging adhesive.
  - .3 Installation: TIAC Code: 1501-H.
- .6 Thickness of insulation as listed in following table.
  - .1 Run-outs to individual units and equipment not exceeding 4000 mm long.
  - .2 Do not insulate exposed runouts to plumbing fixtures, chrome plated piping, valves, fittings.

Applica- tion	Temp degrees C	TIAC code	Pipe sizes (NPS) and insulation thickness (mm)					
			Run out	to 1	1 1/4 to 2	2 1/2 to 4	5 to 6	8 & over
LTHW	up to 175	A-1	38	50	65	75	90	90

- .7 Finishes:

- .1 Exposed indoors: aluminum or SS jacket.
- .2 Exposed in mechanical rooms: aluminum or SS jacket.
- .3 Concealed, indoors: canvas on valves, fittings. No further finish.
- .4 Use vapour retarder jacket on TIAC code A-3 insulation compatible with insulation.
- .5 Finish attachments: SS screws and bands, at 150 mm on centre. Seals: wing or closed.
- .6 Installation: to appropriate TIAC code CRF/1 through CPF/5.

### **3.7 CLEANING**

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

**END OF SECTION**

**Part 1            General**

**1.1                RELATED SECTIONS**

- .1    01 35 29 - Health and Safety Requirements.
- .2    01 45 00 - Quality Control.
- .3    01 74 21 - Construction/Demolition Waste Management and Disposal.
- .4    01 78 00 - Closeout Submittals.
- .5    23 05 93 - Testing, Adjusting and Balancing for HVAC.

**1.2                SUBMITTALS**

- .1    Closeout Submittals:
  - .1    Provide operation and maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
  - .2    Operation and maintenance manual approved by, and final copies deposited with, Departmental Representative before final inspection.
  - .3    Operation data to include:
    - .1    Control schematics for systems including environmental controls.
    - .2    Description of systems and their controls.
    - .3    Description of operation of systems at various loads together with reset schedules and seasonal variances.
    - .4    Operation instruction for systems and component.
    - .5    Description of actions to be taken in event of equipment failure.
    - .6    Valves schedule and flow diagram.
    - .7    Colour coding chart.
  - .4    Maintenance data to include:
    - .1    Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.
    - .2    Data to include schedules of tasks, frequency, tools required and task time.
  - .5    Performance data to include:
    - .1    Equipment manufacturer's performance datasheets with point of operation as left after commissioning is complete.
    - .2    Equipment performance verification test results.
    - .3    Special performance data as specified.
    - .4    Testing, adjusting and balancing reports as specified in Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.
  - .6    Approvals:

- .1 Submit two (2) copies of draft Operation and Maintenance Manual to Departmental Representative for approval. Submission of individual data will not be accepted unless directed by Departmental Representative.
- .2 Make changes as required and re-submit as directed by Departmental Representative.
- .7 Additional data:
  - .1 Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.
- .8 As-built drawings:
  - .1 Submit completed reproducible as-built drawings with Operating and Maintenance Manuals.
- .9 Submit copies of as-built drawings for inclusion in final TAB report.

### **1.3 MAINTENANCE**

- .1 Furnish spare parts in accordance with Section 01 78 00 - Closeout Submittals as follows:
  - .1 One set of packing for each pump.
  - .2 One casing joint gasket for each size pump.
  - .3 One glass for each gauge glass.
- .2 Provide one set of special tools required to service equipment as recommended by manufacturers and in accordance with Section 01 78 00 - Closeout Submittals.
- .3 Furnish one commercial quality grease gun, grease and adapters to suit different types of grease and grease fittings.

### **Part 2 Products**

#### **2.1 N/A**

### **Part 3 Execution**

#### **3.1 PAINTING REPAIRS AND RESTORATION**

- .1 Prime and touch up marred finished paintwork to match original.
- .2 Restore to new condition, finishes which have been damaged.

#### **3.2 CLEANING**

- .1 Clean interior and exterior of all systems including strainers.

**3.3 FIELD QUALITY CONTROL**

- .1 Site Tests: conduct following tests in accordance with Section 01 45 00 - Quality Control and submit report as described in PART 1 - SUBMITTALS.

**3.4 DEMONSTRATION**

- .1 Contractor's Engineer will use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.
- .2 Trial usage to apply to all equipment and systems.
- .3 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.
- .4 Use operation and maintenance manual, as-built drawings, and audio visual aids as part of instruction materials.
- .5 Instruction duration time requirements as specified in appropriate sections.

**3.5 PROTECTION**

- .1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

**END OF SECTION**



**Part 1            General**

**1.1                RELATED SECTIONS**

- .1    01 78 00 - Closeout Submittals.
- .2    01 91 13 - General Commissioning (Cx) Requirements.
- .3    21 05 01 - Common Work Results for Mechanical.
- .4    23 05 05 - Installation of Pipe work.
- .5    23 05 23 01 - Valves – Bronze.
- .6    23 05 23 02 - Valves - Cast Iron.
- .7    23 05 93 - Testing, Adjusting and Balancing for HVAC.

**1.2                REFERENCES**

Use the latest applicable edition of the following references.

- .1    American National Standards Institute (ANSI)/American Society of Mechanical Engineers International (ASME)
  - .1    ANSI/ASME B16.15, Cast Bronze Threaded Fittings, Classes 125 and 250.
  - .2    ANSI/ASME B16.18, Cast Copper Alloy Solder Joint Pressure Fittings.
  - .3    ANSI/ASME B16.22, Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
  - .4    ANSI/ASME B16.24, Cast Copper Alloy Pipe Flanges and Flanged Fittings, Class 150, 300, 400, 600, 900, 1500 and 2500.
- .2    ASTM International Inc.
  - .1    ASTM A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
  - .2    ASTM A536, Standard Specification for Ductile Iron Castings.
  - .3    ASTM B88M, Standard Specification for Seamless Copper Water Tube (Metric).
- .3    American National Standards Institute/American Water Works Association (ANSI)/(AWWA)
  - .1    ANSI/AWWA C111/A21.11, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
- .4    Canadian Standards Association (CSA International)
  - .1    CSA B242, Groove and Shoulder Type Mechanical Pipe Couplings.
- .5    Department of Justice Canada (Jus)

- .1 Canadian Environmental Protection Act, c. 33 (CEPA).
- .6 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .7 Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS).
  - .1 MSS-SP-70, Gray Iron Gate Valves, Flanged and Threaded Ends.
  - .2 MSS-SP-71, Gray Iron Swing Check Valves, Flanged and Threaded Ends.
  - .3 MSS-SP-80, Bronze Gate, Globe, Angle and Check Valves.
- .8 National Research Council (NRC)/Institute for Research in Construction
  - .1 NRCC 38728, National Plumbing Code of Canada (NPC).
- .9 Transport Canada (TC)
  - .1 Transportation of Dangerous Goods Act, c. 34 (TDGA).

## **Part 2 Products**

### **2.1 PIPING**

- .1 Domestic hot, cold and recirculation systems, within building.
  - .1 Above ground: copper tube, hard drawn, type K and M: to ASTM B88M.
  - .2 Buried or embedded: copper tube, soft annealed, type L: to ASTM B88M, in long lengths and with no buried joints.

### **2.2 FITTINGS**

- .1 Bronze pipe flanges and flanged fittings, Class 150: to ANSI/ASME B16.24.
- .2 Cast bronze threaded fittings, Class 125: to ANSI/ASME B16.15.
- .3 Cast copper, solder type: to ANSI/ASME B16.18.
- .4 Wrought copper and copper alloy, solder type: to ANSI/ASME B16.22.
- .5 NPS 2 and larger: ANSI/ASME B16.18 or ANSI/ASME B16.22 roll grooved to CSA B242.
- .6 NPS 1 1/2 and smaller: wrought copper to ANSI/ASME B16.22; with 301 stainless steel internal components and EPDM seals. Suitable for operating pressure to 1380 kPa.

### **2.3 JOINTS**

- .1 Rubber gaskets, latex-free 1.6 mm thick: to AWWA C111.
- .2 Bolts, nuts, hex head and washers: to ASTM A307, heavy series.
- .3 Solder: 95/5.

- .4 Teflon tape: for threaded joints.
- .5 Grooved couplings: designed with angle bolt pads to provide rigid joint, complete with EPDM gasket.
- .6 Dielectric connections between dissimilar metals: dielectric fitting, complete with thermoplastic liner.

## **2.4 GATE VALVES**

- .1 NPS 2 and under, soldered:
  - .1 Rising stem: to MSS-SP-80, Class 125, 860 kPa, bronze body, screw-in bonnet, solid wedge disc as specified Section 23 05 23.01 - Valves - Bronze.
- .2 NPS 2 and under, screwed:
  - .1 Rising stem: to MSS-SP-80, Class 125, 860 kPa, bronze body, screw-in bonnet, solid wedge disc as specified Section 23 05 23.01 - Valves - Bronze.
- .3 NPS 2 1/2 and over, in mechanical rooms, flanged:
  - .1 Rising stem: to MSS-SP-70, Class 125, 860 kPa, flat flange faces, cast-iron body, OS&Y bronze trim specified Section 23 05 23.02 - Valves - Cast Iron.

## **2.5 GLOBE VALVES**

- .1 NPS2 and under, soldered:
  - .1 To MSS-SP-80, Class 125, 860 kPa, bronze body, renewable composition disc, screwed over bonnet as specified Section 23 05 23.01 - Valves - Bronze.
  - .2 Lock shield handles: as required.
- .2 NPS 2 and under, screwed:
  - .1 To MSS-SP-80, Class 150, 1 MPa, bronze body, screwed over bonnet, renewable composition disc as specified Section 23 05 23.01 - Valves - Bronze.
  - .2 Lock shield handles: as required.

## **2.6 SWING CHECK VALVES**

- .1 NPS 2 and under, soldered:
  - .1 To MSS-SP-80, Class 125, 860 kPa, bronze body, bronze swing disc, screw in cap, regrindable seat as specified Section 23 05 23.01 - Valves - Bronze.
- .2 NPS 2 and under, screwed:
  - .1 To MSS-SP-80, Class 125, 860 kPa, bronze body, bronze swing disc, screw in cap, regrindable seat as specified Section 23 05 23.01 - Valves - Bronze.
- .3 NPS 2 1/2 and over, flanged:
  - .1 To MSS-SP-71, Class 125, 860 kPa, cast iron body, flat flange faces, renewable seat, bronze disc, bolted cap specified Section 23 05 23.02 - Valves - Cast Iron: Gate, Globe, Check.

## **2.7 BALL VALVES**

- .1 NPS 2 and under, screwed:
  - .1 Class 150.
  - .2 Bronze body, chrome plated brass ball, PTFE adjustable packing, brass gland and PTFE seat, steel lever handle as specified Section 23 05 23.01 - Valves - Bronze.
- .2 NPS 2 and under, soldered:
  - .1 To ANSI/ASME B16.18, Class 150.
  - .2 Bronze body, chrome plated brass ball, PTFE adjustable packing, brass gland and PTFE seat, steel lever handle, with NPT to copper adaptors as specified Section 23 05 23.01 - Valves - Bronze.

## **Part 3 Execution**

### **3.1 APPLICATION**

- .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

### **3.2 INSTALLATION**

- .1 Install in accordance with NPC and Province Plumbing Code and local authority having jurisdiction.
- .2 Install pipe work in accordance with Section 23 05 05 - Installation of Pipe work, supplemented as specified herein.
- .3 Assemble piping using fittings manufactured to ANSI standards.
- .4 Install CWS piping below and away from HWS and HWC and other hot piping so as to maintain temperature of cold water as low as possible.
- .5 Connect to fixtures and equipment in accordance with manufacturer's written instructions unless otherwise indicated.
- .6 Buried tubing:
  - .1 Lay in well compacted washed sand in accordance with AWWA Class B bedding.
  - .2 Bend tubing without crimping or constriction. Minimize use of fittings.

### **3.3 VALVES**

- .1 Isolate equipment, fixtures and branches with gate or ball valves.

### **3.4 PRESSURE TESTS**

- .1 Conform to requirements of Section 21 05 01 - Common Work Results for Mechanical.
- .2 Test pressure: greater of 1 time maximum system operating pressure or 860 kPa.

### **3.5 PRE-START-UP INSPECTIONS**

- .1 Systems to be complete, prior to flushing, testing and start-up.
- .2 Verify that system can be completely drained.
- .3 Ensure that air chambers, expansion compensators are installed properly.

### **3.6 START-UP**

- .1 Timing: start up after:
  - .1 Pressure tests have been completed.
  - .2 Certificate of static completion has been issued.
- .2 Provide continuous supervision during start-up.

### **3.7 PERFORMANCE VERIFICATION**

- .1 Reports:
  - .1 In accordance with Section 01 91 13 - General Commissioning (Cx)  
Requirements: Reports, using report forms as specified in Section 01 91 13 -  
General Commissioning (Cx) Requirements: Report Forms and Schematics.
  - .2 Include certificate of water flow and pressure tests conducted on incoming water  
service, demonstrating adequacy of flow and pressure.

### **3.8 OPERATION REQUIREMENTS**

- .1 Co-ordinate operation and maintenance requirements including, cleaning and  
maintenance of specified materials and products with Section 23 05 05 - Installation of  
Pipe work.
- .2 Operation, include:
  - .1 Cleaning materials and schedules.
  - .2 Repair and maintenance materials and instructions.

### **3.9 CLEANING**

- .1 Clean in accordance with Section 01 74 11 - Cleaning.

**END OF SECTION**

**Part 1            General**

**1.1                RELATED SECTIONS**

- .1        01 61 00 - Common Product Requirements.
- .2        01 74 11 – Cleaning.
- .3        01 74 21 - Construction/Demolition Waste Management and Disposal.
- .4        23 0 593 - Testing, Adjusting and Balancing for HVAC.

**1.2                REFERENCES**

Use the latest applicable edition of the following references.

- .1        ASTM International Inc.
  - .1        ASTM B32, Standard Specification for Solder Metal.
  - .2        ASTM B306, Standard Specification for Copper Drainage Tube (DWV).
  - .3        ASTM C564, Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
- .2        Canadian Standards Association (CSA International).
  - .1        CSA B67, Lead Service Pipe, Waste Pipe, Traps, Bends and Accessories.
  - .2        CAN/CSA-B70, Cast Iron Soil Pipe, Fittings and Means of Joining.
  - .3        CAN/CSA-B125.3, Plumbing Fittings.
- .3        Green Seal Environmental Standards (GSES)
  - .1        Standard GS-36, Commercial Adhesives.
- .4        South Coast Air Quality Management District (SCAQMD), California State
  - .1        SCAQMD Rule 1168, Adhesive and Sealant Applications.

**Part 2            Products**

**2.1                COPPER TUBE AND FITTINGS**

- .1        Above ground sanitary vent Type DWV to: ASTM B306.
  - .1        Fittings.
    - .1        Cast brass: to CAN/CSA-B125.3.
    - .2        Wrought copper: to CAN/CSA-B125.3.
  - .2        Solder: tin-lead, 50:50, type 50A, to ASTM B32.

## **2.2 CAST IRON PIPING AND FITTINGS**

- .1 Buried sanitary, storm and vent minimum NPS 3, to: CAN/CSA-B70, with one layer of protective polyurethane coating.
  - .1 Joints:
    - .1 Mechanical joints:
      - .1 Neoprene or butyl rubber compression gaskets: to ASTM C564 or CAN/CSA-B70.
      - .2 Stainless steel clamps.
    - .2 Hub and spigot:
      - .1 Caulking lead: to CSA B67.
      - .2 Cold caulking compounds.
  - .2 Above ground sanitary, storm and vent: to CAN/CSA-B70.
    - .1 Mechanical joints:
      - .1 Neoprene or butyl rubber compression gaskets with stainless steel clamps.

## **Part 3 Execution**

### **3.1 APPLICATION**

- .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

### **3.2 INSTALLATION**

- .1 In accordance with Section 23 05 01 - Use of HVAC Systems During Construction.
- .2 Install in accordance with National Plumbing Code, Provincial Plumbing Code, and local authority having jurisdiction.

### **3.3 TESTING**

- .1 Pressure test buried systems before backfilling.
- .2 Hydraulically test to verify grades and freedom from obstructions.

### **3.4 CLEANING**

- .1 Clean in accordance with Section 01 74 11 - Cleaning.

**END OF SECTION**

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**Part 1            General**

**1.1                SUMMARY**

- .1    Section Includes:
  - .1        Materials and installation for piping, fittings, equipment used in compressed air systems.
  - .2        Sustainable requirements for construction and verification.
- .2    Related Sections:
  - .1        01 35 29 - Health and Safety Requirements.
  - .2        01 45 00 - Quality Control.
  - .3        01 78 00 - Closeout Submittals.
  - .4        21 05 01 - Common Work Results for Mechanical.
  - .5        23 05 16 - Expansion Fittings and Loops for HVAC Piping.
  - .6        23 05 17 - Pipe Welding.
  - .7        23 08 01 - Performance Verification of Mechanical Piping Systems.
  - .8        23 08 02 - Cleaning and Start-Up of Mechanical Piping Systems.

**1.2                REFERENCES**

Use the latest applicable edition of the following references.

- .1    American Society of Mechanical Engineers (ASME)
  - .1        ASME Boiler and Pressure Vessel Code Section VIII Pressure Vessels.
    - .1            BPVC-VIII B, BPVC Section VIII - Rules for Construction of Pressure Vessels Division 1.
    - .2            BPVC-VIII-2 B, BPVC Section VIII - Rules for Construction of Pressure Vessels Division 2 - Alternative Rules.
    - .3            BPVC-VIII-3 B, BPVC Section VIII - Rules for Construction of Pressure Vessels Division 3 - Alternative Rules High Press Vessels.
  - .2        ASME B16.5, Pipe Flanges and Flanged Fittings.
  - .3        ASME B16.11, Forged Fittings, Socket-Welding and Threaded.
- .2    American Society for Testing and Materials International (ASTM)
  - .1        ASTM A53/A53M, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
  - .2        ASTM A181/A181M, Standard Specification for Carbon Steel Forgings for General Purpose Piping.
- .3    Canadian Standards Association (CSA International)
  - .1        CSA B51, Boiler, Pressure Vessel, and Pressure Piping Code.



- .4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).

## **Part 2 Products**

### **2.1 AIR COMPRESSOR**

- .1 General: Two (2) stage, air-cooled, reciprocating, vertical or horizontal, tank-mounted or base-mounted, V-belt driven.
- .2 Motor: standard protected.
- .3 Control:
  - .1 Manual control with H-0-A starter switch.
  - .2 Pressure switch to cut out and with minimum differential pressure.
- .4 Accessories: belt guard and pressure gauges.
- .5 Air intakes: complete with bird screen, replaceable cartridge type intake filter and silencer.
- .6 Capacity: as required.
- .7 Vibration isolation: 95% minimum efficiency.

### **2.2 AIR RECEIVER**

- .1 Vertical or horizontal tank: to CSA B51, ASME Section VIII and provincial regulations. Capacity: as required.
- .2 Accessories: adjustable pressure regulator, safety valve, 125 mm diameter gauge with pressure range of 0 to 1500 kPa, drain cock and automatic condensate trap.
- .3 Provincial inspector's certificate and label.
- .4 Finish: shop primed, ready for field painting.

### **2.3 REFRIGERATED AIR DRYER**

- .1 Self-contained, hermetically sealed, complete with air cooled heat exchanger, compressor, automatic controls, moisture removal trap, wiring, piping and refrigerant charge.
- .2 Inlet and outlet connections to be factory insulated.
- .3 Capacity as required:

- .1 Dew point of minus 35 degrees C, 800 kPa and 35 degrees C inlet air at evaporator. 20 degrees C air to condenser.
- .2 Size to operate at 40 % of time at design capacity.
- .4 Electrical supply: as required.

#### **2.4 COMBINATION FILTER-REGULATOR**

- .1 Factory assembled, heavy-duty with mounting bracket and low pressure side relief valve.
- .2 Maximum inlet pressure: 800 kPa.
- .3 Operating temperature: minus 18 degrees C to plus 52 degrees C.
- .4 Filter element: 40 micron. Bowls: polycarbonate.
- .5 Pressure range in regulator: 34 kPa to 800 kPa.
- .6 Gauge range: 0 kpa to 1100 kPa.

#### **2.5 PIPING**

- .1 Piping: to ASTM A53/A53M, schedule 80 seamless black steel.
- .2 Fittings:
  - .1 NPS2 and smaller: to ASME B16.11, schedule 80 steel, socket welded.
  - .2 NPS2 1/2 and larger: to ASME B16.11, schedule 80 steel, butt or socket welded.
- .3 Couplings: to ASME B16.11, socket welded or threaded half coupling type.
- .4 Unions: 1000 kPa malleable iron with brass-to-iron ground seat.
- .5 Dissimilar metal junctions: use dielectric unions.
- .6 Flanges:
  - .1 NPS2 and smaller: to ASME B16.5, forged steel, raised face and socket welded.
  - .2 NPS2 1/2 and larger: to ASME B16.5, forged steel, raised face and slip-on or weld neck.
- .7 Joints:
  - .1 NPS2 and smaller: socket welded.
  - .2 NPS2 1/2 and larger: butt welded.

#### **2.6 BALL VALVES**

- .1 Three piece design or top entry for ease of in-line maintenance.
  - .1 To ASTM A181/A181M, Class 70, carbon steel body screwed ends, carbon steel ball and associated trim suitable for compressed air application.

.2 To withstand 1034 kPa maximum pressure.

## **2.7 COUPLERS/CONNECTORS**

- .1 Industrial interchange series, full-bore.
- .2 Maximum inlet pressure: 1700 kPa.
- .3 Valve seat: moulded nylon.
- .4 Body: zinc plated steel.
- .5 Threads: NPT.

## **Part 3 Execution**

### **3.1 MANUFACTURER'S INSTRUCTIONS**

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

### **3.2 COMPRESSOR STATION**

- .1 Install on vibration isolators on housekeeping pad as indicated.

### **3.3 REFRIGERATED AIR DRYER**

- .1 Install on three-valve bypass.
- .2 Install tee connection after dryer for emergency connection to instrument control air system.

### **3.4 COMPRESSED AIR LINE FILTER**

- .1 Install on discharge line from refrigerated air dryer.

### **3.5 MAIN AIR PRESSURE REGULATORS**

- .1 Install at air compressor station.
- .2 Install additional regulators as required.

### **3.6 COMPRESSED AIR PIPING CONNECTIONS AND INSTALLATION**

- .1 Install flexible connection in accordance with Section 23 05 16 - Expansion Fittings and Loops for HVAC Piping.
- .2 Install shut-off valves at outlets, major branch lines and in locations as indicated.

- .3 Install quick-coupler chucks and pressure gauges on drop pipes.
- .4 Install unions to permit removal or replacement of equipment.
- .5 Install tees in lieu of elbows at changes in direction of piping. Install plug in open ends of tees.
- .6 Grade piping at 1% slope minimum.
- .7 Install compressed air trap and pressure equalizing pipe at moisture collecting points. Drain pipe to nearest floor drain.
- .8 Make branch connections from top of main.
- .9 Install compressed air trap at bottom of risers and at low points in mains, piped to nearest drain. Distance between drain points to be 30 m maximum.
- .10 Provide drain from refrigerated air dryer.
- .11 Weld steel piping in accordance with Section 23 05 17 - Pipe Welding and;
  - .1 To ASME code and requirements of authority having jurisdiction.
  - .2 Weld concealed and inaccessible piping regardless of size.

### **3.7 FIELD QUALITY CONTROL**

- .1 Site Tests/Inspection:
  - .1 Testing: pressure test in accordance with requirements of Section 21 05 01 - Common Work Results for Mechanical, for 4 h minimum, to 1100 kPa, with outlets closed and with compressor isolated from system. Pressure drop not to exceed 10 kPa.

### **3.8 CLEANING**

- .1 Refer to Section 23 08 01 - Performance Verification of Mechanical Piping Systems and Section 23 08 02 - Cleaning and Start-Up of Mechanical Piping System.
- .2 Cleaning: blow out piping to clean interior thoroughly of oil and foreign matter.
- .3 Check entire installation is approved by authority having jurisdiction.
- .4 Perform cleaning operations as specified in Section 01 74 11 - Cleaning and in accordance with manufacturer's recommendations.

**END OF SECTION**

**Part 1 General**

**1.1 SUMMARY**

- .1 Section Includes:
  - .1 Materials and installation for plumbing specialties and accessories..
  - .2 Sustainable requirements for construction and verification.
- .2 Related Sections:
  - .1 01 35 29 - Health and Safety Requirements.
  - .2 01 45 00 - Quality Control.
  - .3 01 78 00 - Closeout Submittals.
  - .4 01 91 13 - General Commissioning (Cx) Requirements.

**1.2 REFERENCES**

Use the latest applicable edition of the following references.

- .1 American Society for Testing and Materials International (ASTM).
  - .1 ASTM A126, Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings.
  - .2 ASTM B62, Specification for Composition Bronze or Ounce Metal Castings.
- .2 American Water Works Association (AWWA).
  - .1 AWWA C700, Cold Water Meters-Displacement Type, Bronze Main Case.
  - .2 AWWA C701, Cold Water Meters-Turbine Type for Customer Service.
  - .3 AWWA C702-1, Cold Water Meters-Compound Type.
- .3 Canadian Standards Association (CSA International).
  - .1 CSA-B64 Series, Backflow Preventers and Vacuum Breakers.
  - .2 CSA-B79, Floor, Area and Shower Drains, and Cleanouts for Residential Construction.
  - .3 CSA-B356, Water Pressure Reducing Valves for Domestic Water Supply Systems.
- .4 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
  - .1 Material Safety Data Sheets (MSDS).
- .5 Plumbing and Drainage Institute (PDI).
  - .1 PDI-G101, Testing and Rating Procedure for Grease Interceptors with Appendix of Sizing and Installation Data.
  - .2 PDI-WH201, Water Hammer Arresters Standard.

### **1.3 SUBMITTALS**

- .1 Closeout submittals: submit maintenance and engineering data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals, include:
  - .1 Description of plumbing specialties and accessories, giving manufacturers name, type, model, year and capacity.
  - .2 Details of operation, servicing and maintenance.
  - .3 Recommended spare parts list.

## **Part 2 Products**

### **2.1 FLOOR DRAINS**

- .1 Floor Drains and Trench Drains: to CSA B79.
- .2 Type 2: heavy duty; cast iron body, heavy duty non-tilting or hinged lacquered cast iron grate, integral seepage pan and clamping collar.
- .3 Type 3: combination funnel floor drain; cast iron body with integral seepage pan, clamping collar, nickel-bronze adjustable head strainer with integral funnel.

### **2.2 CLEANOUTS**

- .1 Cleanout Plugs: heavy cast iron male ferrule with brass screws and threaded brass or bronze plug. Sealing-caulked lead seat or neoprene gasket.
- .2 Access Covers:
  - .1 Wall Access: face or wall type, polished nickel bronze or stainless steel square and or round cover with flush head securing screws, bevelled edge frame complete with anchoring lugs.
  - .2 Floor Access: cast box with anchor lugs and:
    - .1 Plugs: bolted bronze with neoprene gasket.
    - .2 Cover for Unfinished Concrete Floors: cast iron round or square, gasket, vandal-proof screws.

### **2.3 WATER HAMMER ARRESTORS**

- .1 Copper construction, piston type: to PDI-WH201.

### **2.4 BACK FLOW PREVENTERS**

- .1 Preventers: to CSA-B64 Series, application as required, back flow preventer with intermediate atmospheric vent.

### **2.5 VACUUM BREAKERS**

- .1 Breakers: to CSA-B64 Series, vacuum breaker atmospheric.

## **2.6 PRESSURE REGULATORS**

- .1 Capacity: as required.
- .2 Up to NPS1-1/2 bronze bodies, screwed: to ASTM B62.
- .3 NPS2 and over, semi-steel bodies, Class 125, flanged: to ASTM A126, Class B.
- .4 Semi-steel spring chambers with bronze trim.

## **2.7 WATER MAKE-UP ASSEMBLY**

- .1 Complete with backflow preventer pressure gauge on inlet and outlet, pressure reducing valve to CSA B356, pressure relief valve on low pressure side and gate valves on inlet and outlet.

## **2.8 STRAINERS**

- .1 860 kPa, Y type with 20 mesh, monel, bronze or stainless steel removable screen.
- .2 NPS2 and under, bronze body, screwed ends, with brass cap.
- .3 NPS2 1/2 and over, cast iron body, flanged ends, with bolted cap.

## **Part 3 Execution**

### **3.1 MANUFACTURER'S INSTRUCTIONS**

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheet.

### **3.2 INSTALLATION**

- .1 Install in accordance with National Plumbing Code of Canada and provincial codes.
- .2 Install in accordance with manufacturer's instructions and as specified.

### **3.3 CLEANOUTS**

- .1 Install cleanouts at base of soil and waste stacks, and rainwater leaders, at locations required code, and as indicated.
- .2 Bring cleanouts to wall or finished floor unless serviceable from below floor.
- .3 Building drain cleanout and stack base cleanouts: line size to maximum NPS4.

### **3.4 WATER HAMMER ARRESTORS**

- .1 Install on branch supplies to fixtures or group of fixtures.

### **3.5 BACK FLOW PREVENTORS**

- .1 Install in accordance with CSA-B64 Series, where indicated and elsewhere as required by code.
- .2 Pipe discharge to terminate over nearest drain.

### **3.6 STRAINERS**

- .1 Install with sufficient room to remove basket.

### **3.7 WATER MAKE-UP ASSEMBLY**

- .1 Install on valved bypass.
- .2 Pipe discharge from relief valve to nearest floor drain.

### **3.8 START-UP**

- .1 General:
  - .1 In accordance with Section 01 91 13 - General Commissioning (Cx)  
Requirements: General Requirements, supplemented as specified herein.
- .2 Timing: start-up only after:
  - .1 Pressure tests have been completed.
  - .2 Disinfection procedures have been completed.
  - .3 Certificate of static completion has been issued.
  - .4 Water treatment systems operational.
- .3 Provide continuous supervision during start-up.

### **3.9 TESTING AND ADJUSTING**

- .1 General:
  - .1 In accordance with Section 01 91 13- General Commissioning (Cx)  
Requirements : General Requirements, supplemented as specified.
- .2 Application tolerances:
  - .1 Pressure at fixtures: +/- 70 kPa.
  - .2 Flow rate at fixtures: +/- 20%.
- .3 Adjustments:
  - .1 Verify that flow rate and pressure meet design criteria.



- .2 Make adjustments while flow rate or withdrawal is (1) maximum and (2) 25% of maximum and while pressure is (1) maximum and (2) minimum.
- .4 Commissioning Reports:
  - .1 In accordance with Section 01 91 13 - General Commissioning (Cx)  
Requirements: Reports, supplemented as specified.
- .5 Training:
  - .1 In accordance with Section 01 91 13 - General Commissioning (Cx)  
Requirements: Training of O&M Personnel, supplemented as specified.
  - .2 Demonstrate full compliance with Design Criteria.

**END OF SECTION**

**Part 1            General**

**1.1                RELATED SECTIONS**

- .1    01 35 29 - Health and Safety Requirements.
- .2    01 45 00 - Quality Control.
- .3    01 74 21 - Construction/Demolition Waste Management and Disposal.
- .4    01 78 00 - Closeout Submittals.
- .5    23 05 93 - Testing, Adjusting and Balancing for HVAC

**1.2                SUBMITTALS**

- .1    Closeout Submittals:
  - .1    Provide operation and maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
  - .2    Operation and maintenance manual approved by, and final copies deposited with, Departmental Representative before final inspection.
  - .3    Operation data to include:
    - .1    Control schematics for systems including environmental controls.
    - .2    Description of systems and their controls.
    - .3    Description of operation of systems at various loads together with reset schedules and seasonal variances.
    - .4    Operation instruction for systems and component.
    - .5    Description of actions to be taken in event of equipment failure.
    - .6    Valves schedule and flow diagram.
    - .7    Colour coding chart.
  - .4    Maintenance data to include:
    - .1    Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.
    - .2    Data to include schedules of tasks, frequency, tools required and task time.
  - .5    Performance data to include:
    - .1    Equipment manufacturer's performance datasheets with point of operation as left after commissioning is complete.
    - .2    Equipment performance verification test results.
    - .3    Special performance data as specified.
    - .4    Testing, adjusting and balancing reports as specified in Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.
- .6    Approvals:

- .1 Submit two (2) copies of draft Operation and Maintenance Manual to Departmental Representative for approval. Submission of individual data will not be accepted unless directed by Departmental Representative.
- .2 Make changes as required and re-submit as directed by Departmental Representative.
- .7 Additional data:
  - .1 Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.
- .8 As-built drawings:
  - .1 Submit completed reproducible as-built drawings with Operating and Maintenance Manuals.
- .9 Submit copies of as-built drawings for inclusion in final TAB report.

### **1.3 QUALITY ASSURANCE**

- .1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.
- .2 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29 - Health and Safety Requirements.

## **Part 2 Execution**

### **2.1 CLEANING**

- .1 Clean interior and exterior of all systems including strainers. Vacuum interior of ductwork and air handling units.

### **2.2 DEMONSTRATION**

- .1 Contractor's Engineer will use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.
- .2 Trial usage to apply to following equipment and systems:
  - .1 Safeties, interlocks, alarms and emergency modes.
  - .2 Boilers and all equipment and systems related to their operation.
- .3 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.
- .4 Use operation and maintenance manual, as-built drawings, and audio visual aids as part of instruction materials.
- .5 Instruction duration time requirements as specified in appropriate sections.

**2.3 PROTECTION**

- .1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

**END OF SECTION**

**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1            01 61 00 - Common Product Requirements.
- .2            23 08 02 - Cleaning and Start-up of Mechanical Piping Systems.
- .3            07 84 00 - Fire Stopping.

**1.2                REFERENCES**

Use the latest applicable edition of the following references.

- .1            Canadian General Standards Board (CGSB)
  - .1            CAN/CGSB-1.181, Ready-Mixed Organic Zinc-Rich Coating.
- .2            Canadian Standards Association (CSA International)
  - .1            CSA B139, Installation Code for Oil Burning Equipment.
  - .2            CSA B149.1, Natural Gas and Propane Installation Code.
- .3            Green Seal Environmental Standards (GSES)
  - .1            Standard GS-11, Environmental Standard for Paints and Coatings.
- .4            National Fire Code of Canada (NFCC)

**1.3                ACTION AND INFORMATIONAL SUBMITTALS**

- .1            Product Data:
  - .1            Provide manufacturer's printed product literature, specifications and datasheets for piping and equipment and include product characteristics, performance criteria, physical size, finish and limitations.

**Part 2            Products**

**2.1                MATERIAL**

- .1            Paint: zinc-rich to CAN/CGSB-1.181.
  - .1            Primers, paints: in accordance with manufacturer's recommendations for surface conditions.
  - .2            Primer: maximum VOC limit 100 g/L to Standard GS-11.
  - .3            Paints: maximum VOC limit 300 g/L to Standard GS-11.
- .2            Sealants: maximum VOC limit to SCAQMD Rule 1168 or to GSES GS-36, whichever is most stringent.

- .3 Adhesives: maximum VOC limit to SCAQMD Rule 1168 or to GSES GS-36, whichever is more stringent.
- .4 Fire Stopping: in accordance with Section 07 84 00 - Fire Stopping.

### **Part 3 Execution**

#### **3.1 APPLICATION**

- .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

#### **3.2 CONNECTIONS TO EQUIPMENT**

- .1 In accordance with manufacturer's instructions unless otherwise indicated.
- .2 Use valves and either unions or flanges for isolation and ease of maintenance and assembly.
- .3 Use double swing joints when equipment mounted on vibration isolation and when piping subject to movement.

#### **3.3 CLEARANCES**

- .1 Provide clearance around systems, equipment and components for observation of operation, inspection, servicing, maintenance and as recommended by manufacturer, National Fire Code of Canada, CSA B139 and CSA B149.
- .2 Provide space for disassembly, removal of equipment and components as recommended by manufacturer, CSA B139 and CSA B149 without interrupting operation of other system, equipment, and components.

#### **3.4 DRAINS**

- .1 Install piping with grade in direction of flow.
- .2 Install drain valve at low points in piping systems, at equipment and at section isolating valves.
- .3 Pipe each drain valve discharge separately to above floor drain.
  - .1 Discharge to be visible.
- .4 Drain valves: NPS 3/4 gate or globe valves, with hose end male thread, cap and chain.

#### **3.5 AIR VENTS**

- .1 Install air vents to CSA B139, CSA B149 and ASME B31.1 at high points in piping systems.
- .2 Install isolating valve at each automatic air valve.

- .3 Install drain piping to approved location and terminate where discharge is visible.

### **3.6 DIELECTRIC COUPLINGS**

- .1 General: compatible with system, to suit pressure rating of system.
- .2 Locations: where dissimilar metals are joined.
- .3 NPS 2 and under: isolating unions or bronze valves.
- .4 Over NPS 2: isolating flanges.

### **3.7 PIPE WORK INSTALLATION**

- .1 Install pipe work to CSA B139, CSA B149 and ASME B31.1.
- .2 Screwed fittings jointed with Teflon tape.
- .3 Protect openings against entry of foreign material.
- .4 Install to isolate equipment and allow removal without interrupting operation of other equipment or systems.
- .5 Assemble piping using fittings manufactured to ANSI standards.
- .6 Saddle type branch fittings may be used on mains if branch line is no larger than half size of main.
  - .1 Hole saw (or drill) and ream main to maintain full inside diameter of branch line prior to welding saddle.
- .7 Install exposed piping, equipment, rectangular cleanouts and similar items parallel or perpendicular to building lines.
- .8 Install concealed pipe work to minimize furring space, maximize headroom, conserve space.
- .9 Slope piping, in direction of flow for positive drainage and venting.
- .10 Install, to permit separate thermal insulation of each pipe.
- .11 Group piping wherever possible.
- .12 Ream pipes, remove scale and other foreign material before assembly.
- .13 Use eccentric reducers at pipe size changes to ensure positive drainage and venting.
- .14 Provide for thermal expansion.
- .15 Valves:
  - .1 Install in accessible locations.
  - .2 Remove interior parts before soldering.

- .3 Install with stems above horizontal position.
  - .4 Valves accessible for maintenance without removing adjacent piping.
  - .5 Install globe valves in bypass around control valves.
  - .6 Use gate or ball valves at branch take-offs for isolating purposes.
  - .7 Use chain operators on valves NPS 2 1/2 and larger where installed more than 2400 mm above floor in Mechanical Rooms.
- .16 Check Valves:
- .1 Install silent check valves on discharge of pumps and in vertical pipes with downward flow.
  - .2 Install swing check valves in horizontal lines on discharge of pumps.

### **3.8 SLEEVES**

- .1 General: install where pipes pass through masonry, concrete structures, fire rated assemblies, and as indicated.
- .2 Material: schedule 40 black steel pipe.
- .3 Construction: use annular fins continuously welded at mid-point at foundation walls and where sleeves extend above finished floors.
- .4 Sizes: 50 mm minimum clearance between sleeve and uninsulated pipe or between sleeve and insulation.
- .5 Installation:
  - .1 Concrete, masonry walls, concrete floors on grade: terminate flush with finished surface.
  - .2 Other floors: terminate 25 mm above finished floor.
- .6 Sealing:
  - .1 Foundation walls and below grade floors: fire retardant, waterproof non-hardening mastic.
  - .2 Elsewhere:
    - .1 Provide space for firestopping.
    - .2 Maintain fire rating integrity.
  - .3 Sleeves installed for future use: fill with lime plaster or other easily removable filler.
  - .4 Ensure no contact between copper pipe or tube and sleeve.

### **3.9 PREPARATION FOR FIRE STOPPING**

- .1 Install firestopping within annular space between pipes, ducts, insulation and adjacent fire separation in accordance with Section 07 84 00 - Fire Stopping.



- .2 Uninsulated unheated pipes not subject to movement: no special preparation.
- .3 Uninsulated heated pipes subject to movement: wrap with non-combustible smooth material to permit pipe movement without damaging fires topping material or installation.
- .4 Insulated pipes and ducts: ensure integrity of insulation and vapour barriers.

### **3.10 FLUSHING OUT OF PIPING SYSTEMS**

- .1 Flush system in accordance with Section 23 08 02 - Cleaning and Start-up of Mechanical Piping Systems.
- .2 Before start-up, clean interior of piping systems in accordance with requirements of Section 01 74 11 - Cleaning.
- .3 Preparatory to acceptance, clean and refurbish equipment and leave in operating condition, including replacement of filters in piping systems.

### **3.11 PRESSURE TESTING OF EQUIPMENT AND PIPEWORK**

- .1 Advise Departmental Representative 48 hours minimum prior to performance of pressure tests.
- .2 Pipe work: test as specified in relevant sections of heating, ventilating and air conditioning work.
- .3 Maintain specified test pressure without loss for four (4) hours minimum unless specified for longer period of time in relevant mechanical sections.
- .4 Prior to tests, isolate equipment and other parts which are not designed to withstand test pressure or media.
- .5 Conduct tests in presence of Departmental Representative and inspector.
- .6 Pay costs for repairs or replacement, retesting, and making good. Insulate or conceal work only after approval and certification of tests by inspector.

### **3.12 EXISTING SYSTEMS**

- .1 Connect into existing piping systems at times approved by Departmental Representative.
- .2 Request written approval by Departmental Representative ten (10) days minimum, prior to commencement of work.
- .3 Be responsible for damage to existing plant by this work.

### **3.13 CLEANING**

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.

**END OF SECTION**

## **Part 1        General**

### **1.1        SUMMARY**

- .1 Section Includes:
  - .1 Electrical motors, drives and guards for mechanical equipment and systems.
  - .2 Supplier and installer responsibility indicated in Motor, Control and Equipment Schedule on electrical drawings and related mechanical responsibility is indicated on Mechanical Equipment Schedule on mechanical drawings.
  - .3 Control wiring and conduit is specified in Division 26 except for conduit, wiring and connections below 50 V which are related to control systems specified in Division 22 and 23. Refer to Division 26 for quality of materials and workmanship.
- .2 Related Sections:
  - .1 01 45 00 - Quality Control.
  - .2 01 61 00 - Common Product Requirements.
  - .3 01 74 11 – Cleaning.
  - .4 01 74 21 - Construction/Demolition Waste Management And Disposal.
  - .5 01 78 00 - Closeout Submittals.

### **1.2        REFERENCES**

Use the latest applicable edition of the following references.

- .1 American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE)
  - .1 ASHRAE 90.1, Energy Standard for Buildings Except Low-Rise Residential Buildings (IESNA cosponsored; ANSI approved; Continuous Maintenance Standard).
- .2 Electrical Equipment Manufacturers' Association Council (EEMAC)
- .3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).

### **1.3        SUBMITTALS**

- .1 Closeout Submittals
  - .1 Provide maintenance data for motors, drives and guards for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

### **1.4        QUALITY ASSURANCE**

- .1 Regulatory Requirements: work to be performed in compliance with CEPA, CEAA, TDGA and applicable Provincial /Territorial regulations.

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**Part 2            Products**

**2.1                MOTORS**

- .1        Provide motors for mechanical equipment as specified.
- .2        Motors under 373 W: speed as indicated (continuous or variable), continuous duty, built-in overload protection, resilient mount, single phase, 120 V, unless otherwise specified or indicated.
- .3        Motors 373 W and larger: EEMAC Class B, squirrel cage induction, speed as indicated, (continuous or variable), continuous duty, drip proof, ball bearing, maximum temperature rise 40 degrees C, 3 phase, 600 V, unless otherwise indicated.

**2.2                BELT DRIVES**

- .1        Fit reinforced belts in sheave matched to drive. Multiple belts to be matched sets.
- .2        Use cast iron or steel sheaves secured to shafts with removable keys unless otherwise indicated.
- .3        For motors under 7.5 kW: standard adjustable pitch drive sheaves, having plus or minus 10% range. Use mid-position of range for specified r/min.
- .4        For motors 7.5 kW and over: sheave with split tapered bushing and keyway having fixed pitch unless specifically required for item concerned. Provide sheave of correct size to suit balancing.
- .5        Minimum drive rating: 1.5 times nameplate rating on motor. Keep overhung loads within manufacturer's design requirements on prime mover shafts.
- .6        Motor slide rail adjustment plates to allow for centre line adjustment.

**2.3                DRIVE GUARDS**

- .1        Provide guards for unprotected drives.
- .2        Guards for belt drives;
  - .1        Expanded metal screen welded to steel frame.
  - .2        Minimum 1.2 mm thick sheet metal tops and bottoms.
  - .3        38 mm dia. holes on both shaft centres for insertion of tachometer.
  - .4        Removable for servicing.
- .3        Provide means to permit lubrication and use of test instruments with guards in place.
- .4        Install belt guards to allow movement of motors for adjusting belt tension.-
- .5        Guard for flexible coupling:
  - .1        "U" shaped, minimum 1.6 mm thick galvanized mild steel.

- .2 Securely fasten in place.
- .3 Removable for servicing.
- .6 Unprotected fan inlets or outlets:
  - .1 Wire or expanded metal screen, galvanized, 19 mm mesh.
  - .2 Net free area of guard: not less than 80% of fan openings.
  - .3 Securely fasten in place.
  - .4 Removable for servicing.

**Part 3 Execution**

**3.1 MANUFACTURER'S INSTRUCTIONS**

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

**END OF SECTION**

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**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1            01 61 00 - Common Product Requirements.
- .2            01 74 11 – Cleaning.
- .3            01 78 00 - Closeout Submittals.
- .4            03 20 00 - Concrete Reinforcing.
- .5            03 30 00 - Cast-in-Place Concrete.
- .6            23 05 17 - Pipe Welding.
- .7            23 08 01 - Performance Verification Mechanical Piping Systems.
- .8            23 08 02 - Cleaning and Start-up of Mechanical Piping Systems.

**1.2                REFERENCES**

Use the latest applicable edition of the following references.

- .1            ASTM International Inc.
  - .1            ASTM A53/A53M, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
  - .2            ASTM A105/A105M, Standard Specification for Carbon Steel Forgings, for Piping Applications.

**1.3                ACTION AND INFORMATIONAL SUBMITTALS**

- .1            Product Data:
  - .1            Provide manufacturer's printed product literature and datasheets for fixtures, and include product characteristics, performance criteria, physical size, finish and limitations.
    - .1            Manufacturer, model number, line contents, pressure and temperature rating.
    - .2            Movement handled, axial, lateral, angular and the amounts of each.
    - .3            Nominal size and dimensions including details of construction and assembly.

**1.4                CLOSEOUT SUBMITTALS**

- .1            Provide maintenance and operation data in accordance with Section 01 78 00 - Closeout Submittals.
  - .1            Data to include:

- .1 Servicing requirements, including special requirements, stuffing box packing, lubrication and recommended procedures.

## **Part 2 Products**

### **2.1 BELLOWS TYPE EXPANSION JOINTS**

- .1 Bellows type expansion joints may be used for axial, lateral, angular or combination of these movements.
- .2 For axial movement only use externally pressurized packless expansion joints.
- .3 Maximum operating pressure: 1275 kPa. Maximum design pressure: as per safety-relief valves settings.
- .4 Maximum operating temperature: 195 degrees C. Maximum design temperature: as per safety-relief valves settings.
- .5 Type A: controlled flexing, factory tested to 1 1/2 times maximum working pressure. Provide test certificates.
- .6 Bellows:
  - .1 Multiple bellows, hydraulically formed, single or two (2) ply, austenitic stainless steel for specified fluid, pressure and temperature, water treatment and pipeline cleaning procedures.
- .7 Reinforcing or control rings:
  - .1 2 piece nickel iron, if necessary.
- .8 Ends:
  - .1 Raised face flanges to match pipe.
- .9 Liner:
  - .1 Austenitic stainless steel in direction of flow.
- .10 Shroud:
  - .1 Carbon steel, painted.

### **2.2 FLEXIBLE CONNECTION**

- .1 Application: to suit motion.
- .2 Minimum length in accordance with manufacturer's recommendations to suit offset.
- .3 Inner hose: stainless steel, corrugated.

- .4 Braided wire mesh stainless steel, outer jacket.
- .5 Diameter and type of end connection: as indicated.
- .6 Operating conditions:
  - .1 Working pressure: 1275 kPa.
  - .2 Working temperature: 195 degrees C.
  - .3 To match system requirements.

### **2.3 ANCHORS AND GUIDES**

- .1 Anchors:
  - .1 Provide as required.
  - .2 Concrete: to Section 03 30 00 - Cast-in-Place Concrete.
  - .3 Reinforcement: to Section 03 20 00 - Concrete Reinforcing.
- .2 Alignment guides:
  - .1 As required.
  - .2 To accommodate specified thickness of insulation.
  - .3 Vapour barriers, jackets to remain uninterrupted.

## **Part 3 Execution**

### **3.1 APPLICATION**

- .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

### **3.2 INSTALLATION**

- .1 Install expansion joints and flexible connections in accordance with manufacturer's instructions.
- .2 Install pipe anchors and guides as required. Anchors to withstand 150% of axial thrust.
- .3 Do welding in accordance with section 23 05 17 - Pipe Welding.

### **3.3 PIPE CLEANING AND START-UP**

- .1 In accordance with Section 23 08 02 - Cleaning and Start-up of Mechanical Piping Systems.

### **3.4 PERFORMANCE VERIFICATION**

- .1 In accordance with Section 23 08 01 - Performance Verification: Mechanical Piping Systems.



**3.5 CLEANING**

- .1 Clean in accordance with Section 01 74 11 - Cleaning.

**END OF SECTION**

**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1            01 61 00 - Common Product Requirements.
- .2            01 74 11 - Cleaning.
- .3            01 74 21 - Construction/Demolition Waste Management And Disposal.

**1.2                REFERENCES**

Use the latest applicable edition of the following references.

- .1            American National Standards Institute/American Society of Mechanical Engineers (ANSI/ASME)
  - .1            ANSI/ASME B31.1, Power Piping.
  - .2            ANSI/ASME B31.3, Process Piping.
  - .3            ANSI/ASME Boiler and Pressure Vessel Code:
    - .1            BPVC Section I: Power Boilers.
    - .2            BPVC Section V: Nondestructive Examination.
    - .3            BPVC Section IX: Welding and Brazing Qualifications.
- .2            American National Standards Institute/American Water Works Association (ANSI/AWWA)
  - .1            ANSI/AWWA C206, Field Welding of Steel Water Pipe.
- .3            American Welding Society (AWS)
  - .1            AWS C1.1M/C1.1, Recommended Practices for Resistance Welding.
  - .2            AWS Z49.1, Safety in Welding, Cutting and Allied Process.
  - .3            AWS W1, Welding Inspection Handbook..
- .4            Canadian Standards Association (CSA International)
  - .1            CSA W48, Filler Metals and Allied Materials for Metal Arc Welding.
  - .2            CSA B51, Boiler, Pressure Vessel and Pressure Piping Code.
  - .3            CSA-W117.2, Safety in Welding, Cutting and Allied Processes.
  - .4            CSA W178.1, Certification of Welding Inspection Organizations.
  - .5            CSA W178.2, Certification of Welding Inspectors.

**1.3                QUALITY ASSURANCE**

- .1            Qualifications:
  - .1            Welders:

- .1 Welding qualifications in accordance with CSA B51.
- .2 Use qualified and licensed welders possessing certificate for each procedure performed from authority having jurisdiction.
- .3 Each welder to possess identification symbol issued by authority having jurisdiction.
- .2 Inspectors:
  - .1 Inspectors qualified to CSA W178.2.
- .3 Certifications:
  - .1 Registration of welding procedures in accordance with CSA B51.
  - .2 Copy of welding procedures available for inspection.
  - .3 Safety in welding, cutting and allied processes in accordance with CSA-W117.2.

## **Part 2 Products**

### **2.1 ELECTRODES**

- .1 Electrodes: in accordance with CSA W48 Series.

## **Part 3 Execution**

### **3.1 APPLICATION**

- .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

### **3.2 QUALITY OF WORK**

- .1 Welding: in accordance with ANSI/ASME B31.1 and B31.3, ANSI/ASME Boiler and Pressure Vessel Code, Sections I and IX and ANSI/AWWA C206, using procedures conforming to AWS B3.0, AWS C1.1, and special procedures specified elsewhere in Division 15 applicable requirements of provincial authority having jurisdiction.

### **3.3 INSTALLATION REQUIREMENTS**

- .1 Identify each weld with welder's identification symbol.
- .2 Backing rings:
  - .1 Where used, fit to minimize gaps between ring and pipe bore.
  - .2 Do not install at orifice flanges.
- .3 Fittings:
  - .1 NPS 2 and smaller: install welding type sockets.
  - .2 Branch connections: install welding tees or forged branch outlet fittings.

### **3.4 INSPECTION AND TESTS - GENERAL REQUIREMENTS**

- .1 Do not conceal welds until they have been inspected, tested and approved by inspector.
- .2 Provide for inspector to visually inspect welds during early stages of welding procedures in accordance with Welding Inspection Handbook. Repair or replace defects as required by codes and as specified.

### **3.5 SPECIALIST EXAMINATIONS AND TESTS**

- .1 General:
  - .1 Perform examinations and tests by specialist qualified to CSA W178.1 and CSA W178.2.
  - .2 To ANSI/ASME Boiler and Pressure Vessels Code, Section V, CSA B51 and requirements of authority having jurisdiction.
  - .3 Inspect and test 5 % of welds in accordance with "Inspection and Test Plan" by non-destructive visual examination and magnetic particle (hereinafter referred to as "particle") tests and full gamma ray radiographic (hereinafter referred to as "radiography") tests.
- .2 Hydrostatically test welds to ANSI/ASME B31.1.
- .3 Visual examinations: include entire circumference of weld externally and wherever possible internally.
- .4 Failure of visual examinations:
  - .1 Upon failure of welds by visual examination, perform additional testing of total of up to 10 % of welds, selected at random by Departmental Representative by radiographic tests.
- .5 Full radiographic tests for high pressure steam and chilled water piping systems.
  - .1 Spot radiography:
    - .1 Conduct spot radiographic tests of up to 10 % of welds, selected at random from welds which would be most difficult to repair in event of failure after system is operational.
  - .2 Radiographic film:
    - .1 Identify each radiographic film with date, location, name of welder. Replace film if rejected because of poor quality.
  - .3 Interpretation of radiographic films:
    - .1 By qualified radiographer.
  - .4 Failure of radiographic tests:
    - .1 Extend tests to welds by welder responsible when those welds fails tests.

### **3.6 DEFECTS CAUSING REJECTION**

- .1 As described in ANSI/ASME B31.1 and ANSI/ASME Boiler and Pressure Vessels Code.

**3.7 REPAIR OF WELDS WHICH FAILED TESTS**

- .1 Re-inspect and re-test repaired or re-worked welds at Contractor's expense.

**3.8 CLEANING**

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
- .2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

**END OF SECTION**

**Part 1            General**

**1.1                SECTION INCLUDES**

- .1            Materials and installation for thermometers and pressure gauges in piping systems.

**1.2                RELATED SECTIONS**

- .1            01 35 29 - Health and Safety Requirements.
- .2            23 05 53.01 - Mechanical Identification.

**1.3                REFERENCES**

Use the latest applicable edition of the following references.

- .1            American Society of Mechanical Engineers (ASME).
  - .1            ASME B40.100, Pressure Gauges and Gauge Attachments.
  - .2            ASME B40.200, Thermometers, Direct Reading and Remote Reading.
- .2            Canadian General Standards Board (CGSB).
  - .1            CAN/CGSB-14.4, Thermometers, Liquid-in-Glass, Self Indicating, Commercial/Industrial Type.
  - .2            CAN/CGSB-14.5, Thermometers, Bimetallic, Self-Indicating, Commercial/Industrial Type.

**Part 2            Products**

**2.1                GENERAL**

- .1            Design point to be at midpoint of scale or range.

**2.2                DIRECT READING THERMOMETERS**

- .1            Industrial, variable angle type, liquid filled, 125 mm scale length: to CAN/CGSB14.4 and ASME B40.200.

**2.3                REMOTE READING THERMOMETERS**

- .1            100 mm diameter liquid filled activated dial type: to CAN/CGSB-14.5, ASME B40.200, accuracy within one scale division, brass movement, stainless steel capillary, stainless steel spiral armour, stainless steel bulb and polished stainless steel case for wall mounting.

**2.4                THERMOMETER WELLS**

- .1            Copper pipe: copper or bronze.
- .2            Steel pipe: stainless steel.

**2.5 PRESSURE GAUGES**

- .1 112 mm, dial type: to ASME B40.100, Grade 2A, stainless steel bourdon tube having 0.5% accuracy full scale unless otherwise specified.
- .2 Provide:
  - .1 Gasketed pressure relief back with solid front.
  - .2 Bronze stop cock.

**Part 3 Execution**

**3.1 GENERAL**

- .1 Install so they can be easily read from floor or platform. If this cannot be accomplished, install remote reading units.
- .2 Install between equipment and first fitting or valve.

**3.2 THERMOMETERS**

- .1 Install in wells on piping. Provide heat conductive material inside well.
- .2 Install in locations as indicated and on inlet and outlet of:
  - .1 Water boilers.
  - .2 Heat exchangers
- .3 Use extensions where thermometers are installed through insulation.

**3.3 PRESSURE GAUGES**

- .1 Install in following locations:
  - .1 Suction and discharge of pumps.
  - .2 Upstream and downstream of PRV's.
  - .3 Upstream and downstream of control valves.
  - .4 Inlet and outlet of heat exchangers
  - .5 Outlet of boilers.
  - .6 In other locations as indicated.
- .2 Use extensions where pressure gauges are installed through insulation.

**3.4 NAMEPLATES**

- .1 Install engraved lamicoïd nameplates as specified in Section 23 05 53.01 - Mechanical Identification, identifying medium.

**END OF SECTION**

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**Part 1            General**

**1.1                SUMMARY**

.1            Section Includes:

.1            Bronze - valves.

.2            Related Sections:

.1            01 35 29 - Health and Safety Requirements.

.2            01 78 00 - Closeout Submittals.

.3            23 05 01 - Installation of Pipe work.

**1.2                REFERENCES**

Use the latest applicable edition of the following references.

.1            American National Standards Institute (ANSI)/ American Society of Mechanical Engineers (ASME).

.1            ANSI/ASME B1.20.1, Pipe Threads, General Purpose (Inch).

.2            ANSI/ASME B16.18, Cast Copper Alloy Solder Joint Pressure Fittings.

.2            American Society for Testing and Materials International, (ASTM).

.1            ASTM A276, Specification for Stainless Steel Bars and Shapes.

.2            ASTM B62, Specification for Composition Bronze or Ounce Metal Castings.

.3            ASTM B283, Specification for Copper and Copper Alloy Die Forgings (Hot-Pressed).

.4            ASTM B505/B505M, Specification for Copper-Base Alloy Continuous Castings.

.3            Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS).

.1            MSS-SP-25, Standard Marking System for Valves, Fittings, Flanges and Unions.

.2            MSS-SP-80, Bronze Gate Globe, Angle and Check Valves.

.3            MSS-SP-110, Ball Valves, Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

**1.3                SUBMITTALS**

.1            Closeout Submittals:

.1            Submit maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

**Part 2            Products**

**2.1                MATERIALS**

.1            Application:



- .1 On low temperature water and compressed air systems only.
- .2 Valves:
  - .1 Except for specialty valves, to be single manufacturer.
  - .2 All products to have CRN registration numbers.
- .3 End Connections:
  - .1 Connection into adjacent piping/tubing:
    - .1 Steel pipe systems: Screwed ends to ANSI/ASME B1.20.1.
    - .2 Copper tube systems: Solder ends to ANSI/ASME B16.18.
- .4 Gate Valves:
  - .1 Requirements common to gate valves, unless specified otherwise:
    - .1 Standard specification: MSS SP-80.
    - .2 Bonnet: union with hexagonal shoulders.
    - .3 Connections: screwed with hexagonal shoulders.
    - .4 Inspection and pressure testing: to MSS SP-80. Tests to be hydrostatic.
    - .5 Packing: non-asbestos.
    - .6 Handwheel: non-ferrous.
    - .7 Handwheel Nut: bronze to ASTM B62.
  - .2 NPS 2 and under, non-rising stem, solid wedge disc, Class 125
    - .1 Body: with long disc guides, screwed bonnet with stem retaining nut.
    - .2 Operator: Handwheel.
  - .3 NPS 2 and under, non-rising stem, solid wedge disc, Class 150:
    - .1 Body: with long disc guides, screwed bonnet with stem retaining nut.
    - .2 Operator: Handwheel.
  - .4 NPS 2 and under, rising stem, split wedge disc, Class 125:
    - .1 Body: with long disc guides, screwed bonnet.
    - .2 Disc: split wedge, bronze to ASTM B283, loosely secured to stem.
    - .3 Operator: Handwheel.
  - .5 NPS 2 and under, rising stem, solid wedge disc, Class 125:
    - .1 Body: with long disc guides, screwed bonnet.
    - .2 Operator: Handwheel.
  - .6 NPS 2 and under, rising stem, solid wedge disc, Class 150:
    - .1 Body: with long disc guides, screwed bonnet.
    - .2 Operator: Handwheel.
- .5 Globe Valves:
  - .1 Requirements common to globe valves, unless specified otherwise:
    - .1 Standard specification: MSS SP-80.
    - .2 Bonnet: union with hexagonal shoulders.
    - .3 Connections: screwed with hexagonal shoulders.
    - .4 Pressure testing: to MSS SP-80. Tests to be hydrostatic.

- .5 Stuffing box: threaded to bonnet with gland follower, packing nut, high grade non-asbestos packing.
- .6 Handwheel: non-ferrous.
- .7 Handwheel Nut: bronze to ASTM B62.
- .2 NPS 2 and under, composition disc, Class 125:
  - .1 Body and bonnet: screwed bonnet.
  - .2 Disc and seat: renewable rotating disc (composition to suit service conditions), regrindable bronze seat, loosely secured to bronze stem to ASTM B505.
  - .3 Operator: Handwheel.
- .3 NPS 2 and under, composition disc, Class 150:
  - .1 Body and bonnet: union bonnet.
  - .2 Disc and seat: renewable rotating disc in easily removable disc holder, regrindable bronze seat, loosely secured to bronze stem to ASTM B505.
  - .3 Operator: Handwheel.
- .4 NPS 2 and under, plug disc, Class 150, screwed ends:
  - .1 Body and bonnet: union bonnet.
  - .2 Disc and seat ring: tapered plug type with disc stem ring of AISI S420 stainless steel to ASTM A276, loosely secured to stem.
  - .3 Operator: Handwheel.
- .5 Angle valve, NPS 2 and under, composition disc, Class 150:
  - .1 Body and bonnet: union bonnet.
  - .2 Disc and seat: renewable rotating PTFE disc in slip-on easily removable disc holder having integral guides, regrindable bronze seat, loosely secured to stem.
  - .3 Operator: Handwheel.
- .6 Check Valves:
  - .1 Requirements common to check valves, unless specified otherwise:
    - .1 Standard specification: MSS SP-80.
    - .2 Connections: screwed with hexagonal shoulders.
  - .2 NPS 2 and under, swing type, bronze disc, Class 125:
    - .1 Body: Y-pattern with integral seat at 45 degrees, screw-in cap with hex head.
    - .2 Disc and seat: renewable rotating disc, two (2)-piece hinge disc construction; seat: regrindable.
  - .3 NPS 2 and under, swing type, bronze disc:
    - .1 Body: Y-pattern with integral seat at 45 degrees, screw-in cap with hex head.
    - .2 Disc and seat: renewable rotating disc, two-piece hinge disc construction; seat: regrindable.
  - .4 NPS 2 and under, swing type, composition disc, Class 200:
    - .1 Body: Y-pattern with integral seat at 45 degrees, screw-in cap with hex head.

- .2 Disc: renewable rotating disc to suit service conditions, bronze two-piece hinge disc construction.
- .5 NPS 2 and under, horizontal lift type, composition disc, Class 150:
  - .1 Body: with integral seat, union bonnet ring with hex shoulders, cap.
  - .2 Disc: renewable rotating disc in disc holder having guides top and bottom, of bronze to ASTM B62.
- .6 NPS 2 and under, vertical lift type, bronze disc, Class 125:
  - .1 Disc: rotating disc having guides top and bottom, disc guides, retaining rings.
- .7 Silent Check Valves:
  - .1 NPS 2 and under:
    - .1 Body: cast high tensile bronze to ASTM B62 with integral seat.
    - .2 Connections: screwed ends to ANSI B1.20.1 and with hex. shoulders.
    - .3 Disc and seat: renewable rotating disc.
    - .4 Stainless steel spring, heavy duty.
    - .5 Seat: regrindable.
- .8 Ball Valves:
  - .1 NPS 2 and under:
    - .1 Body and cap: cast high tensile bronze to ASTM B62.
    - .2 Pressure rating: 4140-kPa CWP, 860 kPa steam.
    - .3 Connections: Screwed ends to ANSI B1.20.1 and with hexagonal shoulders.
    - .4 Stem: tamperproof ball drive.
    - .5 Stem packing nut: external to body.
    - .6 Ball and seat: replaceable hard chrome solid ball and teflon seats.
    - .7 Stem seal: TFE with external packing nut.
    - .8 Operator: removable lever handle.

### **Part 3 Execution**

#### **3.1 INSTALLATION**

- .1 Install rising stem valves in upright position with stem above horizontal.
- .2 Remove internal parts before soldering.
- .3 Install valves with unions at each piece of equipment arranged to allow servicing, maintenance, and equipment removal.

**END OF SECTION**

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**Part 1            General**

**1.1                SUMMARY**

.1            Section Includes:

.1            Valves Cast Steel, gate, globe, and check.

.2            Related Sections:

.1            01 74 21 - Construction/Demolition Waste Management and Disposal.

.2            01 35 29 - Health and Safety Requirements.

.3            01 78 00 - Closeout Submittals.

.4            23 05 01 - Installation of Pipe work.

.5            23 05 23.01 - Valves – Bronze.

**1.2                REFERENCES**

Use the latest applicable edition of the following references.

.1            American National Standards Institute (ANSI)/American Society of Mechanical Engineers (ASME).

.1            ANSI/ASME B16.5, Pipe Flanges and Flanged Fittings.

.2            ANSI/ASME B16.10, Face-to-Face and End-to-End Dimensions Valves.

.3            ANSI/ASME B16.25, Buttwelding Ends.

.4            ANSI/ASME B16.34, Valves - Flanged, Threaded and Welding End.

.2            American Petroleum Institute (API).

.1            API 598, Valve Inspection and Testing.

.3            American Society for Testing and Materials International, (ASTM).

.1            ASTM A49, Specification for Heat-Treated Carbon Steel Joint Bars.

.2            ASTM A193/A193M, Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service.

.3            ASTM A194/A194M, Specification for Carbon and Alloy Steel Nuts for Bolts for High-Pressure and High-Temperature Service.

.4            ASTM A216/A216M, Specification for Steel Castings, Carbon Suitable for Fusion Welding for High-Temperature Service.

.4            Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS).

.1            MSS SP-25-1998, Standard Marking System for Valves, Fittings, Flanges and Unions.

.2            MSS SP-61-2003, Pressure Testing of Steel Valves.

### **1.3 SUBMITTALS**

- .1 Closeout Submittals:
  - .1 Submit maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

### **1.4 QUALITY ASSURANCE**

- .1 Health and Safety:
  - .1 Do construction occupational health and safety in accordance with Section 01 35 29 - Health and Safety Requirements.

## **Part 2 Products**

### **2.1 MATERIAL**

- .1 Valves:
  - .1 Except for specialty valves, to be of single manufacturer.
  - .2 Valves to be individually tested.
- .2 Requirements common to valves, unless specified otherwise:
  - .1 Pressure-temperature ratings: to ANSI B16.34.
  - .2 Inspections and tests: to API 598.
  - .3 Pressure Testing: to MSS SP-61.
  - .4 Flanged valves:
    - .1 Face-to-face dimensions: to ANSI B16.10.
    - .2 Flange dimensions: to ANSI B16.5 with 1.6 mm raised face.
  - .5 Butt-weld valves:
    - .1 End-to-end dimensions: to ANSI B16.10.
    - .2 End dimensions: to ANSI B16.25 bored for used pipe schedule.
  - .6 Handwheel: non-heating type with raised rim of die-cast aluminum alloy to ASTM B85 or malleable iron to ASTM A49.
  - .7 Markings: to MSS SP-25.
  - .8 Identification:
    - .1 Plate showing catalogue number, size, material of body disc, stem seat, fluid, pressure-temperature rating.
    - .2 Body markings: manufacturer, size, primary service rating, material symbol.
  - .9 CRN registration number required for all products.

### **2.2 GATE VALVES**

- .1 NPS 2 1/2 - 12, rising stem, OS&Y, flexible wedge disc, flanged ends, Class 150 and 300.

- .1 Body and multiple-bolted integral yoke and bonnet: cast steel to ASTM A216/A216M WCB, with full length disc guides designed to ensure correct re-assembly.
- .2 Body/bonnet joint: male-female face with corrugated metallic gasket.
- .3 Bonnet studs: to ASTM A193/A193M Type B7.
- .4 Bonnet nuts: to ASTM A194/A194M Type 2H.
- .5 Stuffing box: including non-galling two-piece ball jointed packing gland, with swing-type eye bolts and nuts.
- .6 Gland packing: containing corrosion inhibitor to prevent stem pitting.
- .7 Yoke sleeve: Ni-Resist, minimum melting point above 954 degrees C.
- .8 Hydraulic grease fitting: for lubrication of yoke sleeve bearing surfaces.
- .9 Disc: with disc stem ring to connect to stem, guided throughout its travel.
  - .1 NPS 2 1/2 - 6: Solid corrosion and heat resistant 13% chromium steel with minimum hardness of 350 HB.
  - .2 NPS 8 and larger: Carbon steel faced with corrosion and heat resistant 13 chromium steel with minimum hardness of 350 HB.
- .10 Seat ring: seamless carbon steel with hard-faced cobalt-chromium-tungsten alloy seating surface, slipped in, seal welded, ground to match disc.
- .11 Stem: heat treated corrosion and heat resistant 13% chromium steel with accurately-cut precision-machined Acme or 60 degrees V threads, top screwed for handwheel nut, T-head disc-stem connection.
- .12 Operator: see elsewhere this section.

### **2.3 GLOBE VALVES**

- .1 NPS 2 1/2 - 12, rising stem, OS&Y, flanged ends, Class 150 and 300:
  - .1 Body and multiple-bolted integral yoke and bonnet: cast steel to ASTM A216/A216M WCB.
  - .2 Body/bonnet joint: male-female face with corrugated metallic gasket.
  - .3 Bonnet studs: to ASTM A193/A193M Type B7.
  - .4 Bonnet nuts: to ASTM A194/A194M Type 2H.
  - .5 Stuffing box: including non-galling two-piece ball-jointed packing gland, with swing-type eye bolts and nuts.
  - .6 Gland packing: containing corrosion inhibitor to prevent stem pitting.
  - .7 Yoke bushing: Ni-Resist, minimum melting point above 954 degrees C.
  - .8 Hydraulic grease fitting: for lubrication of yoke sleeve bearing surfaces.
  - .9 Disc: Plug type with 15 degrees taper seat and bottom guide.
  - .10 Seat rings: with 1.6 mm thick cobalt-chromium-tungsten alloy facings with minimum hardness of 375 HB (cold), slipped in, seal welded, ground to match disc.
  - .11 Stem: heat treated corrosion and heat resistant 13% chromium steel with bonnet bushing, long engagement with yoke bushing for accurate seating, accurately-cut precision-machined Acme or 60 degrees V threads, top screwed for handwheel nut.

.12 Operator: see elsewhere this section.

## **2.4 VALVE OPERATORS**

- .1 Handwheel: on all valves except as specified.
- .2 Handwheel with chain operators: on valves installed more than 2400 mm above floor in boiler rooms and mechanical equipment rooms.
- .3 Pneumatic operators:
  - .1 Application: control valves.

## **2.5 BYPASSES FOR GLOBE VALVES**

- .1 Size of bypass valve:
  - .1 Main valve up to NPS 8: NPS 3/4.
  - .2 Main valve NPS 10 and over: NPS 1.
- .2 Type of bypass valves:
  - .1 On globe valve: globe, with composition bronze disc, bronze trim, to Section 23 05 23.02 - Valves – Cast Iron.

## **2.6 CHECK VALVES**

- .1 NPS 2 1/2 and over, flanged ends, Class150 and 300: swing check.
  - .1 Body and multiple-bolted cap: cast steel to ASTM A216/A216M WCB.
  - .2 Cap studs: to ASTM A193/A193M Type B7.
  - .3 Cap nuts: to ASTM A194/A194M Type 2H.
  - .4 Body/cap joint: male-female face with corrugated metallic gasket.
  - .5 Disc: heat treated corrosion and heat resistant 13% chromium steel.
  - .6 Seat rings: heat treated corrosion and heat resistant 13% chromium steel, slipped in, seal welded, ground to match disc.
  - .7 Hinge: WCB.
  - .8 Hinge pin: stainless steel.

## **2.7 SILENT CHECK VALVES**

- .1 Construction:
  - .1 Body: Cast steel to ASTM A216/A216M WCB with integral seat.
  - .2 Pressure rating: Class 125 and 250.
  - .3 Connections: flanged ends.
  - .4 Double bronze disc with SS seat and stem. Renewable disc, seat, stem and spring. Spring rating must match system design for silent operation and installation.
  - .5 Stainless steel spring, heavy duty.
  - .6 Seat: regrindable.

**Part 3            Execution**

**3.1                INSTALLATION**

- .1            Install in accordance with manufacturer's recommendations in upright position with stem above horizontal.

**3.2                COMMISSIONING**

- .1            As part of commissioning activities, develop schedule of valves and record thereon identifier, location, service, purchase order number and date, manufacturer, identification data specified above.

**END OF SECTION**



**1.1 REFERENCES (use the latest applicable edition of the following references)**

- .1 American National Standards Institute (ANSI)/American Society of Mechanical Engineers (ASME)
  - .1 ASME B1.20.1, Pipe Threads, General Purpose (Inch).
  - .2 ASME B16.1, Gray Iron Pipe Flanges and Flanged Fittings: Classes 25,125 and 250.
  - .3 ANSI/ASME B16.5, Pipe Flanges and Flanged Fittings: NPS 1/2 through 24.
  - .4 ANSI/ASME B16.11, Forged Fittings, Socket-Welding and Threaded.
  - .5 ANSI/ASME B16.25, Buttwelding Ends.
  - .6 ANSI/ASME B16.34, Valves - Flanged, Threaded and Welding Ends.
- .2 American Petroleum Institute (API)
  - .1 API Std. 609, Butterfly Valves: Double Flanged, Lug- and Wafer-Type.
- .3 ASTM International Inc.
  - .1 ASTM A126, Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
  - .2 ASTM A536, Standard Specification for Ductile Iron Castings.
  - .3 ASTM B62, Standard Specification for Composition Bronze or Ounce Metal Castings.
  - .4 ASTM B209M, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate Metric.
- .4 Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS)
  - .1 MSS SP-67, Butterfly Valves.

**1.2 CLOSEOUT SUBMITTALS**

- .1 Submit maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

**Part 2 Products**

**2.1 BUTTERFLY VALVES - RESILIENT SEAT - 250 PSIG**

- .1 Except to specialty valves, to be of single manufacturer.
- .2 To be suitable for dead-end service.
- .3 CRN registration number required for products.
- .4 Sizes:
  - .1 Lug type: NPS 2 to 30.
- .5 Pressure rating for tight shut-off at temperatures up to maximum for seat material.

- .1 NPS 2 - 12: 250 psig.
- .2 NPS 14 - 48: 250 psig.
- .6 Minimum seat temperature ratings to 121 degrees C.
- .7 Application: on-off operation on water systems only.
- .8 Operators:
  - .1 NPS 2 - 6: handles capable of locking in any of ten (10) positions - 0 degrees to 90 degrees. Handle and release trigger - ductile iron. Return spring and hinge pin: carbon steel. Latch plate and mounting hardware: cadmium plated carbon steel. Standard coating: black laquer.
  - .2 NPS 8 - 30: manual enclosed gear operator
- .9 Designed to comply with MSS SP-67 and API 609.
- .10 Compatible with ANSI Class 250/Class 300 flanges.
- .11 Construction:
  - .1 Body ductile iron.
  - .2 Disc: 316 SS.
  - .3 Seat: Buna-N.
  - .4 Shaft: 316 stainless steel.
  - .5 Taper pin: 316 SS.
  - .6 Key: stainless.
  - .7 O-Ring: Buna-N.
  - .8 Bushings.
  - .9

## **2.2 MOUNTING FLANGES**

- .1 Class 250 cast iron to ANSI B16.1 or Class 300 steel to B16.5 pipe flanges.

## **Part 3 Execution**

### **3.1 PREPARATION**

- .1 Valve and mating flange preparation.
  - .1 Inspect adjacent pipeline, remove rust, scale, welding slag, other foreign material.
  - .2 Ensure that valve seats and pipe flange faces are free of dirt or surface irregularities which may disrupt flange seating and cause external leakage.
  - .3 Install butterfly valves with disc in almost closed position.
  - .4 Inspect valve disc seating surfaces and waterway and eliminate dirt or foreign material.

### **3.2           INSTALLATION OF VALVES**

- .1       Install in accordance with manufacturer's instructions.
- .2       Do not use gaskets between pipe flanges and valves unless instructed otherwise by valve manufacturer.
- .3       Verify suitability of valve for application by inspection of identification tag.
- .4       Mount actuator on to valve prior to installation.
- .5       Handle valve with care so as to prevent damage to disc and seat faces.
- .6       Valves in horizontal pipe lines should be installed with stem in horizontal position to minimize liner and seal wear.
- .7       Ensure that valves are centered between bolts before bolts are tightened and then opened and closed to ensure unobstructed disc movement. If interference occurs due, for example to pipe wall thickness, taper bore adjacent piping to remove interference.

### **3.3           ACTUATOR INSTALLATION**

- .1       Cycle valve operation from fully closed to fully open then back to fully closed.
- .2       At same time, check travel stop settings for proper disc alignment.

### **3.4           CLEANING**

- .1       Clean installed products in accordance to manufacturer's recommendation.

**END OF SECTION**

**Part 1            General**

**1.1                SUMMARY**

- .1    Section Includes:
  - .1        Concrete housekeeping pads, hangers and supports for mechanical piping, ducting and equipment.
  - .2        Sustainable requirements for construction and verification.
- .2    Related Sections:
  - .1        01 35 29 - Health and Safety Requirements.
  - .2        01 45 00 - Quality Control.
  - .3        01 61 00 - Common Product Requirements.
  - .4        01 78 00 - Closeout Submittals.
  - .5        03 30 00 – Cast-in-place Concrete
  - .6        05 12 23 – Structural Steel for Buildings.
  - .7        05 50 00 – Metal Fabrications.
  - .8        23 05 48 - Vibration and Seismic Controls for HVAC Piping and Equipment.

**1.2                REFERENCES**

Use the latest applicable edition of the following references.

- .1    American National Standards Institute/American Society of Mechanical Engineers (ANSI/ASME)
  - .1        ANSI/ASME B31.1, Power Piping.
- .2    American Society for Testing and Materials International (ASTM)
  - .1        ASTM A125, Specification for Steel Springs, Helical, Heat-Treated.
  - .2        ASTM A307, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
  - .3        ASTM A563, Specification for Carbon and Alloy Steel Nuts.
- .3    Factory Mutual (FM)
- .4    Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1        Material Safety Data Sheets (MSDS).
- .5    Manufacturer's Standardization Society of the Valves and Fittings Industry (MSS)
  - .1        MSS SP58, Pipe Hangers and Supports - Materials, Design and Manufacture.
  - .2        ANSI/MSS SP69, Pipe Hangers and Supports - Selection and Application.
  - .3        MSS SP89, Pipe Hangers and Supports - Fabrication and Installation Practices.
- .6    Underwriter's Laboratories of Canada (ULC)

### **1.3 SYSTEM DESCRIPTION**

- .1 Design Requirements:
  - .1 Construct pipe hanger and support to manufacturer's recommendations utilizing manufacturer's regular production components, parts and assemblies.
  - .2 Base maximum load ratings on allowable stresses prescribed by MSS SP69, ASME B31.1 and ASME B31.3.
  - .3 Ensure that supports, guides, anchors do not transmit excessive quantities of heat to building structure.
  - .4 Design hangers and supports to support systems under conditions of operation, allow free expansion and contraction, prevent excessive stresses from being introduced into pipe work or connected equipment.
  - .5 Provide for vertical adjustments after erection and during commissioning. Amount of adjustment in accordance with MSS SP58.
- .2 Performance Requirements:
  - .1 Design supports, platforms, catwalks, hangers, to withstand seismic events as specified Section 230548 – Vibration and Seismic Controls for HVAC Piping and Equipment.

### **1.4 SUBMITTALS**

- .1 Closeout Submittals:
  - .1 Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

### **1.5 QUALITY ASSURANCE**

- .1 Health and Safety:
  - .1 Do construction occupational health and safety in accordance with Section 01 35 29 - Health and Safety Requirements.

## **Part 2 Products**

### **2.1 GENERAL**

- .1 Fabricate hangers, supports and sway braces in accordance with ANSI B31.1 and MSS SP58.
- .2 Use components for intended design purpose only. Do not use for rigging or erection purposes.

### **2.2 PIPE HANGERS**

- .1 Finishes:
  - .1 Pipe hangers and supports: galvanized after manufacture.
  - .2 Use hot dipped galvanizing process.
  - .3 Ensure steel hangers in contact with copper piping are copper plated.

### **2.3 RISER CLAMPS**

- .1 Steel or cast iron pipe: galvanized carbon steel to MSS SP58, type 42, UL listed and FM approved.
- .2 Copper pipe: carbon steel copper plated to MSS SP58, type 42.
- .3 Bolts: to ASTM A307.
- .4 Nuts: to ASTM A563.

### **2.4 INSULATION PROTECTION SHIELDS**

- .1 Insulated hot piping:
  - .1 Curved plate 300 mm long minimum, with edges turned up, welded-in centre plate for pipe sizes NPS 12 and over, galvanized carbon steel to comply with MSS SP69.

### **2.5 CONSTANT SUPPORT SPRING HANGERS**

- .1 Springs: alloy steel to ASTM A125, shot peened, magnetic particle inspected, with +/-5% spring rate tolerance, tested for free height, spring rate, loaded height and provided with Certified Mill Test Report (CMTR).
- .2 Load adjustability: 10 % minimum adjustability each side of calibrated load. Adjustment without special tools. Adjustments not to affect travel capabilities.
- .3 Provide upper and lower factory set travel stops.
- .4 Provide load adjustment scale for field adjustments.
- .5 Total travel to be actual travel + 20%. Difference between total travel and actual travel 25 mm minimum.
- .6 Individually calibrated scales on each side of support calibrated prior to shipment, complete with calibration record.

### **2.6 VARIABLE SUPPORT SPRING HANGERS**

- .1 Vertical movement: 13 mm minimum, 50 mm maximum, use single spring pre-compressed variable spring hangers.
- .2 Vertical movement greater than 50 mm: use double spring pre-compressed variable spring hanger with two (2) springs in series in single casing.
- .3 Variable spring hanger complete with factory calibrated travel stops. Provide certificate of calibration for each hanger.

- .4 Steel alloy springs: to ASTM A125, shot peened, magnetic particle inspected, with +/-5% spring rate tolerance, tested for free height, spring rate, loaded height and provided with CMTR.

## **2.7 EQUIPMENT SUPPORTS**

- .1 Fabricate equipment supports not provided by equipment manufacturer from structural grade steel meeting requirements of Section 05 12 23 - Structural Steel for Buildings. Submit calculations with shop drawings.

## **2.8 PLATFORMS AND CATWALKS**

- .1 To Section 05 50 00 - Metal Fabrications.

## **2.9 HOUSE-KEEPING PADS**

- .1 Provide 100 mm high concrete housekeeping pads for base-mounted equipment; size pads 50 mm larger than equipment; chamfer pad edges.
- .2 Concrete: to Section 03 30 00 - Cast-in-place Concrete.

## **2.10 OTHER EQUIPMENT SUPPORTS**

- .1 Fabricate equipment supports from structural grade steel.

## **Part 3 Execution**

### **3.1 MANUFACTURER'S INSTRUCTIONS**

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

### **3.2 INSTALLATION**

- .1 Vibration Control Devices:
  - .1 Install on piping systems at pumps, boilers, chillers, cooling towers, and as required.
- .2 Provide supplementary structural steelwork where structural bearings do not exist or where concrete inserts are not in correct locations.
- .3 Use approved constant support type hangers where:
  - .1 Vertical movement of pipe work is 13 mm or more,
  - .2 Transfer of load to adjacent hangers or connected equipment is not permitted.
- .4 Use variable support spring hangers where:
  - .1 Transfer of load to adjacent piping or to connected equipment is not critical.
  - .2 Variation in supporting effect does not exceed 25 % of total load.

**3.3 HANGER SPACING**

- .1 Plumbing piping: to Canadian Plumbing Code and Ontario Plumbing Code.
- .2 Gas and fuel oil piping: up to NPS 1/2: every 1.8 m.
- .3 Copper piping: up to NPS 1/2: every 1.5 m.
- .4 Flexible joint roll groove pipe: in accordance with table below, but not less than one hanger at joints.
- .5 Within 300 mm of each elbow:

Maximum Pipe Size : NPS	Maximum Spacing Steel	Maximum Spacing Copper
up to 1-1/4	2.1 m	1.8 m
1-1/2	2.7 m	2.4 m
2	3.0 m	2.4 m
2-1/2	3.3 m	2.7 m
3	3.6 m	3.0 m
3-1/2	3.9 m	3.0 m
4	4.2 m	3.6 m
5	4.8 m	
6	5.1 m	
8	5.7 m	
10	6.6 m	
12	6.9 m	

- .6 Pipe work greater than NPS 12: to MSS SP69.

**3.4 HORIZONTAL MOVEMENT**

- .1 Angularity of rod hanger resulting from horizontal movement of pipe work from cold to hot position not to exceed four (4) degrees from vertical.
- .2 Where horizontal pipe movement is less than 13 mm, offset pipe hanger and support so that rod hanger is vertical in the hot position.

**3.5 FIELD QUALITY CONTROL**

- .1 Site Tests: conduct following tests:
  - .1 To MSS SP-58 and MSS SP-69.

**END OF SECTION**



**Part 1 General**

**1.1 SUMMARY**

- .1 Section Includes:
  - .1 Vibration isolation materials and components, seismic control measures and their installation.
- .2 Related Sections:
  - .1 01 35 29 - Health and Safety Requirements.
  - .2 01 61 00 - Common Product Requirements.
  - .3 01 74 11 - Cleaning.
  - .4 03 30 00 - Cast-in-Place Concrete.
  - .5 23 05 93 - Testing, Adjusting and Balancing for HVAC.

**1.2 REFERENCES**

Use the latest applicable edition of the following references.

- .1 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .2 National Fire Protection Association (NFPA)
  - .1 NFPA 13, Standard for the Installation of Sprinkler Systems.
- .3 National Building Code of Canada (NBC).

**1.3 SUBMITTALS**

- .1 Quality assurance submittals.
  - .1 Certificates: submit certificates to Contractor's Engineer, signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
  - .2 Instructions: submit manufacturer's installation instructions.
    - .1 Make available one (1) copy of systems supplier's installation instructions.

**Part 2 Products**

**2.1 GENERAL**

- .1 Size and shape of bases type and performance of vibration isolation as required.

**2.2 ACOUSTIC BARRIERS FOR ANCHORS AND GUIDES**

- .1 Acoustic barriers: between pipe and support, consisting of 25 mm minimum thick heavy duty duck and neoprene isolation material.

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### **2.3 HORIZONTAL THRUST RESTRAINT**

- .1 Spring and elastomeric element housed in box frame; assembly complete with rods and angle brackets for equipment and ductwork attachment; provision for adjustment to limit maximum start and stop movement to 9 mm.
- .2 Arrange restraints symmetrically on either side of unit and attach at centerline of thrust.

### **2.4 SEISMIC CONTROL MEASURES**

- .1 General:
  - .1 Following systems and/or equipment to remain operational during and after earthquakes:
    - .1 Boilers.
    - .2 Seismic control systems to work in every direction.
    - .3 Fasteners and attachment points to resist same maximum load as seismic restraint.
    - .4 Drilled or power driven anchors and fasteners not permitted.
    - .5 No equipment, equipment supports or mounts to fail before failure of structure.
    - .6 Supports of cast iron or threaded pipe not permitted.
    - .7 Seismic control measures not to interfere with integrity of firestopping.
  - .2 Static equipment:
    - .1 Anchor equipment to equipment supports. Anchor equipment supports to structure.
    - .2 Suspended equipment:
      - .1 Use one or more of following methods depending upon site conditions:
        - .1 Install tight to structure.
        - .2 Cross brace in every direction.
        - .3 Brace back to structure.
        - .4 Cable restraint system.
      - .3 Seismic restraints:
        - .1 Cushioning action gentle and steady.
        - .2 Never reach metal-like stiffness.
  - .3 Vibration isolated equipment:
    - .1 Seismic control measures not to jeopardize noise and vibration isolation systems. Provide 6 to 9 mm clearance during normal operation of equipment and systems between seismic restraint and equipment.
    - .2 Incorporate seismic restraints into vibration isolation system to resist complete isolator unloading.
    - .3 As required.
  - .4 Piping systems:
    - .1 Piping systems: hangers longer than 300 mm; brace at each hanger.

- .2 Compatible with requirements for anchoring and guiding of piping systems.
- .5 Bracing methods:
  - .1 Structural angles or channels.
  - .2 Cable restraint system incorporating grommets, shackles and other hardware to ensure alignment of restraints and to avoid bending of cables at connection points. Incorporate neoprene into cable connections to reduce shock loads.

### **Part 3 Execution**

#### **3.1 MANUFACTURER'S INSTRUCTIONS**

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

#### **3.2 INSTALLATION**

- .1 Seismic control measures to meet requirements of NBC.
- .2 Install vibration isolation equipment in accordance with manufacturer's instructions and adjust mountings to level equipment.
- .3 Ensure piping, ducting and electrical connections to isolated equipment do not reduce system flexibility and that piping, conduit and ducting passage through walls and floors do not transmit vibrations.
- .4 Unless indicated otherwise, support piping connected to isolated equipment with spring mounts or spring hangers with 25 mm minimum static deflection as follows:
  - .1 Up to NPS4: first three (3) points of support. NPS5 to NPS8: first four (4) points of support. NPS10 and over: first six (6) points of support.
  - .2 First point of support: static deflection of twice deflection of isolated equipment, but not more than 50 mm.
- .5 Where isolation is bolted to floor use vibration isolation rubber washers.
- .6 Block and shim level bases so that ductwork and piping connections can be made to rigid system at operating level, before isolator adjustment is made. Ensure that there is no physical contact between isolated equipment and building structure.

#### **3.3 FIELD QUALITY CONTROL**

- .1 Inspection and Certification:
  - .1 Experienced and competent sound and vibration testing professional engineer to take vibration measurement for HVAC systems after start up and TAB of systems to Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.
  - .2 Take vibration measurements for equipment listed below.
    - .1 Boilers.
    - .2 Pumps.

- .3 Establish adequacy of equipment isolation and acceptability of noise levels in occupied areas and where appropriate, remedial recommendations (including sound curves).
- .4 Submit to Contractor's Engineer complete report of test results including sound curves.

### **3.4 CLEANING**

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

**END OF SECTION**

## **Part 1        General**

### **1.1            SUMMARY**

- .1 Section Includes:
  - .1 Materials and requirements for the identification of piping systems, duct work, valves and controllers, including the installation and location of identification systems.
- .2 Related Sections:
  - .1 01 61 00 - Common Product Requirements.

### **1.2            REFERENCES**

Use the latest applicable edition of the following references.

- .1 Canadian Gas Association (CGA)
  - .1 CSA/CGA B149.1, Natural Gas and Propane Installation Code.
  - .2 CSA/CGA B139, Installation Code for Oil Burning Equipment.
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-1.60, Interior Alkyd Gloss Enamel.
  - .2 CAN/CGSB-24.3, Identification of Piping Systems.
- .3 National Fire Protection Association (NFPA)
  - .1 NFPA 13, Standard for the Installation of Sprinkler Systems.
  - .2 NFPA 14, Standard for the Installation of Standpipe and Hose Systems.

## **Part 2        Products**

### **2.1            MANUFACTURER'S EQUIPMENT NAMEPLATES**

- .1 Metal or plastic laminate nameplate mechanically fastened to each piece of equipment by manufacturer.
- .2 Lettering and numbers raised or recessed.
- .3 Information to include, as appropriate:
  - .1 Equipment: manufacturer's name, model, size, serial number, capacity.
  - .2 Motor: voltage, Hz, phase, power factor, duty, frame size.

### **2.2            SYSTEM NAMEPLATES**

- .1 Colours:
  - .1 Hazardous: red letters, white background.

.2 Elsewhere: black letters, white background (except where required otherwise by applicable codes).

.2 Construction:

.1 3 mm thick laminated plastic or white anodized aluminum, matte finish, with square corners, letters accurately aligned and machine engraved into core.

.3 Sizes:

.1 Conform to following table:

Size # mm	Sizes (mm)	No. of Lines	Height of Letters (mm)
1	10 x 50	1	3
2	13 x 75	1	5
3	13 x 75	2	3
4	20 x 100	1	8
5	20 x 100	2	5
6	20 x 200	1	8
7	25 x 125	1	12
8	25 x 125	2	8
9	35 x 200	1	20

.2 Use maximum of 25 letters/numbers per line.

.4 Locations:

.1 Terminal cabinets, control panels: use size # 5.

.2 Equipment in Mechanical Rooms: use size # 9.

.5 Identification for PWGSC Preventive Maintenance Support System (PMSS):

.1 Use arrangement of Main identifier, Source identifier, Destination identifier.

.2 Equipment in Mechanical Room:

.1 Main identifier: size #9.

.2 Source and Destination identifiers: size #6.

.3 Terminal cabinets, control panels: size #5.

.3 Equipment elsewhere: sizes as appropriate.

## 2.3 EXISTING IDENTIFICATION SYSTEMS

.1 Apply existing identification system to new work.

.2 Where existing identification system does not cover for new work, use identification system specified this section.

.3 Before starting work, obtain written approval of identification system from Departmental Representative.

## 2.4 PIPING SYSTEMS GOVERNED BY CODES

.1 Identification:

.1 Natural gas: to CSA/CGA B149.1.

## 2.5 IDENTIFICATION OF PIPING SYSTEMS

- .1 Identify contents by background colour marking, pictogram (as necessary), legend; direction of flow by arrows. To CAN/CGSB 24.3 except where specified otherwise.
- .2 Pictograms:
  - .1 Where required: Workplace Hazardous Materials Information System (WHMIS) regulations.
- .3 Legend:
  - .1 Block capitals to sizes and colours listed in CAN/CGSB 24.3.
- .4 Arrows showing direction of flow:
  - .1 Outside diameter of pipe or insulation less than 75 mm: 100 mm long x 50 mm high.
  - .2 Outside diameter of pipe or insulation 75 mm and greater: 150 mm long x 50 mm high.
  - .3 Use double-headed arrows where flow is reversible.
- .5 Extent of background colour marking:
  - .1 To full circumference of pipe or insulation.
  - .2 Length to accommodate pictogram, full length of legend and arrows.
- .6 Materials for background colour marking, legend, arrows:
  - .1 Pipes and tubing 20 mm and smaller: waterproof and heat-resistant pressure sensitive plastic marker tags.
  - .2 Other pipes: pressure sensitive vinyl with protective overcoating, waterproof contact adhesive undercoating, suitable for ambient of 100 % RH and continuous operating temperature of 150 degrees C and intermittent temperature of 200 degrees C.
- .7 Colours and Legends:
  - .1 Where not listed, obtain direction from Departmental Representative.
  - .2 Colours for legends, arrows: to following table:

Background colour:	Legend, arrows:
Yellow	BLACK
Green	WHITE
Red	WHITE

3 Background colour marking and legends for piping systems:

Contents	Background colour marking	Legend
** Add design temperature		
++ Add design temperature and pressure		
Make-up water	Yellow	MAKE-UP WTR
Domestic cold water supply	Green	DOM. CWS
Waste water	Green	WASTE WATER
Sanitary	Green	SAN
Plumbing vent	Green	SAN. VENT
Natural gas	to Codes	
Gas regulator vents	to Codes	
Compressed air (<700kPa)	Green	COMP. AIR <700 kPa
Compressed air (>700kPa)	Yellow	COMP. AIR >700 kPa
Instrument air	Green	INSTRUMENT AIR



## **2.6 VALVES, CONTROLLERS**

- .1 Brass tags with 12 mm stamped identification data filled with black paint.
- .2 Include flow diagrams for each system, of approved size, showing charts and schedules with identification of each tagged item, valve type, service, function, normal position, location of tagged item.

## **2.7 CONTROLS COMPONENTS IDENTIFICATION**

- .1 Identify all systems, equipment, components, controls, sensors with system nameplates specified in this section.
- .2 Inscriptions to include function and (where appropriate) fail-safe position.

## **2.8 LANGUAGE**

- .1 Identification in English and French.
- .2 Use one nameplate and label for both languages.

## **Part 3 Execution**

### **3.1 MANUFACTURER'S INSTRUCTIONS**

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

### **3.2 INSTALLATION**

- .1 Perform work in accordance with CAN/CGSB-24.3 except as specified otherwise.
- .2 Provide ULC and CSA registration plates as required by respective agency.
- .3 Identify systems, equipment to conform to PWGSC PMSS.

### **3.3 NAMEPLATES**

- .1 Locations:
  - .1 In conspicuous location to facilitate easy reading and identification from operating floor.
- .2 Standoffs:
  - .1 Provide for nameplates on hot and/or insulated surfaces.
- .3 Protection:
  - .1 Do not paint, insulate or cover.

### **3.4 LOCATION OF IDENTIFICATION ON PIPING AND DUCTWORK SYSTEMS**

- .1 On long straight runs in open areas in boiler rooms, equipment rooms, galleries, tunnels: at not more than 17 m intervals and more frequently if required to ensure that at least one is visible from any one viewpoint in operating areas and walking aisles.
- .2 Adjacent to each change in direction.
- .3 At least once in each small room through which piping or ductwork passes.
- .4 On both sides of visual obstruction or where run is difficult to follow.
- .5 On both sides of separations such as walls, floors, partitions.
- .6 Where system is installed in pipe chases, ceiling spaces, galleries, confined spaces, at entry and exit points, and at access openings.
- .7 At beginning and end points of each run and at each piece of equipment in run.
- .8 At point immediately upstream of major manually operated or automatically controlled valves, and dampers. Where this is not possible, place identification as close as possible, preferably on upstream side.
- .9 Identification easily and accurately readable from usual operating areas and from access points.
  - .1 Position of identification approximately at right angles to most convenient line of sight, considering operating positions, lighting conditions, risk of physical damage or injury and reduced visibility over time due to dust and dirt.

### **3.5 VALVES, CONTROLLERS**

- .1 Valves and operating controllers, except at plumbing fixtures, radiation, or where in plain sight of equipment they serve: Secure tags with non-ferrous chains or closed "S" hooks.
- .2 Install one copy of flow diagrams, valve schedules mounted in frame behind non-glare glass where directed by Departmental Representative. Provide one copy (reduced in size if required) in each operating and maintenance manual.
- .3 Number valves in each system consecutively.

**END OF SECTION**

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**Part 1            General**

**1.1                SUMMARY**

- .1        TAB is used throughout this Section to describe the process, methods and requirements of testing, adjusting and balancing for HVAC.
- .2        TAB means to test, adjust and balance to perform in accordance with requirements of Contract Documents and to do other work as specified in this section.

**1.2                QUALIFICATIONS OF TAB PERSONNEL**

- .1        Provide documentation confirming qualifications, successful experience.
- .2        TAB: performed in accordance with the requirements of standard under which TAB Firm's qualifications are approved:
  - .1        Associated Air Balance Council, (AABC) National Standards for Total System Balance, MN-1.
  - .2        National Environmental Balancing Bureau (NEBB) TABES, Procedural Standards for Testing, Adjusting, Balancing of Environmental Systems.
  - .3        Sheet Metal and Air Conditioning Contractors' National Association (SMACNA), HVAC TAB HVAC Systems - Testing, Adjusting and Balancing.
- .3        Recommendations and suggested practices contained in the TAB Standard: mandatory.
- .4        Use TAB Standard provisions, including checklists, and report forms to satisfy Contract requirements.
- .5        Use TAB Standard for TAB, including qualifications for TAB Firm and Specialist and calibration of TAB instruments.
- .6        Where instrument manufacturer calibration recommendations are more stringent than those listed in TAB Standard, use manufacturer's recommendations.
- .7        TAB Standard quality assurance provisions such as performance guarantees form part of this contract.
  - .1        For systems or system components not covered in TAB Standard, use TAB procedures developed by TAB Specialist.
  - .2        Where new procedures, and requirements, are applicable to Contract requirements have been published or adopted by body responsible for TAB Standard used (AABC, NEBB, or TABB), requirements and recommendations contained in these procedures and requirements are mandatory.

**1.3                PURPOSE OF TAB**

- .1        Test to verify proper and safe operation, determine actual point of performance, evaluate qualitative and quantitative performance of equipment, systems and controls at design, average and low loads using actual or simulated loads.

- .2 Adjust and regulate equipment and systems to meet specified performance requirements and to achieve specified interaction with other related systems under normal and emergency loads and operating conditions.
- .3 Balance systems and equipment to regulate flow rates to match load requirements over full operating ranges.

#### **1.4 EXCEPTIONS**

- .1 TAB of systems and equipment regulated by codes, standards to satisfaction of authority having jurisdiction.

#### **1.5 CO-ORDINATION**

- .1 Schedule time required for TAB (including repairs, re-testing) into project construction and completion schedule to ensure completion before acceptance of project.
- .2 Do TAB of each system independently and subsequently, where interlocked with other systems, in unison with those systems.

#### **1.6 PRE-TAB**

- .1 During construction, co-ordinate location and installation of TAB devices, equipment, accessories, measurement ports and fittings.

#### **1.7 START-UP**

- .1 Follow start-up procedures as recommended by equipment manufacturer unless specified otherwise.

#### **1.8 OPERATION OF SYSTEMS DURING TAB**

- .1 Operate systems for length of time required for TAB and as required for verification of TAB reports.

#### **1.9 START OF TAB**

- .1 Start TAB when building is essentially completed, including:
  - .1 Installation of ceilings, doors, windows, other construction affecting TAB.
  - .2 Application of weatherstripping, sealing, and caulking.
  - .3 Pressure, leakage, other tests specified elsewhere Division 23.
- .2 Provisions for TAB installed and operational.
- .3 Start-up, verification for proper, normal and safe operation of mechanical and associated electrical and control systems affecting TAB including but not limited to:
  - .1 Proper thermal overload protection in place for electrical equipment.
  - .2 Liquid systems:
    - .1 Flushed, filled, vented.
    - .2 Correct pump rotation.
    - .3 Strainers in place, baskets clean.

- .4 Isolating and balancing valves installed, open.
- .5 Calibrated balancing valves installed, at factory settings.
- .6 Chemical treatment systems complete, operational.

**1.10 APPLICATION TOLERANCES**

- .1 Do TAB to following tolerances of design values:
  - .1 HVAC systems: plus 5%, minus 5%.

**1.11 ACCURACY TOLERANCES**

- .1 Measured values accurate to within plus or minus 2% of actual values.

**1.12 INSTRUMENTS**

- .1 Calibrate in accordance with requirements of most stringent of referenced standard for either applicable system or HVAC system.

**1.13 SUBMITTALS**

- .1 Submit, prior to commencement of TAB:
  - .1 Proposed methodology and procedures for performing TAB if different from referenced standard.

**1.14 PRELIMINARY TAB REPORT**

- .1 Submit to Departmental Representative, prior to submission of formal TAB report, sample of rough TAB sheets. Include:
  - .1 Details of instruments used.
  - .2 Details of TAB procedures employed.
  - .3 Calculations procedures.
  - .4 Summaries.

**1.15 TAB REPORT**

- .1 Format in accordance with AABC Standards.

- .2 TAB report to show results in SI units and to include:
  - .1 Project record drawings.
  - .2 System schematics.
- .3 Submit six (6) copies of TAB Report to Departmental Representative for verification, in either English or French in D-ring binders, complete with index tabs.

**1.16 SETTINGS**

- .1 After TAB is completed, replace drive guards, close access doors, lock devices in set positions and ensure sensors are at required settings.
- .2 Permanently mark settings to allow restoration at any time during life of facility. Do not eradicate or cover markings.

**1.17 COMPLETION OF TAB**

- .1 TAB considered complete when final TAB Report received and approved by Contractor's Engineer.

**END OF SECTION**

## **Part 1            General**

### **1.1                SUMMARY**

- .1    Related Sections:
  - .1        01 91 13 - General Commissioning (Cx) Requirements
  - .2        22 15 00 – Boilers, instrumentation and general service compressed air systems.
  - .3        23 08 02- Cleaning and Start-up of Mechanical Piping Systems.

### **1.2                REFERENCES**

Use the latest applicable edition of the following references.

- .1    American Society for Testing and Materials International (ASTM)
  - .1        ASTM E202, Standard Test Methods for Analysis of Ethylene Glycols and Propylene Glycols.

### **1.3                CLEANING AND START-UP OF MECHANICAL PIPING SYSTEMS**

- .1    In accordance with Section 23 08 02 - Cleaning and Start-up of Mechanical Piping Systems.

### **1.4                HYDRONIC SYSTEMS – PERFORMANCE VERIFICATION (PV)**

- .1    Perform hydronic systems performance verification after cleaning is completed and system is in full operation.
- .2    When systems are operational, perform following tests:
  - .1        Conduct full scale tests at maximum design flow rates, temperatures and pressures for continuous consecutive period of 48 hours to demonstrate compliance with design criteria.
  - .2        Verify performance of hydronic system circulating pumps as specified, recording system pressures, temperatures, fluctuations by simulating maximum design conditions and varying.
    - .1            Pump operation.
    - .2            Boiler operation.
    - .3            Pressure bypass open/closed.
    - .4            Control pressure failure.
    - .5            Maximum heating demand.
    - .6            Boiler failure.
    - .7            Outdoor reset. Re-check heat exchanger output supply temperature at 100 % and 50 % reset, maximum water temperature.

## **1.5 FUEL OIL SYSTEMS**

- .1 Environmental protection systems:
  - .1 Test spill protection and over-fill protection systems using manufacturer's recommended procedures.
- .2 Fuel oil pumps:
  - .1 Check strainers on pump inlet, relief valve on pump outlet with discharge to oil return piping, pressure gauge on strainer inlet, pump inlet and pump discharge.
- .3 Notify authorities having jurisdiction to enable witnessing of tests as required.

## **1.6 INDUSTRIAL QUALITY COMPRESSED AIR SYSTEMS**

- .1 Commissioning Agency: installing Contractor.
- .2 Commissioning Procedures:
  - .1 Air Compressor: refer to Section 221500 – Boilers, instrumentation and general service compressed air systems.
  - .2 Check operation of automatic drain valves.
  - .3 Bleed off measured flow rate of compressed air from receiver.
  - .4 Measure cumulative length of time that air compressor operates to recover pressure. Carry out test over extended period of time.
  - .5 Test compressor unloading systems at stages of operation. This may be performed by repeating above test at several bleed-off rates.

## **1.7 REPORTS**

- .1 In accordance with Section 01 91 13 - General Commissioning (Cx) Requirements: Reports, supplemented as specified herein.

## **1.8 TRAINING**

- .1 In accordance with Section 01 91 13 - General Commissioning (Cx) Requirements: Training of O&M Personnel, supplemented as specified herein.

**END OF SECTION**



**Part 1 General**

**1.1 SUMMARY**

- .1 Section Includes:
  - .1 Procedures and cleaning solutions for cleaning mechanical piping systems.
- .2 Related Sections:
  - .1 01 35 29 - Health and Safety Requirements.
  - .2 01 61 00 - Common Product Requirements.
  - .3 23 05 93 - Testing, Adjusting and Balancing for HVAC.
  - .4 23 25 00 - HVAC Water Treatment Systems.

**1.2 REFERENCES**

Use the latest applicable edition of the following references.

- .1 American Society for Testing and Materials International (ASTM)
  - .1 ASTM E202, Standard Test Methods for Analysis of Ethylene Glycols and Propylene Glycols.
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).

**1.3 QUALITY ASSURANCE**

- .1 Health and Safety:
  - .1 Do construction occupational health and safety in accordance with Section 01 35 29 - Health and Safety Requirements.

**Part 2 Products**

**2.1 CLEANING SOLUTIONS**

- .1 Tri-sodium phosphate: 0.40 kg per 100 L water in system.
- .2 Sodium carbonate: 0.40 kg per 100 L water in system.
- .3 Low-foaming detergent: 0.01 kg per 100 L water in system.

**Part 3 Execution**

**3.1 MANUFACTURER'S INSTRUCTIONS**

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

**3.2 CLEANING HYDRONIC SYSTEMS**

- .1 Cleaning Agency:
  - .1 Retain qualified water treatment specialist to perform system cleaning.
- .2 Report on Completion of Cleaning:
  - .1 When cleaning is completed, submit report, complete with certificate of compliance with specifications of cleaning component supplier.

**END OF SECTION**

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**Part 1            General**

**1.1                SUMMARY**

- .1    Section Includes:
  - .1        Materials and installation procedures for electric heating and cooling controls.
- .2    Related Sections:
  - .1        01 35 29 - Health and Safety Requirements.
  - .2        01 61 00 - Common Product Requirements.

**1.2                REFERENCES**

Use the latest applicable edition of the following references.

- .1    Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1        Material Safety Data Sheets (MSDS).

**Part 2            Products**

**2.1                FLOW SWITCH**

- .1    Flow switch pipe size as indicated, CSA Enclosure , rated at 16 A at 120 V. Maximum liquid temperature: 121 degrees C. Maximum liquid gauge pressure of 1034 kPa ambient temperature range 0 degrees C to 82 degrees C.

**2.2                PRESSURE SWITCH**

- .1    Pressure switch for air with auto reset, contacts open on rise. Maximum allowable gauge pressure of 1.2 MPa. Full load 16 A at 120 V.

**Part 3            Execution**

**3.1                MANUFACTURER'S INSTRUCTIONS**

- .1    Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

**3.2                INSTALLATION**

- .1    Install control devices.

**END OF SECTION**

**Part 1      General**

**1.1          SUMMARY**

- .1 Section Includes:
  - .1 Materials and installation for piping, valves and fittings for gas fired equipment.
- .2 Related Sections:
  - .1 01 35 29 - Health and Safety Requirements.
  - .2 01 45 00 - Quality Control.
  - .3 01 78 00 - Closeout Submittals.
  - .4 23 05 01 - Installation of Pipework.
  - .5 23 08 01 - Performance Verification of Mechanical Piping Systems.
  - .6 23 08 02 - Cleaning and Start-Up of Mechanical Piping Systems.

**1.2          REFERENCES**

Use the latest applicable edition of the following references.

- .1 American Society of Mechanical Engineers (ASME)
  - .1 ASME B16.5 Pipe Flanges and Flanged Fittings.
  - .2 ASME B18.2.1 Square and Hex Bolts and Screws Inch Series.
- .2 American Society for Testing and Materials International (ASTM)
  - .1 ASTM A47/A47M, Standard Specification for Ferritic Malleable Iron Castings.
  - .2 ASTM A53/A53M, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless.
- .3 American Petroleum Institute (API)
  - .1 API 5L, Specification for Line Pipe.
  - .2 API 6D, Specification for Pipeline Valves (Gate, Ball and Check Valves).
  - .3 ANSI/API 1104, Standard for Welding Pipeline and Related Facilities.
- .4 Canadian Standards Association (CSA International)
  - .1 CSA W47.1 Certification of Companies for Fusion Welding of Steel.
- .5 Canadian Standards Association (CSA)/Canadian Gas Association (CGA)
  - .1 CAN/CSA B149.1HB, Natural Gas and Propane Installation Code Handbook.
  - .2 CAN/CSA B149.2, Propane Storage and Handling Code.
  - .3 Ministry of Municipal Affairs and Housing, Ontario Building Code.
- .6 Department of Justice Canada (Jus)
  - .1 Canadian Environmental Assessment Act (CEAA).
  - .2 Canadian Environmental Protection Act (CEPA).
  - .3 Transportation of Dangerous Goods Act (TDGA).

- .7 Transport Canada/Canadian Transport Commission
  - .1 General Order No. 0-32, Regulations Respecting the Design, Location, Construction, Operation and Maintenance of Stationary Bulk Storage for Flammable Liquids.
- .8 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).

### **1.3 SUBMITTALS**

- .1 Closeout Submittals: submit maintenance and engineering data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

## **Part 2 Products**

### **2.1 PIPE**

- .1 Steel pipe: to ASTM A53/A53M, Schedule 40, seamless as follows:
  - .1 NPS 1/2 to 2, screwed.
  - .2 NPS 2 1/2 and over, plain end.

### **2.2 JOINTING MATERIAL**

- .1 Screwed fittings: pulverized lead paste.
- .2 Welded fittings: to CSA W47.1.
- .3 Flange gaskets: non metallic flat.

### **2.3 FITTINGS**

- .1 Steel pipe fittings, screwed, flanged or welded:
  - .1 Malleable iron: screwed, banded, Class 150.
  - .2 Steel pipe flanges and flanged fittings: to ASME B16.5.
  - .3 Welding: butt-welding fittings.
  - .4 Unions: malleable iron, brass to iron, ground seat, to ASTM A47/A47M.
  - .5 Bolts and nuts: to ASME B18.2.1.
  - .6 Nipples: schedule 40, to ASTM A53/A53M.

### **2.4 VALVES**

- .1 Provincial Code approved lubricated ball type.

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**Part 3 Execution**

**3.1 MANUFACTURER'S INSTRUCTIONS**

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

**3.2 PIPING**

- .1 Install in accordance with Section 23 05 01 - Installation of Pipe work, applicable Provincial Codes, CAN/CSA B149.1 and CAN/CSA B149.2, supplemented as specified.
- .2 Install drip points:
  - .1 At low points in piping system.
  - .2 At connections to equipment.

**3.3 VALVES**

- .1 Install valves with stems upright unless otherwise approved by Departmental Representative.
- .2 Install valves at branch take-offs to isolate pieces of equipment, and as indicated.

**3.4 FIELD QUALITY CONTROL**

- .1 Site Tests/Inspection:
  - .1 Test system in accordance with CAN/CSA B149.1, CAN/CSA B149.2 and requirements of authorities having jurisdiction.
- .2 Performance Verification:
  - .1 Refer to Section 23 08 01 - Performance Verification of Mechanical Piping Systems.
- .3 PV procedures:
  - .1 Test performance of components.

**3.5 ADJUSTING**

- .1 Purging: purge after pressure test in accordance with CAN/CSA B149.1 and CAN/CSA B149.2.
- .2 Pre-Start-Up Inspections:
  - .1 Check vents from regulators, control valves, terminate outside building in approved location, protected against blockage, damage.
  - .2 Check gas trains, entire installation is approved by authority having jurisdiction.

**3.6 CLEANING**

- .1 Cleaning: in accordance with Section 23 08 02 - Cleaning and Start-Up of Mechanical Piping Systems, CAN/CSA B149.1 and CAN/CSA B149.2 supplemented as specified.

- .2 Perform cleaning operations as specified in Section 230802 - Cleaning and Start-up of Mechanical Piping Systems and in accordance with manufacturer's recommendations.

END OF SECTION

**Part 1            General**

**1.1                SUMMARY**

- .1    Section Includes.
  - .1        Materials and installation for steel piping, valves and fittings for hydronic systems in building services piping.
- .2    Related Sections.
  - .1        01 35 29 - Health and Safety Requirements.
  - .2        01 78 00 - Closeout Submittals.
  - .3        21 05 01 - Common Work Results for Mechanical.
  - .4        23 05 17 - Pipe Welding.
  - .5        23 08 02 - Cleaning and Start-up of Mechanical Piping Systems.
  - .6        23 05 01 - Installation of Pipework.
  - .7        23 05 23.01 - Valves - Bronze.
  - .8        23 05 93 - Testing, Adjusting and Balancing for HVAC.
  - .9        23 08 01 - Performance Verification of Mechanical Piping.
  - .10      23 08 02 - Cleaning and Start-up of Mechanical Piping Systems.

**1.2                REFERENCES**

Use the latest applicable edition of the following references.

- .1    American Society of Mechanical Engineers (ASME).
  - .1        ASME B16.1, Cast Iron Pipe Flanges and Flanged Fittings.
  - .2        ASME B16.3, Malleable Iron Threaded Fittings.
  - .3        ASME B16.5, Pipe Flanges and Flanged Fittings.
  - .4        ASME B16.9, Factory-Made Wrought Butt welding Fittings.
  - .5        ASME B18.2.1, Square and Hex Bolts and Screws (Inch Series).
  - .6        ASME B18.2.2, Square and Hex Nuts (Inch Series).
- .2    American Society for Testing and Materials International, (ASTM).
  - .1        ASTM A47/A47M, Standard Specification for Ferritic Malleable Iron Castings.
  - .2        ASTM A53/A53M, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated Welded and Seamless.
  - .3        ASTM A536, Standard Specification for Ductile Iron Castings.
  - .4        ASTM B61, Standard Specification for Steam or Valve Bronze Castings.
  - .5        ASTM B62, Standard Specification for Composition Bronze or Ounce Metal Castings.
  - .6        ASTM E202, Standard Test Method for Analysis of Ethylene Glycols and Propylene Glycols.



- .3 American Water Works Association (AWWA).
  - .1 AWWA C111, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
- .4 Canadian Standards Association (CSA International).
  - .1 CSA B242, Groove and Shoulder Type Mechanical Pipe Couplings.
  - .2 CAN/CSA W48, Filler Metals and Allied Materials for Metal Arc Welding (Developed in cooperation with the Canadian Welding Bureau).
- .5 Manufacturer's Standardization of the Valve and Fittings Industry (MSS).
  - .1 MSS-SP-67, Butterfly Valves.
  - .2 MSS-SP-70, Cast Iron Gate Valves, Flanged and Threaded Ends.
  - .3 MSS-SP-71, Cast Iron Swing Check Valves Flanged and Threaded Ends.
  - .4 MSS-SP-80, Bronze Gate, Globe, Angle and Check Valves.
  - .5 MSS-SP-85, Cast Iron Globe and Angle Valves, Flanged and Threaded Ends.

### **1.3 SUBMITTALS**

- .1 Closeout Submittals.
  - .1 Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals and include following:
    - .1 Special servicing requirements.

## **Part 2 Products**

### **2.1 Application**

- .1 On Low Temperature Hot Water systems.

### **2.2 PIPE**

- .1 Steel pipe: to ASTM A53/A53M, Grade B.

### **2.3 PIPE JOINTS**

- .1 NPS2 and under: screwed fittings with PTFE tape or lead-free pipe dope.
- .2 NPS2-1/2 and over: welding fittings and flanges to CAN/CSA W48.
- .3 Roll grooved: standard coupling to CSA B242.
- .4 Flanges: raised face, weld neck to AWWA C111.
- .5 Orifice flanges: slip-on raised face, 2100 kPa.
- .6 Flange gaskets: to AWWA C111.
- .7 Pipe thread: taper.

.8 Bolts and nuts: to ASME B18.2.1 and ASME B18.2.2.

.9 Roll grooved coupling gaskets: type EPDM.

## **2.4 FITTINGS**

.1 Screwed fittings: malleable iron, to ASME B16.3, Class 300.

.2 Pipe flanges and flanged fittings:

.1 Cast iron: to ASME B16.1.

.2 Steel: to ASME B16.5.

.3 Butt-welding fittings: steel, to ASME B16.9.

.4 Unions: malleable iron, to ASTM A47/A47M and ASME B16.3.

.5 Fittings for roll grooved piping: malleable iron to ASTM A47/A47M ductile iron to ASTM A536.

## **2.5 VALVES**

.1 Connections:

.1 NPS2 and smaller: screwed ends.

.2 NPS2.1/2 and larger: Flanged ends.

.2 Gate valves: to MSS-SP-70 or to MSS-SP-80. Application: Isolating equipment, control valves, pipelines:

.1 NPS2 and under:

.1 Mechanical Rooms: Class 300, rising stem, split wedge disc, as specified Section 23 05 23.01 - Valves – Bronze.

.2 Elsewhere: Class 300, non-rising stem, solid wedge disc, as specified Section 23 05 23.01 - Valves – Bronze.

.2 NPS2 1/2 and over:

.1 Non-rising stem, solid wedge disc, bronze trim, as specified Section 23 05 23.02 - Valves - Cast Iron: Gate, Globe, Check.

.1 Operators: hand wheel or manual gear.

.3 Globe valves: to MSS-SP-80 or 85. Application: Throttling, flow control, emergency bypass:

.1 NPS2 and under:

.1 Mechanical Rooms: with PTFE disc, as specified Section 23 05 23.01 - Valves - Bronze.

.2 Elsewhere: Globe, with composition disc, as specified Section 23 05 23.01 - Valves - Bronze.

.2 NPS2 1/2 and over:

.1 With bronze disc, bronze trim, as specified Section 23 05 23.02 - Valves - Cast Iron: Gate, Globe, Check.

- .2 Operators: hand wheel, manual gear or pneumatic,
- .4 Balancing, for TAB:
  - .1 Sizes: Calibrated balancing valves, as specified this section.
  - .2 NPS2 and under:
    - .1 Globe, with plug disc as specified Section 23 05 23.01 - Valves – Bronze.
- .5 Drain valves: Gate, Class 300, non-rising stem, solid wedge disc, as specified Section 23 05 23.01 - Valves – Bronze.
- .6 Bypass valves on globe valves NPS8 and larger: NPS 1, Globe, with PTFE disc as specified Section 23 05 23.01 - Valves - Bronze.
- .7 Swing check valves: to MSS-SP-71 or MSS-SP-80.
  - .1 NPS2 and under:
    - .1 Class 300, swing, with composition disc, as specified Section 23 05 23.01 - Valves - Bronze.
  - .2 NPS2 1/2 and over:
    - .1 Flanged or Grooved ends: as specified Section 23 05 23.02 - Valves - Cast Iron: Gate, Globe, Check.
- .8 Silent check valves:
  - .1 NPS2 and under:
    - .1 As specified Section 23 05 23.01 - Valves – Bronze.
  - .2 NPS2 1/2 and over:
    - .1 Grooved ends: as specified Section 23 05 23.02 - Valves - Cast Iron: Gate, Globe, Check.
- .9 Ball valves:
  - .1 NPS2 and under: as specified Section 23 05 23.01 - Valves – Bronze.
- .10 Lubricated Plug Valves
  - .1 NPS2 1/2 and over:
    - .1 As specified Section 23 05 23.02 - Valves - Cast Iron: Gate, Globe, Check.

### **Part 3 Execution**

#### **3.1 PIPING INSTALLATION**

- .1 Install pipe work in accordance with Section 23 05 01 - Installation of Pipe Work.

#### **3.2 CLEANING, FLUSHING AND START-UP**

- .1 In accordance with Section 23 08 02 - Cleaning and Start-Up of Mechanical Piping Systems.

**3.3 TESTING**

- .1 Test system in accordance with Section 21 05 01 - Common Work Results for Mechanical.

**3.4 PERFORMANCE VERIFICATION**

- .1 In accordance with Section 23 08 01 - Performance Verification of Mechanical Piping.

**END OF SECTION**

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**Part 1            General**

**1.1                RELATED SECTIONS**

- .1        01 61 00 - Common Product Requirements.
- .2        01 74 11 - Cleaning.
- .3        01 74 21 - Construction/Demolition Waste Management and Disposal
- .4        01 78 00 - Closeout Submittals.

**1.2                REFERENCES**

Use the latest applicable edition of the following references.

- .1        American Society of Mechanical Engineers (ASME)
  - .1        ASME-04, Boiler and Pressure Vessel Code.
- .2        ASTM International Inc.
  - .1        ASTM A47/A47M-99, Standard Specification for Ferritic Malleable Iron Castings.
  - .2        ASTM A278/A278M-01, Standard Specification for Gray Iron Castings for Pressure-Containing Parts for Temperatures up to 650 degrees F (350 degrees C).
  - .3        ASTM A516/A516M, Standard Specification for Pressure Vessel Plates, Carbon Steel, for Moderate - and Lower - Temperature Service.
  - .4        ASTM A536-84, Standard Specification for Ductile Iron Castings.
  - .5        ASTM B62, Standard Specification for Composition Bronze or Ounce Metal Castings.
  - .6        ASTM/ASME B31.1, Power Piping.
  - .7        ASTM/ASME B31.3, Process Piping.
- .3        Canadian Standards Association (CSA International)
  - .1        CSA B51-03, Boiler, Pressure Vessel, and Pressure Piping Code.
  - .2        CSA B51-03, Boiler, Pressure Vessel, and Pressure Piping Code, Supplement #1.

**1.3                CLOSEOUT SUBMITTALS**

- .1        Submit maintenance and operation data in accordance with Section 01 78 00 - Closeout Submittals.

**Part 2            Products**

**2.1                AUTOMATIC AIR VENT**

- .1        Standard float vent: brass body and NPS 1/8 connection and rated at 1276 kPa working pressure.
- .2        Industrial float vent: cast iron body and NPS 1/2 connection and rated at 1276 kPa working pressure.

- .3 Float: solid material suitable for 115 degrees C working temperature.

## **2.2 AIR SEPARATOR - BOILER MOUNTED**

- .1 Complete with dip tube.
- .2 Working pressure : 1276 kPa.

## **2.3 AIR SEPARATOR - EXPANSION TANK FITTING**

- .1 Complete with adjustable vent tube and built-in manual vent valve.
- .2 Working pressure : 1276 kPa.

## **2.4 AIR SEPARATOR - IN-LINE**

- .1 Working pressure: 1276 kPa.
- .2 Size: as required.

## **2.5 COMBINATION SEPARATORS/STRAINERS**

- .1 Steel, tested and stamped in accordance with ANSI/ASME BPVC, for 1276 kPa operating pressure, with galvanized steel integral strainer with 5 mm perforations, tangential inlet and outlet connections, and internal stainless steel air collector tube.

## **2.6 COMBINATION LOW PRESSURE RELIEF AND REDUCING VALVE**

- .1 Adjustable pressure setting.
- .2 Low inlet pressure check valve.
- .3 Removable strainer.

## **2.7 PIPE LINE STRAINER**

- .1 NPS 1/2 to 2: bronze body to ASTM B62, screwed connections, Y pattern.
- .2 NPS 2 1/2 to 12: cast steel body to ASTM A278/A278M, Class 30, or cast iron body to ASTM A278/A278M, Class 30 flanged connections.
- .3 NPS 2 to 12: T type with ductile iron body to ASTM A536, grooved ends.
- .4 Blowdown connection: NPS 1.
- .5 Screen: stainless steel with 1.19 mm perforations.
- .6 Working pressure: 1276 kPa.

## **Part 3 Execution**

### **3.1 APPLICATION**

- .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and

datasheets.

- .2 The Contractor must retain the services of the buried piping system manufacturer's representative to inspect the installation and finished field joints prior to backfilling. The inspection report must be transmitted to Departmental Representative.

### **3.2 GENERAL**

- .1 Run drain lines and blow off connections to terminate above nearest drain.
- .2 Maintain adequate clearance to permit service and maintenance.
- .3 Check shop drawings for conformance of tappings for ancillaries and for equipment operating weights.

### **3.3 STRAINERS**

- .1 Install in horizontal or down flow lines.
- .2 Ensure clearance for removal of basket.
- .3 Install ahead of each pump.
- .4 Install ahead of each automatic control valve larger than NPS 1 and as required.

### **3.4 AIR VENTS**

- .1 Install at high points of systems.
- .2 Install gate valve on automatic air vent inlet. Run discharge to nearest drain.

### **3.5 PRESSURE SAFETY RELIEF VALVES**

- .1 Run discharge pipe to terminate above nearest drain.

### **3.6 SUCTION DIFFUSERS**

- .1 Install on inlet to pumps having suction size greater than 50.

### **3.7 CLEANING**

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.

**END OF SECTION**

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**Part 1            General**

**1.1                SUMMARY**

- .1    Section Includes:
  - .1        Materials, accessories and installation for breechings, chimneys and stacks.
- .2    Related Sections:
  - .1        01 35 29 - Health and Safety Requirements.
  - .2        01 61 00 - Common Product Requirements.
  - .3        01 78 00 - Closeout Submittals.
  - .4        03 30 00 – Cast-in-Place Concrete.

**1.2                REFERENCES**

Use the latest applicable edition of the following references.

- .1    Sheet Metal and Air Conditioning Contractors National Association (SMACNA)
- .2    Underwriters' Laboratories of Canada (ULC)
- .3    Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1        Material Safety Data Sheets (MSDS).
- .4    Environmental Protection Act of Ontario
- .5    Technical Standards and Safety Act of Ontario

**1.3                SUBMITTALS**

- .1    Closeout Submittals
  - .1        Submit operation and maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

**1.4                QUALITY ASSURANCE**

- .1    Regulatory Requirements: work to be performed in compliance with CEPA, CEAA, TDGA, and applicable Provincial regulations.

**Part 2            Products**

**2.1                FUELS: PRESSURE BREECHING**

- .1    ULC labelled, 760 degrees C rated.
- .2    Sectional, prefabricated, single wall with mineral wool insulation and stainless steel outer jacket with mated fittings and couplings.
  - .1        Type 316 stainless steel.



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**2.2 ACCESSORIES**

- .1 Cleanouts: bolted, gasketed type, full size of breeching, as required.
- .2 Hangers and supports: in accordance with recommendations of Sheet Metal and Air Conditioning Contractors National Association Inc. (SMACNA).
- .3 Expansion sleeves with heat resistant caulking, held in place as required.

**Part 3 Execution**

**3.1 MANUFACTURER'S INSTRUCTIONS**

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

**3.2 INSTALLATION - GENERAL**

- .1 Follow manufacturer's and SMACNA installation recommendations for shop fabricated components.
- .2 Suspend breeching at 1.5 m centres and at each joint.
- .3 Support chimney as required.
- .4 Install thimbles where penetrating roof, floor, ceiling and where breeching enters masonry chimney. Pack annular space with heat resistant caulking.
- .5 Install flashings on chimneys penetrating roofs, as required.
- .6 Install rain caps and cleanouts, as required.

**END OF SECTION**

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**Part 1            General**

**1.1                SUMMARY**

- .1 Section Includes:
  - .1 Heating boiler units:
    - .1 Low Temperature Hot Water boilers.
    - .2 Installation.
    - .3 Commissioning.
  - .2 Related Sections:
    - .1 01 35 29 - Health and Safety Requirements.
    - .2 01 61 00 - Common Product Requirements.
    - .3 01 78 00 - Closeout Submittals.
    - .4 23 05 48 - Vibration and Seismic Controls for HVAC Piping and Equipment.

**1.2                REFERENCES**

Use the latest applicable edition of the following references.

- .1 American Boiler Manufacturer's Association (ABMA)
- .2 American National Standards Institute (ANSI)
- .3 American National Standards Institute (ANSI)/ American Society of Mechanical Engineers (ASME)
  - .1 ANSI/ASME Boiler and Pressure Vessel Code, Section IV.
- .4 Canadian Standards Association (CSA International)
  - .1 CSA B51, Boiler, Pressure Vessel, and Pressure Piping Code.
- .5 Electrical and Electronic Manufacturer's Association of Canada (EEMAC)
- .6 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .7 Environmental Protection Act of Ontario
- .8 Technical Standards and Safety Act of Ontario

**1.3                SUBMITTALS**

Closeout Submittals:

- .1 Submit operation and maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

**1.4                QUALITY ASSURANCE**

- .1 Regulatory Requirements: work to be performed in compliance with CEPA, CEAA, TDGA, and applicable Provincial regulations.

## **1.5 MAINTENANCE**

- .1 Extra materials:
  - .1 Special tools for burners, manholes, handholes and Operation and Maintenance.
  - .2 Spare burner tips.
  - .3 Spare burner gun.

## **Part 2 Products**

### **2.1 GENERAL**

#### **2.2.1 Packaged boiler:**

- .1 Packaged boiler:
  - .1 Complete with burner, and all necessary accessories and controls.
  - .2 Factory tested at rated capacity
  - .3 Ready for attachment to piping, electrical power, controls, flue gases exhaust.
  - .4 Designed and constructed to ANSI/ASME Boiler and Pressure vessel Code.
  - .5 CRN (Canadian Registration Number), to CSA B51.
  - .6 Boiler/burner package to bear ULC label.
- .2 Electrical:
  - .1 Power: 600 V, 3 phase, 60 Hz.
  - .2 Controls: 120 V, 1 phase, 60 Hz.
  - .3 Electrical components: CSA approved.
- .3 Controls: factory wired. Enclosed in Electrical and Electronic Manufacturers' Association of Canada (EEMAC) 1 steel cabinet.
- .5 Thermal insulation:
  - .1 Mineral fibre. Seal insulation at handholes, manholes, piping connections with insulating cement or asphaltic paint. Finish with heat resisting paint.
- .6 Jackets: heavy gauge metal, finished with heat resisting paint.
- .7 Mounting:
  - .1 Structural steel base, lifting lugs.
- .8 Anchor bolts and templates:
  - .1 Supply for installation by other Divisions. Anchor bolts to be sized to Section 23 05 48 – Vibration and Seismic Controls for HVAC Piping and Equipment
- .9 Start-up, instruction, on-site performance tests: three (3) days per boiler.
- .10 Trial usage:
  - .1 Contractor's Engineer may use boilers for test purposes prior to acceptance and commencement of warranty period. Departmental Representative to be given advance notification of tests.
  - .2 Supply labour, materials and instruments required for tests.

- .11 Temporary use by contractor:
  - .1 Monitor and record performance continuously. Keep log of maintenance activities carried out.
  - .2 Refurbish to as new condition before final inspection and acceptance.

## **2.4 AUXILIARIES**

- .1 Provide auxiliaries for each boiler and to meet ANSI/ASME requirements.
- .2 CRN (Canadian Registration Number), to CSA B51

## **2.5 EMISSION CONTROL**

- .1 Rate of discharge of air contaminants from boiler not to exceed limits defined under Ontario Environmental Protection Act and federal regulations. Flue Gas Recirculation should be used to meet requirements.

## **2.6 NOISE CONTROL**

- .1 Noise level inside and outside the plant shall be kept below the requirements of local, provincial and federal regulations.

## **Part 3 Execution**

### **3.1 MANUFACTURER'S INSTRUCTIONS**

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

### **3.2 INSTALLATION**

- .1 Install in accordance with ANSI/ASME Boiler and Pressure Vessels Code Section IV, regulations of Province of Ontario having jurisdiction, except where specified otherwise, and manufacturers recommendations.
- .2 Make required piping connections to inlets and outlets recommended by boiler manufacturer.
- .3 Maintain clearances as indicated or if not indicated, as recommended by manufacturer for operation, servicing and maintenance without disruption of operation of any other equipment/system.
- .4 Mount unit level using specified vibration isolation in Section 23 05 48 - Vibration and Seismic Controls for HVAC Piping and Equipment.

### **3.3 MOUNTINGS AND ACCESSORIES**

- .1 Safety valves and relief valves:
  - .1 Run drain pipe from each valve outlet and drip pan elbow to above nearest drain.

**3.4 FIELD QUALITY CONTROL**

- .1 Commissioning:
  - .1 Manufacturer to:
    - .1 Certify installation.
    - .2 Start up and commission installation.
    - .3 Carry out on-site performance verification tests.
    - .4 Demonstrate operation and maintenance.
  - .2 Provide Departmental Representative at least 24 hours notice prior to inspections, tests, and demonstrations. Submit written report of inspections and test results to Contractor's Engineer.

**END OF SECTION**



**Biomass (Graded Wood Chip Fuel) Pilot Project**

**Measurement & Verification of Boiler Efficiencies and Outputs**

Measure

1. Combustion Efficiency
2. Boiler efficiency
3. Comparison of efficiencies and emissions at different operation modes - full and partial loads
4. Annual Fuel Utilization Efficiency (ASHRAE standard 103-2007)

1.) Combustion Efficiency

Calculated from energy input minus heat losses (in flue gas). Flue gas composition and temperature will need to be measured. This is also useful to compare different operation modes, as different air ratios or flue gas temperatures can immediately be evaluated.

2.) Boiler Efficiency

Useful (heat output/energy input) per time unit. Note, that the boiler will have a significant heat and fuel storage capacity, therefore the boiler efficiency is best calculated during stationary conditions.

3.) Part load operation can have a significant influence on pollutant emissions.

4.) Annual Fuel Utilization Efficiency

Is the thermal efficiency measure of combustion to represent the actual, season-long average efficiency of the boiler, measured as per AHRAE Standard 103-2007

**Required Measurements**

Flue Gas measurements both at partial (30%) and nominal full loads

- emissions (concentrations)
  - Oxygen (required under EASR)
  - Carbon Dioxide
  - Carbon Monoxide
- Humidity
- Temperature (required under EASR)
- Volumetric flow rate

1.) Boiler Measurements both at partial (30%) and nominal loads

- Electric Meter for boiler and (Virtual) sub-meter for auxiliary equipment
- Water meter (volume and temperature input/output) (required under EASR)

## 2.) Fuel Measurements

Biofuel (woodchips) – measured in both tonnage and \$/MMBtu or \$/GJ (per hot water boiler output)

- Calorific value (high heating and low heating)
- Particle size distribution
- Ash
- Ash components

As per the Ministry of the Environment and Climate Change (MOECC) the biomass boiler must comply with the Environmental Activity and Sector Registry – Limits and Other Requirements (“EASR”). The selected system must satisfy the requirements described in EASR to achieve environmental approval. In addition to physical requirements of the design conditions must include specific ongoing measurements and installation testing.

The following documents are included with this attachment;

1. Ontario Regulation 1/17
2. Environmental Activity and Sector Registry – Limits and Other Requirement
3. Guideline for the control of air emissions from small wood-fired combustors (<3MW)
4. Fuel Specifications for wood Chip as per the CAN/CSA-ISO 17225 Part 4 Graded Wood Chips

## **Fuel Accounting**

### Biomass

Fuel volume is easily determined, however the energy content has significant uncertainties

Regular fuel sampling will be required to accurately evaluate fuel efficiencies

Assumption is that fuel sized chips are relatively homogenous MEETING p31 OR p45

Moisture content should be sampled on a regular basis.

- In-house fuel sampling equipment and training is included as part of this contract, as well as external third party monthly sampling of fuel.

## **Supply installation and integration of meters and sensors**

Supply installation and integration of meters and sensors for ongoing measurement and verifications are included in this contract. Work to install, connected and map to PSPC metering database by R&R Automation as a sub-contractor.



**ONTARIO REGULATION 1/17**

made under the

**ENVIRONMENTAL PROTECTION ACT**

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Printed in *The Ontario Gazette*: January 21, 2017**REGISTRATIONS UNDER PART II.2 OF THE ACT — ACTIVITIES REQUIRING ASSESSMENT OF AIR EMISSIONS****CONTENTS****PART I****INTERPRETATION AND APPLICATION**

- [1.](#) Interpretation  
[2.](#) Prescribed activities, s. 20.21 (1) of the Act  
[3.](#) Application, activities prescribed by more than one EASR regulation

**PART II****REGISTRATION MATTERS**

- [4.](#) Prescribed date environmental compliance approval ceases to have effect  
[5.](#) Registration of all activities at facility when first activity is registered  
[6.](#) Registration requirement, Environmental Assessment Act undertakings  
[7.](#) Registration requirement, Niagara Escarpment Planning and Development Act  
[8.](#) Registration requirement, information to be filed  
[9.](#) Continuation of applications for environmental compliance approval  
[10.](#) Registration exemptions, modifications to facility

**PART III****ACTIVITY REQUIREMENTS - CLAUSE 20.21 (1) (C) OF THE ACT****AIR**

- [11.](#) Air contaminants  
[12.](#) EASR ESDM report requirements  
[13.](#) EASR ESDM report supplement  
[14.](#) Notice under s. 24 of Ontario Regulation 419/05  
[15.](#) Notice to submit in-stack testing results

**NOISE**

- [16.](#) Noise emissions  
[17.](#) Noise report  
[18.](#) Noise setback, subpara 8 i of s. 17 (1)  
[19.](#) Primary noise screening, subpara 8 ii of s. 17 (1)  
[20.](#) Secondary noise screening, subpara 8 iii of s. 17 (1)  
[21.](#) Acoustic assessment, subpara 8 iv of s. 17 (1)  
[22.](#) Noise abatement action plan, subpara 8 v of s. 17 (1)  
[23.](#) Notice to prepare acoustic audit report

**ODOUR**

- [24.](#) Odour emissions  
[25.](#) Odour screening report  
[26.](#) Best management practices plan for odour  
[27.](#) Odour control report  
[28.](#) Notice to submit best management practices plan for odour

**FUGITIVE DUST**

- [29.](#) Best management practices plan for fugitive dust control  
[30.](#) Notice to submit best management practices plan for fugitive dust control

**OTHER ACTIVITY REQUIREMENTS**

- [31.](#) Small wood-fired combustors  
[32.](#) Modifications to facility — requirement re reports  
[33.](#) Procedures  
[34.](#) Complaints

**PART IV****MISCELLANEOUS**

- [35.](#) Records

[36.](#) Form of reports, etc.

**PART V**  
**COMMENCEMENT**

[37.](#) Commencement  
[Schedule](#)

**PART I**  
**INTERPRETATION AND APPLICATION**

**Interpretation**

**1. (1) In this Regulation,**

“ACB list” means the document entitled “Air Contaminants Benchmarks (ACB) List: Standards, guidelines and screening levels for assessing point of impingement concentrations of air contaminants”, as amended from time to time and published by the Ministry and available on a Government website;

“acoustic assessment” means a detailed assessment of sound discharged into the air from sources of sound at a facility that assesses the predictable worst case sound levels at affected points of noise reception using calculations or measurements capable of accurately determining sound levels at points of noise reception;

“biogas” has the same meaning as in Ontario Regulation 160/99 (Definitions and Exemptions) made under the *Electricity Act, 1998*;

“biomass” has the same meaning as in Ontario Regulation 160/99;

“boiler” means a piece of equipment that includes a combustion source and that is used for the purpose of generating hot water or steam;

“combustion source” means a device in which combustible material is oxidized, resulting in the release of heat and products of combustion;

“combustion turbine” means a combustion source containing an engine that operates according to the Brayton thermodynamic cycle, in which fuel is burned and the products of combustion are allowed to expand through the blades of a rotating turbine at a high temperature;

“EASR ESDM report” means an Environmental Activity and Sector Registry Emission Summary and Dispersion Modelling report;

“EASR publication” means the document entitled “Environmental Activity and Sector Registry - Limits and Other Requirements”, setting out matters such as limits, intensity rates and requirements relating to the equipment and technology used at facilities, the operation of facilities, record-keeping and the monitoring and reporting of information relating to facilities, as amended from time to time and published by the Ministry and available on a Government website;

“EASR regulation” means a regulation made under the Act by which one or more activities are prescribed for the purposes of subsection 20.21 (1) of the Act;

“facility” means all plants, structures, equipment, apparatuses, mechanisms or things, including surfaces and storage piles, that function as a single integrated operation and that are,

(a) owned or operated by the same person, and

(b) located on the same site;

“heater” means a piece of equipment that includes a combustion source and that is used to transfer heat directly or indirectly to material that is being processed;

“land disposal”, with respect to waste, has the same meaning as in Regulation 347 (General —Waste Management) made under the Act;

“licensed engineering practitioner” means a person who holds a licence, limited licence or temporary licence under the *Professional Engineers Act*;

“modification”, in respect of a facility, means any of the following that may discharge or alter the rate or manner of discharge of a contaminant into the air:

1. the construction, alteration, extension or replacement of any plant, structure, equipment, apparatus, mechanism or thing,

2. the alteration of a process or rate of production;

“NAICS” means the North American Industry Classification System maintained for Canada by Statistics Canada, as amended from time to time;

“point of noise reception” means a point described in Chapter 3 of the EASR publication at which sound discharged into the air from a source of sound at a facility is received;

“point of odour reception” means a point described in Chapter 4 of the EASR publication at which odour discharged into the air from a source of odour at a facility is received;

“Primary Noise Screening Method” means the method, published by the Ministry as updated from time to time and available on a Government of Ontario website, for determining the minimum separation distance that would result in sound levels less than or equal to the sound level limits set out in Chapter 3 of the EASR publication;

“Registry” means the Environmental Activity and Sector Registry established under Part II.2 of the Act;

“Secondary Noise Screening Method” means the method, published by the Ministry as updated from time to time and available on a Government of Ontario website, for determining the combined sound level at an affected point of noise reception;

“site”, with respect to a facility, means the property on which the facility is located;

“small wood-fired combustor” means a wood-fired combustor that has a nominal load heat input capacity of less than three megawatts;

“thermal treatment” has the same meaning as in Regulation 347;

“wood-fired combustor” means a combustion source designed to burn wood fuel such as hogged wood fuel, wood chips, wood pellets, bark, sawdust, woodwaste, cellulosic plant material, paper or paper sludge.

(2) A reference in this Regulation to an activity being engaged in or another thing occurring at a facility is a reference to the activity being engaged in or the thing occurring at the site on which the facility is located.

**Prescribed activities, s. 20.21 (1) of the Act**

2. (1) Subject to subsections (2) and (3), the following are prescribed activities for the purposes of subsection 20.21 (1) of the Act:

1. The use, operation, construction, alteration, extension or replacement of any plant, structure, equipment, apparatus, mechanism or thing at a facility that may discharge or from which may be discharged a contaminant into any part of the natural environment other than water.
2. The alteration of a process or rate of production at a facility if the alteration may result in,
  - i. the discharge of a contaminant into any part of the natural environment other than water, or
  - ii. the alteration of the rate or manner of discharge of a contaminant into any part of the natural environment other than water.

(2) Subsection (1) does not apply in respect of the following activities:

1. An activity engaged in at a facility that is part of a class identified by a NAICS code listed in the Schedule to this Regulation, if the NAICS code is the primary NAICS code for the facility.
2. An activity engaged in at a facility that is part of a class identified by a NAICS code that begins with 3212 (Veneer, plywood and engineered wood product manufacturing) if that NAICS code is the primary NAICS code for the facility. However, subsection (1) does apply in respect of an activity engaged in at a facility that is part of a class identified by the NAICS code 321211 (Hardwood veneer and plywood mills).
3. An activity engaged in at a facility at which at least one of the following activities takes place:
  - i. The land disposal of waste.
  - ii. The processing or disposal of waste by way of thermal treatment, other than the thermal treatment of the fuel described in subparagraph iii in a small wood-fired combustor that was installed at the facility on or after January 31, 2017.
  - iii. The use of a wood-fired combustor, other than a small wood-fired combustor that was installed at the facility on or after January 31, 2017 and that exclusively uses as fuel one or more of the following:
    - A. Wood briquettes that meet the specifications set out in Chapter 5 of the EASR publication.
    - B. Wood chips that meet the specifications set out in Chapter 5 of the EASR publication.
    - C. Wood pellets that meet the specifications set out in Chapter 5 of the EASR publication.
  - iv. The use of a plating process that uses cadmium, cyanide, chromium or nickel, including chrome plating, electroplating or electroless plating.
  - v. The use of an electrolytic stripping process that removes cadmium, chromium or nickel from an object.

- vi. The processing of metals outdoors, including torching, shearing, shredding or plasma cutting, other than for the purpose of routine maintenance carried out at the facility on any plant, structure, equipment, apparatus or thing.
  - vii. The operation of an alternative low-carbon fuel site within the meaning of Ontario Regulation 79/15 (Alternative Low-Carbon Fuels) made under the Act.
  - viii. The operation of an end-of-life vehicle waste disposal site within the meaning of Ontario Regulation 85/16 (Registrations under Part II.2 of the Act - End-of-life Vehicles) made under the Act.
  - ix. The operation of a fossil-fuel electric power generation facility with a maximum electrical power output capacity equal to or greater than 25 megawatts.
  - x. The operation of a combustion source that uses biogas, biomass, coal, petroleum coke or waste as a fuel or that uses a fuel derived from biogas, biomass, coal, petroleum coke or waste. However, this does not include the operation of a small wood-fired combustor that was installed at the facility on or after January 31, 2017 and that exclusively uses one or more of the fuels described in subparagraph iii.
  - xi. The use of a combustion turbine.
4. An activity engaged in at a facility if a landfilling site that is no longer permitted to accept waste is located on the site on which the facility is located.
  5. An activity engaged in at a facility if a site-specific air standard is or has previously been set in respect of the facility under section 35 of Ontario Regulation 419/05 (Air Pollution — Local Air Quality) made under the Act for a contaminant discharged from the facility.
  6. An activity engaged in at a facility if, in respect of the facility, a person is or has previously been registered in the Ministry's Technical Standards Registry – Air Pollution under section 39 of Ontario Regulation 419/05.
  7. A discrete activity involving the use of equipment that is intended to be moved from one site to another to perform the same function at each site, such as the use of mobile rock crushing equipment or mobile PCB destruction equipment.
  8. An activity engaged in at a facility that is located on a property that is one of a group of properties that are deemed to be a single property under subsection 4 (2) of Ontario Regulation 419/05.
  9. An activity that is exempt from subsection 9 (1) of the Act, other than an activity that is exempt by operation of subsection 9 (4) of the Act.
- (3) Subsection (1) does not apply to activities engaged in with respect to a renewable energy project if, by operation of subsection 9 (1) of Ontario Regulation 359/09 (Renewable Energy Approvals Under Part V.0.1 of the Act) made under the Act, section 47.3 of the Act does not apply to a person engaging in the project.

**Application, activities prescribed by more than one EASR regulation**

- 3.** (1) This section sets out the rules governing the application of this Regulation with respect to an activity that is prescribed for the purposes of subsection 20.21 (1) of the Act by section 2 of this Regulation and that is also prescribed by another EASR regulation.
- (2) This Regulation applies with respect to an activity described in subsection (1) and the other EASR regulation is deemed not to apply with respect to the activity.
- (3) Despite subsection (2), this Regulation does not apply with respect to an activity described in subsection (1), and the other EASR regulation continues to apply with respect to the activity, if the only activities engaged in at the facility at which the activity is engaged in are one or more of the following:
1. Activities described in subsection (1) that are all prescribed under a single other EASR regulation.
  2. Activities described in paragraph 9 of subsection 2 (2).
- (4) Despite subsection (2), if the person engaging in an activity described in subsection (1) at a facility has registered the activity in the Registry before the day this Regulation came into force, this Regulation does not apply with respect to the activity and the other EASR regulation continues to apply with respect to the activity until the earlier of the following days:
1. The date, as set out in a confirmation of registration provided by the Director, on which a registration is in effect in respect of an additional activity in which the person engages at the facility and that is prescribed for the purposes of subsection 20.21 (1) of the Act under this Regulation.
  2. January 31, 2027.

**PART II  
REGISTRATION MATTERS**

**Prescribed date environmental compliance approval ceases to have effect**

4. For the purposes of clause 20.17 (b) of the Act, January 31, 2027 is prescribed as the day on which an environmental compliance approval issued in respect of an activity prescribed by section 2 of this Regulation ceases to apply to the activity.

**Registration of all activities at facility when first activity is registered**

5. (1) This section applies to a person who, before January 31, 2027, registers an activity that is prescribed by section 2 in the Registry if, immediately before the person registers the activity in respect of a facility, an environmental compliance approval in respect of the activity is in effect.

(2) Subject to sections 6 and 7, a person to whom this section applies shall, when registering the activity in the Registry, register all other activities prescribed by section 2 in which the person engages or proposes to engage at the facility.

**Registration requirement, *Environmental Assessment Act* undertakings**

6. A person who proposes to engage in an activity prescribed by section 2 that forms part of an undertaking to which Part II or II.1 of the *Environmental Assessment Act* applies shall not register the activity in the Registry until,

- (a) if a class environmental assessment approved under Part II.1 of that Act applies with respect to the undertaking and no order has been issued with respect to the proposed undertaking under section 16 of that Act, the day all requirements necessary to proceed with the undertaking under the class environmental assessment have been satisfied; or
- (b) in the case of any other undertaking, the day an approval is given under Part II of that Act to proceed with the undertaking.

**Registration requirement, *Niagara Escarpment Planning and Development Act***

7. (1) A person who proposes to engage in an activity prescribed by section 2 at a facility that is located in an area of development control within the Niagara Escarpment Planning Area shall not register the activity in the Registry before a development permit required under section 24 of the *Niagara Escarpment Planning and Development Act* has been issued in respect of the facility.

(2) In this section,

“Niagara Escarpment Planning Area” has the same meaning as in the *Niagara Escarpment Planning and Development Act*.

**Registration requirement, information to be filed**

8. The following information shall be filed in the Registry under subsection 2 (1) of Ontario Regulation 245/11 (Registrations Under Part II.2 of the Act — General) made under the Act:

1. The Emissions Summary Table required under section 12 of this Regulation to be included in the EASR ESDM report in respect of the facility at which the activity is engaged in.
2. If an acoustic assessment has been conducted in respect of that facility, the Acoustic Assessment Summary Table required under Chapter 3 of the EASR publication for the purposes of sections 21 and 22 of this Regulation.

**Continuation of applications for environmental compliance approval**

9. (1) If an application for approval to engage in an activity mentioned in subsection 9 (1) of the Act was submitted to the Director on or before December 31, 2016 and the Director did not make a decision with respect to the application before that day,

- (a) the application is exempt from subsection 20.2 (3) of the Act; and
- (b) the application is exempt from subsection 20.3 (2) of the Act.

(2) A person who is engaging in an activity in respect of which an application for approval described in subsection (1) has been made is exempt from subsection 20.21 (1) of the Act until the earliest of the following days:

1. The day the person withdraws the application.
2. The day the Director refuses to issue an environmental compliance approval in respect of the activity.
3. If the Director issues an environmental compliance approval in respect of the activity, the day the approval ceases to apply in respect of the activity as determined under section 20.17 of the Act.

**Registration exemptions, modifications to facility**

10. (1) This section applies with respect to a person who modifies or proposes to modify a facility if the modification involves an activity prescribed by section 2.

- (2) Subject to subsection (3), the person is exempt from clauses 20.21 (1) (a) and (b) of the Act in respect of the activity if,
  - (a) the activity is engaged in at a facility in respect of which the person has previously registered an activity prescribed by section 2 of this Regulation; and

(b) the registration in respect of the previously registered activity has been neither suspended nor removed from the Registry.

(3) Subsection (2) does not apply if the previous registration was filed in respect of an activity that is prescribed by another EASR regulation.

**PART III  
ACTIVITY REQUIREMENTS - CLAUSE 20.21 (1) (C) OF THE ACT**

**AIR**

**Air contaminants**

11. (1) For the purposes of clause 20.21 (1) (c) of the Act, a person who engages in an activity prescribed by section 2 of this Regulation shall ensure that the following requirements are complied with in respect of the facility at which the activity is engaged in:

1. At all times when engaging in the activity, an EASR ESDM report that meets the requirements in section 12 must be available at the facility.

2. A new EASR ESDM report that meets the requirements in section 12 must be prepared at least once every 10 years.

3. Each EASR ESDM report prepared in respect of the facility must be accompanied by an EASR ESDM report supplement that meets the requirements in section 13.

4. At all times when engaging in the activity, the person engaging in the activity must ensure that the facility is operating within the operational parameters set out in the EASR ESDM report supplement.

5. At all times when engaging in the activity, the person shall ensure that the following rules are adhered to with respect to the concentration of each of the following contaminants discharged from the facility at a point of impingement:

i. If the contaminant is identified in the ACB list as belonging to the category “Benchmark 1”, the concentration must be at or below the concentration for each specified averaging period set out for the contaminant in that document.

ii. If the contaminant is identified in the ACB list as belonging to the category “Benchmark 2”,

A. the concentration must be at or below the concentration for each specified averaging period set out for the contaminant in that document, or

B. if the concentration is above the concentration for a specified averaging period set out for the contaminant in that document, the concentration must not be likely to cause an adverse effect for that averaging period.

iii. If subparagraphs i and ii do not apply to the contaminant, the concentration must not be likely to cause an adverse effect for a specified averaging period that relates to the adverse effect.

6. Subject to paragraph 7, at all times when engaging in the activity, the person shall ensure that each piece of combustion equipment listed in the EASR ESDM supplement as required by paragraph 9 of subsection 13 (1) is operated in a manner that does not result in the discharge of a contaminant,

i. at an emission intensity rate that exceeds an applicable intensity rate set out for the contaminant in Chapter 1 of the EASR publication, or

ii. in a concentration that exceeds an applicable limit set out for the contaminant in Chapter 1 of the EASR publication.

7. Paragraph 6 does not apply,

i. to combustion equipment during its start-up and shut-down periods, or

ii. to a boiler or heater during a period when, in a year, it uses a fuel other than the primary fuel identified in the EASR ESDM supplement in respect of the boiler or heater if,

A. the supplement confirms that the total number of hours during which the boiler or heater uses non-primary fuels in a year does not exceed 500, and

B. the boiler or heater has not used non-primary fuels for more than 500 hours in that year.

(2) In this section,

“shut-down” means an operating condition during which the operation of a piece of combustion equipment is decreased from normal operating conditions to an inoperative state;

“start-up” means an operating condition during which the operation of a piece of combustion equipment is increased from an inoperative state to normal operating conditions.

**EASR ESDM report requirements****12. (1) The following are the requirements for an EASR ESDM report:**

1. It must be dated, signed and sealed by a licensed engineering practitioner and set out the practitioner's name and licence number.
2. The information in the report must be accurate as of the date it is signed and sealed.
3. It must set out the primary NAICS code and any other applicable NAICS codes for the facility.
4. It must be prepared in accordance with section 26 of Ontario Regulation 419/05 (Air Pollution — Local Air Quality) made under the Act, subject to subsection (2) of this section, using one or more approved dispersion models in accordance with subsection 6 (1) of that Regulation. The approved dispersion models must be used in accordance with sections 9 to 17 of that Regulation.
5. It must demonstrate that the concentration of each contaminant discharged or proposed to be discharged from the facility into the air, predicted by the approved dispersion model for the point of impingement with the highest concentration of the contaminant, meets one of the following criteria:
  - i. If the contaminant is identified in the ACB list as belonging to the category "Benchmark 1", the concentration must be at or below the concentration for each specified averaging period set out for the contaminant in that document.
  - ii. If the contaminant is identified in the ACB list as belonging to the category "Benchmark 2",
    - A. the concentration must be at or below the concentration for each specified averaging period set out for the contaminant in that document, or
    - B. if the concentration is above the concentration for a specified averaging period set out for the contaminant in that document, the concentration must not be likely to cause an adverse effect for that averaging period.
  - iii. If subparagraphs i and ii do not apply to the contaminant, the concentration must not be likely to cause an adverse effect for a specified averaging period that relates to the adverse effect.

(2) The Emissions Summary Table described in paragraph 14 of subsection 26 (1) of Ontario Regulation 419/05 and required to be prepared under paragraph 4 of subsection (1) must include the following information in addition to the information required by Ontario Regulation 419/05:

1. With respect to each contaminant to which sections 19 and 20 of Ontario Regulation 419/05 do not apply in respect of an averaging period, a comparison between the concentration predicted by the approved dispersion model for the point of impingement with the highest concentration and the concentration for the contaminant set out in the ACB list.
2. The comparison described in paragraph 1 must be included for each averaging period set out for the contaminant in the ACB list.
3. The comparison described in paragraph 1 must be expressed as a percentage of the concentration set out in the ACB list.

**EASR ESDM report supplement****13. (1) The following are the requirements for an EASR ESDM report supplement:**

1. It must set out the name of the person who completed it and must be dated and signed by that person.
2. The information in the report must be accurate as of the date it is signed.
3. It must set out the legal name of each owner of the facility and the name under which each owner carries on business, if it is not the owner's legal name.
4. If the person who operates the facility is not an owner, the supplement must set out the legal name of each person who operates the facility and the name under which each operator carries on business, if it is not the operator's legal name.
5. It must set out the site address of the facility.
6. It must contain a statement signed by the person engaging in the prescribed activity confirming that all information the person gave to the licensed engineering practitioner in order to prepare the EASR ESDM report was complete and accurate.
7. It must contain a statement, signed by the licensed engineering practitioner who signed and sealed the EASR ESDM report, that includes the following:
  - i. Confirmation that, based on the information provided to the practitioner, the information in the report is accurate as of the date it is signed and sealed.

- ii. Confirmation that the EASR ESDM report was prepared in accordance with section 26 of Ontario Regulation 419/05 (Air Pollution — Local Air Quality) made under the Act and with subsection 12 (2) of this Regulation.
  - iii. Confirmation that one or more approved dispersion models were used to prepare the EASR ESDM report and that the models were used in accordance with sections 9 to 17 of Ontario Regulation 419/05.
  - iv. A statement indicating whether the information set out in the EASR ESDM report under paragraph 5 of subsection 12 (1) with respect to the concentration of contaminants is based on proposed discharges.
  - v. A description of the methods and procedures that were employed in preparing the report to ensure minimization of errors and omissions.
  - vi. A description of the operational parameters that were determined for the purpose of preparing the EASR ESDM report, including the maximum rates of production, process limits, performance limits and parameters relating to equipment and infrastructure.
  - vii. A description of the operating and maintenance procedures required to ensure that the facility is operating within the operational parameters referred to in subparagraph vi and subparagraph 9 i.
8. It must contain a statement, signed by a licensed engineering practitioner, confirming that each piece of combustion equipment listed in subsection (2) that is used or proposed to be used at the facility is designed to discharge the contaminants set out in Chapter 1 of the EASR publication with respect to the piece of combustion equipment in an amount that is less than or equal to the applicable limit set out for the contaminant in that Chapter.
9. The statement required by paragraph 8 must set out the basis for the confirmation provided under that paragraph, including the following information with respect to each piece of combustion equipment:
- i. The information required under Chapter 1 of the EASR publication related to the design of the combustion equipment, the operational parameters for the combustion equipment and emission estimating techniques used to form the basis for the confirmation under paragraph 8.
  - ii. For a boiler or heater, its maximum energy input capacity, the primary type of fuel it uses and any non-primary fuels that it may use, the total number of hours in a year that non-primary fuels may be used, the air pollution control equipment installed in or attached to it, the date it was installed or is proposed to be installed at the facility, the date of the most recent modification made to it, and, if applicable, the hours it is intended to be used.
  - iii. For an electricity generation engine, the type of fuel used in it, its power rating, its intended purpose, the air pollution control equipment installed in or attached to it, the date it was installed or is proposed to be installed at the facility, the date of the most recent modification made to it and, if applicable, the hours it is intended to be used.
  - iv. For a small wood-fired combustor, the type of fuel used in it, confirmation that it has an automated wood fuel feed system, its nominal load heat input and output capacity, its partial load heat input and output capacity, the air pollution control equipment installed in or attached to it, the date it was installed or is proposed to be installed at the facility and the date of the most recent modification made to it.

(2) The combustion equipment referred to in paragraph 8 of subsection (1) is the following:

- 1. A boiler or heater, unless the boiler or heater meets any of the following criteria:
  - i. It uses a fuel other than gaseous fuel, distillate oil or residual oil.
  - ii. Its maximum energy input capacity is less than or equal to 10.5 gigajoules per hour.
  - iii. It was installed at the facility before March 31, 2001 and has not been modified since its installation.
  - iv. It uses fuel derived from a primary process or operation at the facility and the fuel is not produced for commercial purposes at the facility.
  - v. It is used to recover heat from the exhaust gases of another combustion source.
  - vi. The combustion source included in the boiler or heater is a combustion turbine, a small wood-fired combustor or an electricity generation engine.
- 2. An electricity generation engine, unless the electricity generation engine meets any of the following criteria:
  - i. It is in a standby power system.
  - ii. It is used to generate electricity for use in a community or facility that is located in an off-grid area described in Chapter 2 of the EASR publication.
  - iii. It is used to generate electricity for use in a remote community or a remote facility described in Chapter 2 of the EASR publication.



- iv. It was installed in the facility before February 27, 2009, it has not been modified since its installation, and on the day immediately before the first registration in respect of the facility is filed in the Registry, an environmental compliance approval in respect of the engine is in effect.

**3. A small wood-fired combustor, unless the small wood-fired combustor meets the following criterion:**

**i. It is exempt from the application of section 9 of the Act by Ontario Regulation 524/98 (Environmental Compliance Approvals — Exemptions from Section 9 of the Act) made under the Act.**

(3) If an EASR ESDM report lists a contaminant set out in Schedule 3 to Ontario Regulation 419/05 that is discharged or proposed to be discharged before February 1, 2020, the EASR ESDM report supplement may contain a statement by the licensed engineering practitioner confirming that the EASR ESDM report has been prepared as if section 20 of that Regulation applies to the contaminant.

(4) If the EASR ESDM report supplement contains the statement described in subsection (3), the person engaging in the activity is deemed to have requested the notice mentioned in subsection 20 (4) of Ontario Regulation 419/05 and the Director is deemed to have given notice to the person requiring the person to comply with section 20 of that Regulation with respect to the contaminant as of the date the EASR ESDM report was prepared.

(5) In this section,

“electricity generation engine” means a combustion source that is a reciprocating engine and that is used to generate electricity;

“standby power system” means any apparatus, mechanism, equipment or other thing, and any related exhaust stacks, fuel tanks and piping, that includes one or more electricity generation engines and that is intended to be used only for the provision of electrical power during power outages or involuntary power reductions.

**Notice under s. 24 of Ontario Regulation 419/05**

**14.** (1) A person who engages in an activity prescribed by section 2 and who receives a notice from the Director under section 24 of Ontario Regulation 419/05 (Air Pollution — Local Air Quality) made under the Act shall prepare, not later than the date specified in the notice,

- (a) a new EASR ESDM report that meets the requirements of section 12; and
- (b) a new EASR ESDM report supplement that meets the requirements in section 13.

(2) If the person is also required to update a report under subsection 25 (5) of Ontario Regulation 419/05, the person shall also prepare, in accordance with the timelines applicable to that subsection,

- (a) a new EASR ESDM report that meets the requirements of section 12; and
- (b) a new EASR ESDM report supplement that meets the requirements in section 13.

**Notice to submit in-stack testing results**

**15.** (1) The Director may give written notice to a person who engages in an activity prescribed by section 2 that involves a piece of combustion equipment listed in subsection 13 (2) requiring the person to submit to the Director the results of in-stack testing if no such results in respect of the piece of combustion equipment have previously been submitted to the Director.

(2) The Director may also give written notice to a person who engages in an activity prescribed by section 2 that involves a piece of combustion equipment listed in subsection 13 (2) requiring the person to submit to the Director the results of in-stack testing if the Director has reasonable grounds to believe that,

- (a) a discharge from the combustion equipment may cause an adverse effect; or
- (b) the combustion equipment is discharging a contaminant in an amount that is greater than the intensity rate or limit set out in Chapter 1 of the EASR publication for the contaminant and the combustion equipment.

(3) Before the Director gives a person a notice under this section, the Director shall give the person a draft of the notice, with reasons, and an opportunity to make written submissions to the Director during the period that ends 30 days after the draft is given.

(4) A person to whom the Director has given written notice under subsection (1) or (2) shall ensure that the in-stack testing is conducted in accordance with the Director’s notice and that the results are submitted not later than the date specified in the notice.

(5) In this section,

“flue gas” means a gas that is generated by a combustion process;

“in-stack testing” means the measurement of the amount of combustion contaminants in the flue gas of a piece of combustion equipment.

## NOISE

**Noise emissions**

**16.** For the purposes of clause 20.21 (1) (c) of the Act, a person who engages in an activity prescribed by section 2 of this Regulation shall ensure that the following requirements are complied with in respect of the facility at which the person engages in the activity:

1. At all times when engaging in the activity, a noise report that meets the requirements in sections 17 to 22 must be available at the facility.
2. A new noise report that meets the requirements in sections 17 to 22 must be prepared at least once every 10 years.
3. If a noise abatement action plan is prepared under subparagraph 8 v of subsection 17 (1), it must be implemented in accordance with its contents.
4. At all times when engaging in the activity, the person engaging in the activity must ensure that the facility is operating within the operational parameters, if any, set out in the noise report. However, this requirement does not apply if a noise abatement action plan is being implemented at the facility.
5. At all times when engaging in the activity, the person shall ensure that the combined sound level resulting from the sound discharged from the facility does not exceed the applicable sound level limit set out in Chapter 3 of the EASR publication at each affected point of noise reception. However, this requirement does not apply if a noise abatement action plan is being implemented at the facility.
6. At all times when engaging in the activity, the person engaging in the activity must ensure that the facility is implementing the noise control measures and procedures, if any, set out in the noise report.
7. Each record described in Chapter 3 of the EASR publication in respect of a source of sound must be prepared and retained at the facility for the period set out in that Chapter, or if no retention period is set out in that Chapter, for 20 years after its creation.

**Noise report**

**17.** (1) The following are the requirements for a noise report:

1. It must be dated, signed and sealed by a licensed engineering practitioner and set out the practitioner's name and licence number.
2. The information in the report must be accurate as of the date it is signed and sealed.
3. It must set out the primary NAICS code and any other applicable NAICS codes for the facility.
4. It must contain a statement by the licensed engineering practitioner mentioned in paragraph 1 confirming that, based on the information provided to the practitioner, the information in the report is accurate as of the date it is signed and sealed.
5. It must set out the legal name of each owner of the facility and the name under which each owner carries on business, if it is not the owner's legal name.
6. If the person who operates the facility is not an owner, the noise report must set out the legal name of each person who operates the facility and the name under which each operator carries on business, if it is not the operator's legal name.
7. It must set out the site address of the facility.
8. It must contain a statement by the licensed engineering practitioner mentioned in paragraph 1 confirming that one of the following criteria is met:
  - i. The distance between the facility and the property boundary of the closest point of noise reception is equal to or greater than 1000 metres.
  - ii. The actual separation distance from the facility to the closest point of noise reception is equal to or greater than the minimum separation distance, as determined by using the Primary Noise Screening Method.
  - iii. The combined sound level resulting from sound discharged from the facility at each affected point of noise reception, as determined using the Secondary Noise Screening Method, is less than or equal to the applicable sound level limit set out in Chapter 3 of the EASR publication.
  - iv. The combined sound level resulting from sound discharged from the facility at each affected point of noise reception, as determined using an acoustic assessment, is less than or equal to the applicable sound level limit set out in Chapter 3 of the EASR publication.
  - v. A noise abatement action plan is included in the noise report. This criterion applies only in respect of a facility that commenced operation before the day this Regulation came into force and at which, as of the day the first registration in respect of the facility is filed in the Registry, the combined sound level resulting from sound

discharged from the facility at an affected point of noise reception, as determined using an acoustic assessment, is greater than the applicable sound level limit set out in Chapter 3 of the EASR publication.

(2) For the purpose of subparagraph 8 i of subsection (1), the distance between a facility and the property boundary of a point of noise reception shall be measured from Point A to Point B in accordance with the following:

1. Point A is,
  - i. the point that is located on the exterior wall of a building at the facility and that is closest to the property boundary of the point of noise reception, or
  - ii. if there is an outdoor source of sound at the facility that is located closer to the property boundary of the point of noise reception than the point mentioned in subparagraph i, the point that is located on the edge of the outdoor source of sound and that is closest to the property boundary of the point of noise reception.
2. Point B is the point that is located on the property boundary of the point of noise reception and that is closest to Point A.

**Noise setback, subpara 8 i of s. 17 (1)**

**18.** If the licensed engineering practitioner confirms that the criterion in subparagraph 8 i of subsection 17 (1) is met, the noise report must contain a drawing, made to scale, that shows Points A and B described in subsection 17 (2).

**Primary noise screening, subpara 8 ii of s. 17 (1)**

**19.** If the licensed engineering practitioner confirms that the criterion in subparagraph 8 ii of subsection 17 (1) is met, the noise report must contain the following:

1. Confirmation that the comparison of the actual separation distance and the minimum separation distance was performed in accordance with the Primary Noise Screening Method.
2. A copy of all the information used for the Primary Noise Screening Method and the results it generated.

**Secondary noise screening, subpara 8 iii of s. 17 (1)**

**20.** If the licensed engineering practitioner confirms that the criterion in subparagraph 8 iii of subsection 17 (1) is met, the noise report must contain the following:

1. Confirmation that the combined sound levels were determined using the Secondary Noise Screening Method.
2. Confirmation that the affected points of noise reception were determined using the Secondary Noise Screening Method.
3. A copy of all the information used for the Secondary Noise Screening Method and the results it generated.
4. A description of any acoustical barrier used or proposed to be used with respect to each source of sound.
5. A description of the operational parameters that were determined for the purpose of the noise report, including,
  - i. the facility's maximum rates of production, process limits and performance limits,
  - ii. parameters relating to equipment and infrastructure at the facility,
  - iii. the time of day a source of sound is operating or is proposed to be operating,
  - iv. the duration of time a source of sound is operating or is proposed to be operating, and
  - v. whether the sound is tonal or non-tonal.
6. A description of the operating and maintenance procedures required to ensure that the facility is operating within the operational parameters referred to in paragraph 5.
7. A statement signed by the person engaging in the prescribed activity confirming that all information the person gave to the licensed engineering practitioner in order to prepare the noise report was complete and accurate.

**Acoustic assessment, subpara 8 iv of s. 17 (1)**

**21.** If the licensed engineering practitioner confirms that the criterion in subparagraph 8 iv of subsection 17 (1) is met, the noise report must contain the following:

1. The information and confirmations described in paragraphs 5 to 7 of section 20.
2. A description of each noise control measure or procedure used with respect to a source of sound in order to ensure that the sound level at each affected point of noise reception does not exceed the applicable sound level limits set out in Chapter 3 of the EASR publication.
3. Confirmation that the affected points of noise reception were determined in accordance with Chapter 3 of the EASR publication.

4. A description of the methods and procedures that were employed in preparing the report to ensure minimization of error and omissions.
5. The information required under Chapter 3 of the EASR publication, including the Acoustic Assessment Summary Table required under that Chapter.

**Noise abatement action plan, subpara 8 v of s. 17 (1)**

**22.** If the licensed engineering practitioner confirms that the criterion in subparagraph 8 v of subsection 17 (1) is met, the noise report must contain the following:

1. The information and confirmations described in paragraphs 5 and 7 of section 20.
2. A description of each noise control measure or procedure used with respect to a source of sound.
3. Confirmation that the affected points of noise reception were determined in accordance with Chapter 3 of the EASR publication.
4. A description of the methods and procedures that were employed in preparing the report to ensure minimization of error and omissions.
5. The information required under Chapter 3 of the EASR publication, including the Acoustic Assessment Summary Table required under that Chapter.
6. A noise abatement action plan that describes the measures and procedures required to be implemented to prevent or minimize the sound discharged from the facility in order to ensure that the sound level at each affected point of noise reception does not exceed the applicable sound level limits set out in Chapter 3 of the EASR publication.
7. A schedule for implementing the noise control measures and procedures described in paragraph 6, including specific dates by which they will be implemented.

**Notice to prepare acoustic audit report**

**23.** (1) The Director may give written notice to a person who engages in an activity prescribed by section 2 requiring the person to submit to the Director an acoustic audit report that meets the requirements in subsection (3) if the person discharges or causes or permits the discharge of sound into the air from a source of sound at the facility at which the person engages in the activity, and

- (a) the Director has reasonable grounds to believe that,
  - (i) the discharge may cause an adverse effect, or
  - (ii) the sound level resulting from the discharge at an affected point of noise reception is greater than the applicable sound level limit set out in Chapter 3 of the EASR publication; or
- (b) the most recent noise report in respect of the facility confirms that the criterion in subparagraph 8 iv or v of subsection 17 (1) is met.

(2) Before the Director gives a person a notice under this section, the Director shall give the person a draft of the notice, with reasons, and an opportunity to make written submissions to the Director during the period that ends 30 days after the draft is given.

(3) The following are the requirements for an acoustic audit report:

1. It must be dated, signed and sealed by a licensed engineering practitioner and set out the practitioner's name and licence number.
2. It must set out the primary NAICS code and any other applicable NAICS codes for the facility.
3. It must summarize the results of an acoustic audit conducted in accordance with the Director's notice.
4. The licensed engineering practitioner who signs and seals the report must not be the same licensed engineering practitioner who signed and sealed the most recent noise report prepared for the purposes of paragraph 1 of section 16.

(4) A person to whom the Director has given a notice under this section shall ensure that the acoustic audit report is prepared in accordance with the Director's notice and submitted not later than the date specified in the notice.

(5) For the purpose of this section, an acoustic audit must,

- (a) verify the sound level at one or more affected points of noise reception by,
  - (i) measuring the sound level at the affected point of noise reception, or
  - (ii) if it is not possible to measure the sound level at the affected point of noise reception, measuring the sound level at a point near to the affected point of noise reception and predicting the sound level at the affected point of noise reception;

- (b) confirm that the noise control measures and procedures set out in the noise report are being implemented; and
- (c) verify the sound level limits and affected points of noise reception set out in the noise report.

## ODOUR

### Odour emissions

**24.** For the purposes of clause 20.21 (1) (c) of the Act, a person who engages in an activity prescribed by section 2 of this Regulation shall ensure that the following requirements are complied with:

1. At all times when engaging in the activity, an odour screening report that meets the requirements in section 25 must be available at the facility at which the person engages in the activity.
2. A new odour screening report that meets the requirements in section 25 must be prepared at least once every 10 years.
3. At all times when engaging in the activity, a best management practices plan for odour that meets the requirements in section 26 must be available at the facility if, as of the date the odour screening report is completed, any of the following circumstances exists:
  - i. The activity is engaged in at a facility for which the primary or secondary NAICS code is set out in Table 1 of Chapter 4 of the EASR publication, the design capacity of the facility meets the criteria set out opposite the NAICS code in that Table, and the distance between the facility and the closest point of odour reception is less than the distance set out opposite the NAICS code in that Table as measured in accordance with that Chapter.
  - ii. The activity relates to a process set out in Table 2 of Chapter 4 of the EASR publication and the distance between the facility and the closest point of odour reception is less than the distance set out opposite the process in that Table as measured in accordance with that Chapter.
  - iii. The activity is engaged in at a facility for which the primary or secondary NAICS code is set out in Table 3 of Chapter 4 of the EASR publication and the design capacity of the facility meets the criteria set out opposite the NAICS code in that Table.
  - iv. The activity relates to a process set out in Table 4 of Chapter 4 of the EASR publication.
  - v. The Director has given the person a notice under section 28 requiring the person to submit a best management practices plan for odour to the Director, the date for submitting the plan has passed, and the notice has not been revoked.
4. The best management practices plan for odour must be implemented in accordance with its contents.
5. At all times when engaging in the activity, an odour control report that meets the requirements in section 27 must be available at the facility if either of the following circumstances exists:
  - i. The activity is engaged in at a facility for which the primary or secondary NAICS code is set out in Table 3 of Chapter 4 of the EASR publication, the design capacity of the facility meets the criteria set out opposite the NAICS code in that Table, and the distance between the facility and the closest point of odour reception is less than the distance set out opposite the NAICS code in that Table as measured in accordance with that Chapter.
  - ii. The activity relates to a process set out in Table 4 of Chapter 4 of the EASR publication and the distance between the facility and the closest point of odour reception is less than the distance set out opposite the process in that Table as measured in accordance with that Chapter.
6. The best management practices plan for odour and the odour control report must be reviewed at least once in every 10-year period by a licensed engineering practitioner.
7. An updated best management practices plan for odour must be prepared at least once in every 10-year period by a licensed engineering practitioner. However, this requirement does not apply if a licenced engineering practitioner provides the person engaging in the activity with an addendum to the most recent best management plan confirming that the practitioner has reviewed the plan, the information in the plan remains accurate, and no additional measures are necessary to prevent or minimize the discharge of odour from the facility. The addendum must be dated and signed by the licenced engineering practitioner.
8. An updated odour control report must be prepared at least once in every 10-year period by a licensed engineering practitioner. However, this requirement does not apply if a licenced engineering practitioner provides the person engaging in the activity with an addendum to the most recent odour control report confirming that the practitioner has reviewed the report and that the information in the report remains accurate. The addendum must be dated and signed by the licenced engineering practitioner.
9. Each record described in Chapter 4 of the EASR publication in respect of a source of odour must be prepared and retained at the facility for the period set out in that Chapter, or if no retention period is set out in that Chapter, for 20 years after its creation.

**Odour screening report**

**25.** The following are the requirements for an odour screening report:

1. It must set out the name of the person who completed it and must be dated and signed by that person.
2. The information in the report must be accurate as of the date the report is completed.
3. It must set out the primary NAICS code and, if applicable, the secondary NAICS code for the facility.
4. It must set out the legal name of each owner of the facility and the name under which each owner carries on business, if it is not the owner's legal name.
5. If the person who operates the facility is not an owner, the odour screening report must set out the legal name of each person who operates the facility and the name under which each operator carries on business, if it is not the operator's legal name.
6. It must set out the site address of the facility.
7. It must include a description of any of the circumstances set out in paragraph 3 or 5 of section 24 that exist in respect of the facility.

**Best management practices plan for odour**

**26.** The following are the requirements for a best management practices plan for odour:

1. It must be dated, signed and sealed by a licensed engineering practitioner and set out the practitioner's name and licence number.
2. The information in the plan must be accurate as of the date it is signed and sealed.
3. It must contain a statement by the licensed engineering practitioner mentioned in paragraph 1 confirming that, based on the information provided to the practitioner, the information in the plan is accurate as of the date it is signed and sealed.
4. It must contain a statement signed by the person engaging in the prescribed activity confirming that all information the person gave to the licensed engineering practitioner in order to prepare the plan was complete and accurate.
5. It must set out the legal name of each owner of the facility and the name under which each owner carries on business, if it is not the owner's legal name.
6. If the person who operates the facility is not an owner, the plan must set out the legal name of each person who operates the facility and the name under which each operator carries on business, if it is not the operator's legal name.
7. It must set out the site address of the facility.
8. It must set out the following with respect to each source of odour at the facility, including each fugitive source of odour:
  - i. Potential causes for occasional increases in the discharge of odour from the source into the air.
  - ii. If the best management practices plan for odour is the first such plan prepared in respect of the facility, confirmation that the terms or conditions, if any, relating to the control of the discharge of odour from the facility included in an environmental compliance approval that was in effect immediately before the registration in the Registry of an activity engaged in at the facility were considered in the preparation of the best management practices plan for odour.
  - iii. Measures and procedures implemented at the facility to prevent or minimize the discharge of odour from the source into the air.
  - iv. Inspection, maintenance and monitoring procedures to ensure the adoption and continued implementation of measures and procedures to prevent or minimize the discharge of odour from the source into the air.
  - v. Identification of additional measures and procedures that should be implemented at the facility to prevent or minimize the discharge of odour from the source into the air, if any, including:
    - A. A description of the additional measures to be implemented.
    - B. A description of the additional preventative procedures to be implemented.
    - C. If the additional preventative procedures are to be implemented periodically, the frequency with which the procedures are to be implemented.
    - D. A schedule for the implementation of the additional measures, including training of workers.

- E. Inspection, maintenance and monitoring procedures to ensure the adoption and continued implementation of the measures and procedures.

**Odour control report**

27. The following are the requirements for an odour control report:

1. It must be dated, signed and sealed by a licensed engineering practitioner and set out the practitioner's name and licence number.
2. The information in the report must be accurate as of the date it is signed and sealed.
3. It must contain a statement by the licensed engineering practitioner mentioned in paragraph 1 confirming that, based on the information provided to the practitioner, the information in the report is accurate as of the date it is signed and sealed.
4. It must contain a statement signed by the person engaging in the prescribed activity confirming that all information the person gave to the licensed engineering practitioner in order to prepare the report was complete and accurate.
5. It must set out the legal name of each owner of the facility and the name under which each owner carries on business, if it is not the owner's legal name.
6. If the person who operates the facility is not an owner, the report must set out the legal name of each person who operates the facility and the name under which each operator carries on business, if it is not the operator's legal name.
7. It must set out the site address of the facility.
8. It must set out the following:
  - i. A list of the measures and procedures that are used in similar facilities, including facilities in other jurisdictions, to prevent or minimize the discharge of odour, including measures and procedures such as the use of air pollution control technology and the implementation of changes to equipment, processes or materials.
  - ii. An analysis of the measures and procedures identified under subparagraph i, and potential combinations of them, to determine which would be technically feasible to implement at the facility in order to prevent or minimize the discharge of odour.
  - iii. A list of the measures and procedures or combinations that are determined under subparagraph ii to be technically feasible to implement at the facility and, for each measure or procedure that is not included in the best management practices plan for odour, an explanation of why that measure or procedure is not necessary to adequately prevent or minimize the discharge of odour from the facility.
  - iv. An explanation of why the measures and procedures set out in the best management practices plan for odour are adequate to prevent or minimize the discharge of odour from the facility.

**Notice to submit best management practices plan for odour**

28. (1) The Director may give written notice to a person who engages in an activity prescribed by section 2 requiring the person to submit to the Director a best management practices plan for odour that meets the requirements in section 26 if the person discharges or causes or permits the discharge of odour into the air, and,

- (a) the Director has reasonable grounds to believe that the discharge may cause an adverse effect; and
- (b) either,
  - (i) the person is not otherwise required to prepare a best management practices plan for odour under subparagraphs 3 i to iv of section 24, or
  - (ii) the best management practices plan for odour did not include the source of the odour.

(2) Before the Director gives a person a notice under this section, the Director shall give the person a draft of the notice, with reasons, and an opportunity to make written submissions to the Director during the period that ends 30 days after the draft is given.

(3) The best management practices plan for odour required under subsection (1) must be prepared in accordance with the Director's notice and must be submitted not later than the date specified in the notice.

FUGITIVE DUST

**Best management practices plan for fugitive dust control**

29. (1) For the purposes of clause 20.21 (1) (c) of the Act, a person who engages in an activity prescribed by section 2 of this Regulation shall ensure that the following requirements are complied with if the most recent EASR ESDM report in respect of the facility at which the person engages in the activity identifies a source of fugitive dust:

1. At all times when engaging in the activity, a best management practices plan for fugitive dust control in respect of the facility that meets the requirements in subsection (2) must be available at the facility.
  2. The plan must be implemented in accordance with its contents.
  3. The best management practices plan for fugitive dust control must be reviewed at least once in every 10-year period by a licensed engineering practitioner.
  4. An updated best management practices plan for fugitive dust control must be prepared at least once in every 10-year period by a licensed engineering practitioner. However, this requirement does not apply if a licenced engineering practitioner provides the person engaging in the activity with an addendum to the most recent best management plan confirming that the practitioner has reviewed the plan, the information in the plan remains accurate, and no additional measures are necessary to prevent or minimize the discharge of fugitive dust from the facility. The addendum must be dated and signed by the licenced engineering practitioner.
- (2) The following are the requirements for a best management practices plan for fugitive dust control:
1. It must be dated, signed and sealed by a licensed engineering practitioner and set out the practitioner's name and licence number.
  2. The information in the plan must be accurate as of the date it is signed and sealed.
  3. It must contain a statement by the licensed engineering practitioner mentioned in paragraph 1 confirming that, based on the information provided to the practitioner, the information in the plan is accurate as of the date it is signed and sealed.
  4. It must contain a statement signed by the person engaging in the prescribed activity confirming that all information the person gave to the licensed engineering practitioner in order to prepare the plan was complete and accurate.
  5. It must set out the legal name of each owner of the facility and the name under which each owner carries on business, if it is not the owner's legal name.
  6. If the person who operates the facility is not an owner, the plan must set out the legal name of each person who operates the facility and the name under which each operator carries on business, if it is not the operator's legal name.
  7. It must set out the site address of the facility.
  8. It must set out the following with respect to each significant source of fugitive dust at the facility, including each source of fugitive dust that would be a significant source of fugitive dust if it were not controlled:
    - i. Possible causes of the fugitive dust.
    - ii. Measures and procedures implemented at the facility to prevent or minimize the discharge of fugitive dust into the air.
    - iii. Inspection, maintenance and monitoring procedures to ensure the adoption and continued implementation of measures and procedures to prevent or minimize the discharge of fugitive dust into the air.
    - iv. Identification of additional measures and procedures that should be implemented at the facility to prevent or minimize the discharge of fugitive dust into the air, if any, including:
      - A. A description of the additional measures to be implemented.
      - B. A description of the additional preventative procedures to be implemented.
      - C. If the additional preventative procedures are to be implemented periodically, the frequency with which the procedures should be implemented and material application rates, as applicable.
      - D. A schedule for the implementation of the additional measures, including training of workers.
      - E. Inspection, maintenance and monitoring procedures to ensure the adoption and continued implementation of the additional measures.

**Notice to submit best management practices plan for fugitive dust control**

**30.** (1) The Director may give written notice to a person who engages in an activity prescribed by section 2 requiring the person to submit to the Director a best management practices plan for fugitive dust control that meets the requirements in subsection 29 (2) if,

- (a) the person discharges or causes or permits the discharge of fugitive dust into the air;
- (b) the Director has reasonable grounds to believe that the discharge may cause an adverse effect; and
- (c) either,



- (i) the most recent EASR ESDM report in respect of the facility at which the person engages in the activity does not identify the source of fugitive dust, or
  - (ii) the best management practices plan for fugitive dust control does not identify the source as a significant source of fugitive dust.
- (2) Before the Director gives a person a notice under this section, the Director shall give the person a draft of the notice, with reasons, and an opportunity to make written submissions to the Director during the period that ends 30 days after the draft is given.
- (3) A person to whom the Director has given written notice under subsection (1) shall,
    - (a) ensure that the best management practices plan is prepared in accordance with the Director's notice and submitted not later than the date specified in the notice; and
    - (b) comply with the requirements in subsection 29 (1) in respect of the best management practices plan.

#### OTHER ACTIVITY REQUIREMENTS

##### **Small wood-fired combustors**

**31.** For the purposes of clause 20.21 (1) (c) of the Act, a person who engages in an activity prescribed by section 2 of this Regulation that involves a small wood-fired combustor shall ensure that the following requirements are met:

1. The small wood-fired combustor must use an automated wood fuel feed system that meets the criteria set out in Chapter 5 of the EASR publication.
2. A wood fuel management plan in respect of the small wood-fired combustor must be prepared and implemented in accordance with Chapter 5 of the EASR publication.
3. The small wood-fired combustor must meet the design criteria set out in Chapter 5 of the EASR publication.
4. The small wood-fired combustor must be operated within the operational parameters set out in Chapter 5 of the EASR publication.
5. The operational parameters set out in Chapter 5 of the EASR publication must be measured using the measurement methods set out in that Chapter.
6. A statement setting out the results of an installation test in respect of the small wood-fired combustor conducted in accordance with Chapter 5 of the EASR publication must be available at all times when engaging in the activity.
7. A performance assessment of the small wood-fired combustor must be conducted in accordance with Chapter 5 of the EASR publication at least once per year, and the results of each assessment must be recorded.
8. Each record described in Chapter 5 of the EASR publication in respect of the small wood-fired combustor must be prepared and retained at the facility for the period set out in that Chapter or, if no retention period is set out in that Chapter, for 20 years after its creation.

##### **Modifications to facility — requirement re reports**

**32.** (1) Subject to subsections (2) and (3), a person who engages in an activity prescribed by section 2 shall ensure that before a modification is made to the facility at which the person engages in the activity, the person has available at the facility,

- (a) an EASR ESDM report that reflects the proposed modification and that meets the requirements in section 12;
  - (b) an EASR ESDM report supplement that reflects the proposed modification and that meets the requirements in section 13;
  - (c) a noise report that reflects the proposed modification and that meets the requirements in sections 17 to 22; and
  - (d) an odour screening report that reflects the proposed modification and that meets the requirements in section 25.
- (2) Clauses (1) (a) and (b) do not apply if a licensed engineering practitioner provides the person engaging in the activity with an addendum to the most recent EASR ESDM report setting out,
- (a) a description of the proposed modification; and
  - (b) an explanation about why the licensed engineering practitioner is of the opinion that the information in the most recent EASR ESDM report and EASR ESDM report supplement will remain accurate after the modification is made.
- (3) Clause (1) (c) does not apply if a licensed engineering practitioner provides the person engaging in the activity with an addendum to the most recent noise report setting out,
- (a) a description of the proposed modification; and

- (b) an explanation about why the licensed engineering practitioner is of the opinion that the information in the most recent noise report will remain accurate after the modification is made.
- (4) Each addendum mentioned in subsections (2) and (3) must be dated and signed by the licenced engineering practitioner who provides it.
- (5) For greater certainty,
  - (a) an EASR ESDM report or an EASR ESDM report supplement prepared for the purpose of subsection (1) does not satisfy the requirements in paragraphs 1 to 3 of subsection 11 (1) until the facility is modified as set out in the report;
  - (b) a noise report prepared for the purpose of subsection (1) does not satisfy the requirements in paragraphs 1 and 2 of section 16 until the facility is modified as set out in the report; and
  - (c) an odour screening report prepared for the purpose of subsection (1) does not satisfy the requirements in paragraphs 1 and 2 of section 24 until the facility is modified as set out in the report.
- (6) An Emissions Summary Table prepared as part of an EASR ESDM report for the purpose of subsection (1) may be filed in the Registry for the purpose of section 8.

#### **Procedures**

**33.** For the purposes of clause 20.21 (1) (c) of the Act, a person who engages in an activity prescribed by section 2 of this Regulation shall ensure that the following procedures are developed and implemented at the facility at which the person engages in the activity:

1. Operating, maintenance and monitoring procedures to ensure that the facility is operating within the operational parameters set out in the EASR ESDM report supplement in respect of the facility. The procedures must be developed and implemented having regard to the operating and maintenance procedures set out in the EASR ESDM report supplement and must include any recommendations from the manufacturers of sources of contaminant or of equipment related to sources of contaminant.
2. Operating, maintenance and monitoring procedures to ensure that the facility is operating within the operational parameters, if any, set out in the noise report in respect of the facility. The procedures must be developed and implemented having regard to the operating and maintenance procedures set out in the noise report and must include any recommendations from the manufacturers of sources of sound or of equipment related to sources of sound.
3. If a noise report in respect of the facility indicates that a noise abatement action plan referred to in subparagraph 8 v of subsection 17 (1) is being implemented at the facility, procedures to ensure that the noise abatement action plan is implemented.
4. Procedures setting out the frequency of inspections and scheduled preventative maintenance of sources of contaminant at the facility and equipment related to the sources of contaminant.
5. Procedures for record-keeping activities and logs relating to the operating, maintenance and monitoring procedures and plans.
6. Procedures to prevent and respond to spills from sources of contaminant.
7. Procedures for training persons who operate and maintain sources of contaminant and the equipment related to sources of contaminant.
8. Procedures for recording and responding to complaints that relate to the facility and the natural environment.

#### **Complaints**

**34.** A person who engages in an activity prescribed by section 2 and who receives a complaint that relates to the discharge of a contaminant into the air from the facility at which the person engages in the activity shall ensure that the Ministry's Spills Action Centre is immediately notified of the complaint.

### **PART IV MISCELLANEOUS**

#### **Records**

- 35.** (1) A person who engages in an activity prescribed by section 2 shall,
- (a) subject to subsections (2), (3) and (4), retain each report, supplement and plan that the person is required to ensure is prepared under this Regulation at the facility to which the document relates for at least 20 years after the date the document is signed; and
  - (b) retain each addendum to a report mentioned in clause (a) at the facility to which the document relates for at least as long as the report mentioned in clause (a) is required to be kept.

(2) Subsection (1) does not apply to a report prepared for the purpose of a proposed modification to a facility if the facility is not modified as set out in the report, but subsection (1) does apply with respect to an Emissions Summary Table mentioned in subsection 32 (6).

(3) If a noise report includes a noise abatement action plan, the noise report shall be retained for at least 20 years after the date on which the implementation of the noise abatement action plan is completed.

(4) Subsection (1) does not apply to a record required to be prepared under the following provisions if a different retention period is established with respect to the record under those provisions:

1. Paragraph 7 of section 16, in connection with sources of sound.
2. Paragraph 9 of section 24, in connection with sources of odour.
3. Paragraph 8 of section 31, in connection with small wood-fired combustors.

(5) A person who engages in an activity prescribed by section 2 shall ensure that a record of each procedure required to be developed and implemented under section 33 is created and retained at the facility for at least five years after the day the procedure is no longer being implemented at the facility.

(6) A person who engages in an activity prescribed by section 2 shall ensure that each of the following records is created and retained at the facility for at least five years after its creation:

1. A record of each comment the person receives from a provincial officer or the Director with respect to a plan, report or procedure required to be prepared under this Regulation that includes the comment, a description of whether or not the comment was addressed, and,
  - i. if the comment was addressed, a description of the actions taken to do so and the date each was implemented, and
  - ii. if the comment was not addressed, a description of the reasons it was not addressed.
2. A record of the following information with respect to each complaint received by the person with respect to an activity engaged in at the facility or a discharge into the air from the facility, if the complaint relates to the natural environment:
  - i. The date and time when the complaint was received.
  - ii. A copy of the complaint, if it is a written complaint.
  - iii. A summary of the complaint, if it is not a written complaint.
  - iv. A summary of the measures taken, if any, to address the complaint.

(7) A person who engages in an activity prescribed by section 2 shall ensure that a log containing the following information is created, updated and retained at the facility:

1. A description of each modification made to the facility and the date on which the modification was made.
2. A description of each change in the manner in which an approved dispersion model is used in the preparation of an EASR ESDM report and the date on which the change occurred.
3. A summary of how the information in paragraphs 1 and 2 has been reflected in the relevant report, supplement or plan.

(8) A person who engages in an activity prescribed by section 2 that involves a boiler or heater shall ensure that a log containing the following information is created, updated and retained at the facility:

1. Each date the boiler or heater uses a non-primary fuel.
2. For each date mentioned in paragraph 1, the duration, in hours, over which the boiler or heater uses the non-primary fuel.

(9) An entry in a log shall be maintained for at least 20 years after the day the entry is made.

**Form of reports, etc.**

**36.** With respect to any report, plan, table or log that a person is required to prepare or any method that a person is required to use under this Regulation,

- (a) if the Director has approved a form the person shall prepare or use it in that form; and
- (b) if the Director has specified an electronic format the person shall prepare or use it in that format.

**PART V  
COMMENCEMENT**

**Commencement**

**37. This Regulation comes into force on the later of January 31, 2017 and the day it is filed.**

## SCHEDULE

**NAICS codes, paragraph 1 of s. 2 (2) of the Regulation**

1. (1) For the purposes of this Schedule, a facility is part of a class identified by a NAICS code if the facility is identified by a NAICS code that begins with a NAICS code listed in subsection (2).

(2) The following are the NAICS codes mentioned in paragraph 1 of subsection 2 (2) of the Regulation:

1. 2122 (Metal ore mining).
2. 2123 (Non-metallic mineral mining and quarrying).
3. 22132 (Sewage treatment facilities).
4. 31122 (Starch and vegetable fat and oil manufacturing).
5. 31161 (Animal slaughtering and processing).
6. 321111 (Sawmills (except shingle and shake mills)).
7. 3221 (Pulp, paper and paperboard mills).
8. 32411 (Petroleum refineries).
9. 32412 (Asphalt paving, roofing and saturated materials manufacturing).
10. 32419 (Other petroleum and coal product manufacturing).
11. 325 (Chemical manufacturing).
12. 32615 (Urethane and other foam product (except polystyrene) manufacturing).
13. 3262 (Rubber product manufacturing).
14. 32731 (Cement manufacturing).
15. 32732 (Ready-mix concrete manufacturing).
16. 32741 (Lime manufacturing).
17. 3279 (Other non-metallic mineral product manufacturing).
18. 331 (Primary metal manufacturing).
19. 3321 (Forging and stamping).
20. 33281 (Coating, engraving, cold and heat treating and allied activities).
21. 332999 (All other miscellaneous fabricated metal product manufacturing).
22. 336 (Transportation equipment manufacturing).
23. 56211 (Waste collection).
24. 5622 (Waste treatment and disposal).
25. 5629 (Remediation and other waste management services).
26. 81222 (Cemeteries and crematoria).

[Back to top](#)

# **Environmental Activity and Sector Registry – Limits and Other Requirements**

**Version 1.0**

**Published by the  
Ministry of the Environment and Climate Change**

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Cette publication hautement spécialisée *Environmental Activity and Sector Registry - Limits and Other Requirements* n'est disponible qu'en anglais conformément au Règlement 671/92, selon lequel il n'est pas obligatoire de la traduire en vertu de la *Loi sur les services en français*. Pour obtenir des renseignements en français, veuillez communiquer avec le ministère de l'Environnement et de l'Action en matière de changement climatique au 416-314-8001 ou par courriel à [EAASIBGen@ontario.ca](mailto:EAASIBGen@ontario.ca).

Translation: This highly specialized publication *Environmental Activity and Sector Registry - Limits and Other Requirements* is available in English only in accordance with Regulation 671/92, which exempts it from translation under the French Language Services Act. To obtain information in French, please contact the Ministry of the Environment and Climate Change at 416-314-8001 or [EAASIBGen@ontario.ca](mailto:EAASIBGen@ontario.ca)

# Foreword

This document, “Environmental Activity and Sector Registry - Limits and Other Requirements, December, 2016, version 1.0” (the EASR publication) sets out the requirements that facilities must follow if its activities are registered under the Air Emissions EASR Regulation. This publication will be made available through a website maintained by the Ministry of the Environment and Climate Change on the Internet and copies will also be available at the Ministry’s Public Information Centre.

A reference to “the Regulation” in this EASR publication is a reference to Ontario Regulation 1/17 entitled “Registrations Under Part II.2 of The Act — Activities Requiring Assessment of Air Emissions”.

The EASR publication includes requirements for In-stack limits for combustion equipment, noise, odour and small wood-fired combustors. It also includes a list of off-grid and remote facilities/communities for the purposes of subsection 13 (2)2.ii and iii of the Regulation.

The Ministry has additional guidance material available to clients to support the completion of documents required by this Regulation including:

- Air Emissions User Guide for Environmental Activity and Sector Registry
- Procedure for Preparing an Emission Summary and Dispersion Modelling Report
- Air Dispersion Modelling Guideline for Ontario
- Air Contaminants Benchmarks (ACB) List: Standards, guidelines and screening levels for assessing point of impingement concentrations of air contaminants
- Primary Noise Screening Method Guide
- Secondary Noise Screening Method Guide
- Odour Screening Method

The contents of this document may also be updated from time to time. Any changes will be based upon public consultation consistent with the Ontario Environmental Bill of Rights legislation. All web site addresses referred to in this document were current at the time of release.

For any addenda or revisions to the Environmental Activity and Sector Registry - Limits and Other Requirements publication, please visit the MOECC [website](#) or contact:

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# Table of Contents

Foreword.....	3
Chapter 1: In-stack Limits for Combustion Equipment.....	6
General .....	6
Heaters and Boilers - Emission Intensity Rates .....	6
Electricity Generation Engines - Emission Intensity Rates.....	7
Small wood-fired combustors - Emission Limits.....	8
Chapter 2: Off-grid and Remote Facilities/Communities.....	9
Chapter 3: Noise .....	10
Definitions.....	10
Class 4 Areas .....	10
Sound level limits – background, roadways and highways .....	12
Affected points of noise reception.....	12
Sound Level Limits .....	13
Prohibition and Emergency Equipment.....	13
Sound Level Limits – Steady Sound and Quasi-Steady Impulsive Sound .....	14
Sound Level Limits – Impulsive Sound.....	15
Acoustic Assessment Part.....	20
Acoustic Assessment Report.....	20
Chapter 4: Odour .....	23
Definitions.....	23
Point of Odour Reception .....	24
Tables.....	24
Measuring Distances .....	28
Records.....	29



Definitions.....	30
Wood fuel specifications .....	30
Automated wood fuel feed system.....	31
Wood fuel management.....	31
Design criteria.....	33
Operational parameters .....	34
Monitoring operational parameters .....	34
Installation test.....	35
Routine Inspections or Remote Connection.....	36
Performance Assessment.....	37
Records .....	38
Appendix A: Record of Publications .....	40
<b>Chapter 5: Small Wood-fired Combustors .....</b>	<b>30</b>

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# Chapter 1: In-stack Limits for Combustion Equipment

## General

1. (1) For the purposes of this Chapter, an amount (or concentration) of nitrogen oxides shall be calculated in accordance with the following formula:

$$A = (B \times 1.53) + C$$

where,

A = the amount (or concentration) of nitrogen oxides,

B = the amount (or concentration) of nitric oxide,

C = the amount (or concentration) of nitrogen dioxide.

(2) In this Chapter, reference to a concentration, as it relates to requirements for a small wood-fired combustor, is a reference to a concentration, corrected to 11 percent oxygen on a dry basis at reference conditions of temperature of 25 degrees Celsius and pressure of 101.3 kilopascals in the flue gas.

## Heaters and Boilers - Emission Intensity Rates

2. An emission intensity rate referred to in paragraph 6 of subsection 11 (1) and paragraph 8 of subsection 13 (1) of the Regulation in respect of nitrogen oxides for a boiler or heater with an energy input capacity set out in Column 1 of Table 1 that uses a type of fuel set out opposite the capacity in Column 2, is the emission intensity rate set out in Column 3.

**Table 1- Emission Intensity Rates for Heaters and Boilers**

Item	Column 1: Energy input capacity of the boiler or heater (gigajoules per hour)	Column 2: Type of fuel used in boiler or heater	Column 3: Maximum nitrogen oxides emission intensity rate (grams per gigajoule)
1.	>10.5 ≤ 105	Gas	26
2.	>105	Gas	40
3.	>10.5 ≤ 105	Distillate oil	40
4.	>105	Distillate oil	50
5.	>10.5	Residual oil with less than 0.35% nitrogen	90
6.	>10.5 ≤ 105	Residual oil with equal to or greater than 0.35% nitrogen	110
7.	>105	Residual oil with equal to or greater than 0.35% nitrogen	125

### **Electricity Generation Engines - Emission Intensity Rates**

3. An emission intensity rate referred to in paragraph 6 of subsection 11 (1) and paragraph 8 of subsection 13 (1) of the Regulation in respect of a contaminant set out in Column 1 of Table 2 that is discharged from an electricity generation engine is the emission intensity rate set out in Column 2.

**Table 2 – Emission Intensity Rates for Electricity Generation Engines**

Item	Column 1: Contaminant	Column 2: Intensity Rate (kg/MW-hr)
1.	Carbon Monoxide	3.5
2.	Non-methane hydrocarbons	0.19
3.	Nitrogen oxides	0.40
4.	Particulate Matter	0.02

## Small wood-fired combustors - Emission Limits

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4. A concentration referred to in paragraph 6 of subsection 11 (1) and subsection 13 (1) of the Regulation in respect of a contaminant set out in Table 3 that is discharged from a small wood-fired combustor is the limit set out in Column 2.

ON emission limits to be met by the pilot scale wood chips fuel boiler

**Table 3 – In-stack Emission limits for small wood-fired combustors**

Item	Column 1: Contaminant	Column 2: Emission Limit
1.	Carbon Monoxide	400 ppmv (averaged over a 24-hour period)
2.	Particulate matter	75 mg/Rm <sup>3</sup>

## Chapter 2: Off-grid and Remote Facilities/Communities

1. For the purpose of subparagraphs 2 ii and iii of subsection 13 (2) of the Regulation, an electricity generation engine is considered to generate electricity for a facility or community located in an off-grid area or for a remote facility or community if the engine is used in one of the following areas:

- i. Armstrong
- ii. Auden
- iii. Bearskin Lake
- iv. Big Trout Lake
- v. Biscotasing
- vi. Collins
- vii. Deer Lake
- viii. Ferland
- ix. Fort Severn
- x. Graham
- xi. Gull Bay
- xii. Hillspport
- xiii. Kasabonika Lake
- xiv. Kingfisher Lake
- xv. Lac Seul
- xvi. Lansdowne House
- xvii. MacDowell
- xviii. Moose River Crossing
- xix. Ogoki/Marten Falls
- xx. Oba
- xxi. Ponask
- xxii. Ramsey
- xxiii. Sachigo Lake
- xxiv. Sandy Lake
- xxv. Sultan
- xxvi. Wapekeka
- xxvii. Weagamow
- xxviii. Webequie
- xxix. Whitesand

# Chapter 3: Noise

## Definitions

1. (1) In this Chapter,

“background sound level” means the sound level that is present in the environment, produced by sources of sound other than the sources under assessment;

“Class 1 area” means an area where the background sound level during the day and night is dominated by the activities of people;

“Class 2 area” means an area where the background sound level during the day is dominated by the activities of people (07:00 to 19:00) and by natural sounds during the night (19:00 to 07:00 hours);

“Class 3 area” means an area where the background sound level during the day and night is dominated by natural sounds;

“dBA” means the A-weighted sound level;

“dBAI” means the A-weighted sound level of an impulsive sound;

“equivalent sound level (Leq)” means, for sound levels that vary over a period of time, the constant sound level that, over an equal period of time, has the same A-weighted energy as the varying sound (expressed in dBA);

“impulsive sound” means a single pressure pulse or a single burst of pressure pulses, such as a hammer blow;

“logarithmic mean impulse sound level (LLM)” means ten times the logarithm to the base 10 of the arithmetic mean of ten to the power of one tenth the impulse sound level of each impulsive sound;

“quasi-steady impulsive sound” means a sequence of impulsive sounds emitted from the same source, having a time interval of less than 0.5 seconds between successive impulsive sounds;

“steady sound” means non-impulsive sound.

## Class 4 Areas

2. (1) A portion of a Class 1 or 2 area is deemed to be a Class 4 area if development of a noise-sensitive property is intended for that portion and, at the date on which the approval for the noise-sensitive property is approved by the relevant land use planning authority,

- (a) there are no other noise-sensitive properties in the portion;
- (b) there is at least one facility that,
  - (i) discharges sound to a point that will be a point of noise reception at the noise-sensitive property;
  - (ii) has a noise report that meets the requirements of sections 17 to 21 of the Regulation that indicates that the Class 1 or 2 sound level limits, as applicable, are met; and
  - (iii) is party to an agreement with the person proposing the development that sets out noise control measures that are to be implemented at the noise-sensitive property.

(2) A person engaging in an activity prescribed by section 2 of the Regulation who relies on the deeming provision in subsection (1) prior to the construction of the noise-sensitive property shall have written confirmation of the proposed presence of the noise-sensitive property from the relevant land use planning authority.

(3) A portion of an area that has been deemed a Class 4 area in respect of the facility mentioned under subsection (1) or in respect of which an environmental compliance approval was issued by the Director under the Act, is considered a Class 4 area in respect of other facilities.

(4) For the purpose of this section,

“noise-sensitive commercial-purpose building” means a building used for a commercial purpose that includes one or more habitable rooms used as sleeping facilities such as a hotel or a motel;

“noise-sensitive institutional-purpose building” means a building used for an institutional purpose, including an educational facility, a day nursery, a hospital, a health care facility, a shelter for emergency housing, a community centre, a place of worship and a detention centre. A place of worship located on commercially or industrially-zoned land is not considered a noise-sensitive institutional-purpose building;

“noise-sensitive property” means a property upon which is located a dwelling, a building used for a legal non-conforming residential use, or a building used for a noise-sensitive commercial or institutional purpose;

“noise-sensitive space” means the living and sleeping quarters of dwellings, and sleeping quarters of a noise-sensitive commercial or institutional building;

“plane of window” means a point in space corresponding with the location of the centre of a window of a noise-sensitive space

## Sound level limits – background, roadways and highways

3. (1) For the purpose of this Chapter, background sound level must be measured or predicted according to methods or models that result in the accurate determination of the sound level at a point of noise reception.

(2) A sound level limit used for the purposes of the Secondary Noise Screening Method does not include a sound level limit set out in clauses 6(1)(a), (2)(a), (3)(a), (4)(a) and (5)(a) and clauses 7 (1)(a), (2)(a), (3)(a), (4)(a) and (5)(a).

(3) Despite the sound level limits set out in sections 6 and 7, a sound level limit used for the purposes of the Secondary Noise Screening Method may be increased by 5 dBA in respect of an affected point of noise reception that is located,

- (a) less than 100 m from any point on the edge of the pavement of a 400 series highway; or
- (b) less than 30 m from any point on the edge of the pavement of a provincial roadway or regional road.

## Affected points of noise reception

4. (1) Subject to subsection (2), for the purposes of the definition of “point of noise reception” in subsection 1 (1) of the Regulation, a point is **only** a point of noise reception if it is located on a property that contains one or more of the following buildings:

- 1. A building or structure that contains one or more dwellings.
- 2. A building used for a commercial purpose that includes one or more habitable rooms used as sleeping facilities, such as a hotel or motel.
- 3. A building used for an institutional purpose, including an educational facility, a child care centre, a hospital, a health care facility, a shelter for emergency housing, a community centre or a detention centre.
- 4. A building used for a place of worship, other than a place of worship located on land that is zoned for commercial or industrial use.
- 5. A location on a vacant lot, other than an inaccessible vacant lot, that has been zoned to permit a building mentioned in paragraph 1, 2, 3 or 4.
- 6. A portion of a property that is used as a campsite or campground at which overnight accommodation is provided by or on behalf of a public agency or as part of a commercial operation.

(2) A point located on a property on which a building that contains only one dwelling is located is not a point of noise reception if the building is located on the same property as the source of sound and in a separate building from the source of sound.

(3) Subject to subsection (4), an affected point of noise reception is a point of noise reception.



(4) A point of noise reception may be considered not to be an affected point of noise reception if,

1. The distance from the source of sound to the point of noise reception is greater than or equal to the minimum separation distance determined using the Primary Noise Screening Method.
2. The point is one of several points in close proximity and one of the other points is an affected point of noise reception that represents the sound level at the point.
3. The background sound level at the point of noise reception is high relative to the sources of sound being assessed.
4. Having regard to the class of the area in which the point of noise reception is located, the sound level at the point of noise reception is less than the sound level limits that would apply at the point of noise reception in accordance with sections 6 and 7.

(5) Despite subsection (4), if there is a point of noise reception in a cardinal direction, there must be at least one affected point of noise reception in that direction.

## **Sound Level Limits**

### **Prohibition and Emergency Equipment**

5. (1) Subject to subsection (2), for the purpose of the Regulation, the applicable sound level limit must be determined in accordance with sections 6 and 7 with respect to an affected point of noise reception.

(2) It is not necessary to include the sound discharged from emergency equipment when determining the combined sound discharged from all sources of sound at the facility for the purpose of subsection (1).

(3) For each affected point of noise reception determined under section 4 that receives sound discharged from emergency equipment operating in non-emergency situations, the owner and operator of the facility shall ensure that the sound discharged from the emergency equipment does not result in the sound level at the affected point of noise reception exceeding a sound level limit that is 5 dB higher than the applicable sound level limit determined in accordance with sections 6 and 7 with respect to the affected point of noise reception.

(4) Sound level limits do not apply with respect to sound produced by emergency equipment operating in emergency situations.

## Sound Level Limits – Steady Sound and Quasi-Steady Impulsive Sound

6. (1) For each affected point of noise reception determined under section 4 that is located outdoors in an area set out in Column 1 of Table 1 and that receives steady sound or quasi-steady impulsive sound from the facility, the sound level limit at the point of noise reception between the hours of 07:00 to 19:00 is the greater of,

- (a) the background sound level at the point of noise reception; and
- (b) the value set out opposite the area in Column 2 of Table 1.

(2) For each affected point of noise reception located outdoors in an area set out in Column 1 of Table 1 that receives steady sound or quasi-steady impulsive sound from the facility, the sound level limit at the point of noise reception between the hours of 19:00 to 23:00 is the greater of,

- (a) the background sound level at the point of noise reception; and
- (b) the value set out opposite the area in Column 3 of Table 1.

**Table 1 – Sound Level Limits for Outdoor Points of noise reception - Steady Sound or Quasi-Steady Impulsive Sound**

Item	Column 1: Point of noise reception location	Column 2: 1-Hr $L_{eq}$ (dBA) (07:00 – 19:00)	Column 3: 1-Hr $L_{eq}$ (dBA) (19:00 – 23:00)
1.	Class 1 Area	50	50
2.	Class 2 Area	50	45
3.	Class 3 Area	45	40
4.	Class 4 Area	55	55

(3) For each affected point of noise reception determined under section 4 that is a plane of window located in an area set out in Column 1 of Table 2 and that receives steady sound or quasi-steady impulsive sound from the facility, the sound level limit at the point of noise reception between the hours of 07:00 to 19:00 is the greater of,

- (a) the background sound level at the point of noise reception; and
- (b) the value set out opposite the area in Column 2 of Table 2.

(4) For each affected point of noise reception determined under section 4 that is a plane of window located in an area set out in Column 1 of Table 2 that receives steady sound or

quasi-steady impulsive sound from the facility, the sound level limit at the point of noise reception between the hours of 19:00 to 23:00 is the greater of,

- (a) the background sound level at the point of noise reception; and
- (b) the value set out opposite the area in Column 3 of Table 2.

(5) For each affected point of noise reception determined under section 4 that is a plane of window located in an area set out in Column 1 of Table 2 that receives steady sound or quasi-steady impulsive sound from the facility, the sound level limit at the point of noise reception between the hours of 23:00 to 07:00 is the greater of,

- (a) the background sound level at the point of noise reception; and
- (b) the value set out opposite the area in Column 4 of Table 2.

**Table 2 – Sound Level Limits for Plane of Window Points of noise reception - Steady Sound or Quasi-Steady Impulsive Sound**

Item	Column 1: Point of noise reception location	Column 2: 1-Hr $L_{eq}$ (dBA) (07:00 – 19:00)	Column 3: 1-Hr $L_{eq}$ (dBA) (19:00 – 23:00)	Column 4: 1-Hr $L_{eq}$ (dBA) (23:00 – 07:00)
1.	Class 1 Area	50	50	45
2.	Class 2 Area	50	45	45
3.	Class 3 Area	45	40	40
4.	Class 4 Area	60	60	55

### Sound Level Limits – Impulsive Sound

7. (1) For each affected point of noise reception determined under section 4 that is located outdoors in an area set out in Column 1 of Table 3 and that receives an impulsive sound from the facility, the sound level limit at the point of noise reception between the hours of 07:00 to 23:00 is the greater of,

- (a) the background sound level at the point of noise reception; and
- (b) if the number of impulses in a one-hour period is,
  - (i) one, the value set out opposite the area in Column 2 of Table 3,
  - (ii) two, the value set out opposite the area in Column 3 of Table 3,
  - (iii) three, the value set out opposite the area in Column 4 of Table 3,
  - (iv) four, the value set out opposite the area in Column 5 of Table 3,

- (v) five to six, the value set out opposite the area in Column 6 of Table 3,
- (vi) seven to eight, the value set out opposite the area in Column 7 of Table 3,
- (vii) nine or more, the value set out opposite the area in Column 8 of Table 3.

**Table 3 - Sound Level Limits for Outdoor Points of noise reception – Impulsive Sound**

Item	Column 1: Point of noise reception location	Column 2: L <sub>LM</sub> (dBAI) (1 Impulse / hr)	Column 3: L <sub>LM</sub> (dBAI) (2 Impulses / hr)	Column 4: L <sub>LM</sub> (dBAI) (3 Impulses / hr)	Column 5: L <sub>LM</sub> (dBAI) (4 Impulses / hr)	Column 6: L <sub>LM</sub> (dBAI) (5-6 Impulses / hr)	Column 7: L <sub>LM</sub> (dBAI) (7-8 Impulses / hr)	Column 8: L <sub>LM</sub> (dBAI) (9 or more Impulses / hr)
1.	Class 1 Area	80	75	70	65	60	55	50
2.	Class 2 Area	80	75	70	65	60	55	50
3.	Class 3 Area	75	70	65	60	55	50	45
4.	Class 4 Area	85	80	75	70	65	60	55

(2) For each affected point of noise reception determined under section 4 that is a plane of window located in an area set out in Item 1, 2 or 4 of Column 1 of Table 4 and that receives an impulsive sound from the facility, the sound level limit at the point of noise reception between the hours of 07:00 to 23:00 is the greater of,

- (a) the background sound level at the point of noise reception; and
- (b) if the number of impulses in a one-hour period is,
  - (i) one, the value set out opposite the area in Column 2 of Table 4,
  - (ii) two, the value set out opposite the area in Column 3 of Table 4,
  - (iii) three, the value set out opposite the area in Column 4 of Table 4,
  - (iv) four, the value set out opposite the area in Column 5 of Table 4,
  - (v) five to six, the value set out opposite the area in Column 6 of Table 4,
  - (vi) seven to eight, the value set out opposite the area in Column 7 of Table 4,

(vii) nine or more, the value set out opposite the area in Column 8 of Table 4.

(3) For each affected point of noise reception determined under section 4 that is a plane of window located in an area set out in Item 3 of Column 1 of Table 4 and that receives an impulsive sound from the facility, the sound level limit at the point of noise reception between the hours of 07:00 to 19:00 is the greater of,

- (a) the background sound level at the point of noise reception; and
- (b) if the number of impulses in a one-hour period is,
  - (i) one, the value set out opposite the area in Column 2 of Table 4,
  - (ii) two, the value set out opposite the area in Column 3 of Table 4,
  - (iii) three, the value set out opposite the area in Column 4 of Table 4,
  - (iv) four, the value set out opposite the area in Column 5 of Table 4,
  - (v) five to six, the value set out opposite the area in Column 6 of Table 4,
  - (vi) seven to eight, the value set out opposite the area in Column 7 of Table 4,
  - (vii) nine or more, the value set out opposite the area in Column 8 of Table 4.

**Table 4 – Day and Evening Sound Level Limits for Plane of Window Points of noise reception – Impulsive Sound**

Item	Column 1: Point of noise reception location	Column 2: LLM (dBAI) (1 Impulse / hr)	Column 3: LLM (dBAI) (2 Impulses / hr)	Column 4: LLM (dBAI) (3 Impulses / hr)	Column 5: LLM (dBAI) (4 Impulses / hr)	Column 6: LLM (dBAI) (5-6 Impulses / hr)	Column 7: LLM (dBAI) (7-8 Impulses / hr)	Column 8: LLM (dBAI) (9 or more Impulses / hr)
1.	Class 1 Area	80	75	70	65	60	55	50
2.	Class 2 Area	80	75	70	65	60	55	50
3.	Class 3 Area	75	70	65	60	55	50	45
4.	Class 4 Area	90	85	80	75	70	65	60

(4) For each affected point of noise reception determined under section 4 that is a plane of window located in an area set out in Item 1, 2 or 4 of Column 1 of Table 5 and that receives an impulsive sound from the facility, the sound level limit at the point of noise reception between the hours of 23:00 to 07:00 is the greater of,

- (a) the background sound level at the point of noise reception; and
- (b) if the number of impulses in a one-hour period is,
  - (i) one, the value set out opposite the area in Column 2 of Table 5,
  - (ii) two, the value set out opposite the area in Column 3 of Table 5,
  - (iii) three, the value set out opposite the area in Column 4 of Table 5,
  - (iv) four, the value set out opposite the area in Column 5 of Table 5,
  - (v) five to six, the value set out opposite the area in Column 6 of Table 5,
  - (vi) seven to eight, the value set out opposite the area in Column 7 of Table 5,
  - (vii) nine or more, the value set out opposite the area in Column 8 of Table 5

(5) For each affected point of noise reception determined under section 4 that is a plane of window located in an area set out in Item 3 of Column 1 of Table 5 and that receives an impulsive sound from the facility, the sound level limit at the point of noise reception between the hours of 19:00 to 07:00 is the greater of,

- (a) the background sound level at the point of noise reception; and
- (b) if the number of impulses in a one-hour period is,
  - (i) one, the value set out opposite the area in Column 2 of Table 5,
  - (ii) two, the value set out opposite the area in Column 3 of Table 5,
  - (iii) three, the value set out opposite the area in Column 4 of Table 5,
  - (iv) four, the value set out opposite the area in Column 5 of Table 5,
  - (v) five to six, the value set out opposite the area in Column 6 of Table 5,
  - (i) seven to eight, the value set out opposite the area in Column 7 of Table 5,
  - (ii) nine or more, the value set out opposite the area in Column 8 of Table 5.

**Table 5 – Night Sound Level Limits for Plane of Window Points of noise reception – Impulsive Sound**

Item	Column 1: Location of point of noise reception	Column 2: L <sub>LM</sub> (dBAI) (1 Impulse / hr)	Column 3: L <sub>LM</sub> (dBAI) (2 Impulses / hr)	Column 4: L <sub>LM</sub> (dBAI) (3 Impulses / hr)	Column 5: L <sub>LM</sub> (dBAI) (4 Impulses / hr)	Column 6: L <sub>LM</sub> (dBAI) (5-6 Impulses / hr)	Column 7: L <sub>LM</sub> (dBAI) (7-8 Impulses / hr)	Column 8: L <sub>LM</sub> (dBAI) (9 or more Impulses / hr)
1.	Class 1 Area	75	70	65	60	55	50	45
2.	Class 2 Area	75	70	65	60	55	50	45
3.	Class 3	70	65	60	55	50	45	40
4.	Class 4 Area	85	80	75	70	65	60	55

## Acoustic Assessment Part

### Acoustic Assessment Report

8. (1) A noise report that indicates that the criteria set out in paragraph 8 iv or v of subsection 17 (1) of the Regulation are met shall contain the following information:

1. The primary NAICS code for the facility and any other applicable NAICS codes related to the facility.
2. A table entitled “Noise Source Summary Table” that sets out the type and number of sources of sound at the facility and, for each source, sets out the following information:
  - i. Column 1: Source Identifier: a unique identifier for each source of sound.
  - ii. Column 2: Source Description: a brief description of the source of sound.
  - iii. Column 3: Sound Power Level: a measurement in decibels of the acoustical power radiated by the source of sound with respect to the international reference of 10<sup>-12</sup>Watts.
  - iv. Column 4: Sound Characteristics: the acoustical characteristics of the source of sound that affect the measurements, including tonal characteristics and whether the sound is steady, impulsive or quasi-steady impulsive.
  - v. Column 5: Source Location: an indication of whether the source of sound is located outside or inside a building
  - vi. Column 6: Noise Control Measures: an indication of measures and procedures used to control the noise emissions from the source of sound
3. The operating hours of the facility, including the start time and the stop time and, if there are multiple or intermittent source of sounds at the facility, the sequence of operation of the sources. The operational parameters that were assumed for the purpose of the assessment, including the maximum rates of production, process limits and parameters relating to equipment and infrastructure
4. A plan of the facility, drawn to scale, that shows the following items,
  - i. the property boundary of the site on which the facility is located,
  - ii. the location of each source identified in paragraph 2,
  - iii. for each source identified in paragraph 2 that is housed in a building, the size, location and orientation of each exterior opening in the building,
  - iv. the materials used to construct the exterior and interior of each building mentioned in subparagraph iii,
  - v. the location of each acoustical barrier used or proposed to be used with respect to each source of sound, and
  - vi. an indication of North.



5. A summary of the noise control measures and procedures used to prevent or minimize the discharge of sound from more than one source at the facility, for example berms or enclosures.

6. With respect to each noise control measure and procedure identified in subparagraph 2 vi and paragraph 5, the following information:

- i. If a source is silenced, enclosed or shielded by a barrier, the location, dimensions, structural details and material used for the noise control measure,
- ii. The specification of equipment and materials used in the noise control measure such as, transmission loss, insertion loss and noise reduction,
- iii. If the noise control measure uses standard catalogue items, an indication of the manufacturer's make and model number of the noise control measure.

7. A plan of the area surrounding the facility that meets the following criteria:

- i. The plan must set out the property boundary of the site on which the facility is located and a boundary that is at least 1000 metres from the property boundary at every point.
- ii. In the area between the property boundary and the boundary mentioned in subparagraph i, the plan must depict the following,
  - A. The land use zoning and permitted uses (e.g. a Land Use Zoning Designation Plan from the municipality),
  - B. The location of all highways and roadways,
  - C. The location of each affected point of noise reception determined in accordance with section 4, and the property boundaries associated with the affected point of noise reception, and
  - D. The location of each acoustical barrier used or proposed to be used in the area.
- iii. The plan must show the distance between each opening mentioned in subparagraph 4iii and each affected point of noise reception mentioned in sub-sub-paragraph C.
- iv. The plan must indicate North, be drawn to scale and include a zoning legend.

8. A table entitled "Point of noise reception Noise Impact Table" that sets out, for each source of sound identified in paragraph 2, the following information:

- i. Column 1: Source ID: the unique identifier mentioned in subparagraph 2 i.
- ii. Column 2: Point of noise reception ID: a unique identifier for each affected point of noise reception identified in sub-subparagraph 7 ii C.
- iii. Column 3: Distance to Point of noise reception: the distance in metres from the source of sound to each affected point of noise reception identified in subparagraph ii.

- iv. Column 4: Time of Day: For each affected point of noise reception identified in subparagraph ii, set out the time periods (day/evening/night) during which the sound level must be assessed in accordance with section 6 or 7.
  - v. Column 5: Sound Level at Point of noise reception: For each time period identified in subparagraph iv, the predicted or measured sound level (Leq or LLM) identified as units of dBA or dBAI at each affected point of noise reception identified in subparagraph ii resulting from the source of sound.
9. A description of methods used to determine the predicted or measured sound levels mentioned in subparagraph 8 v, including calculations, measurement techniques and equipment used to measure noise.
10. Confirmation from the licensed engineering practitioner mentioned in paragraph 1 of subsection 17 (1) of the Regulation that the methods mentioned in paragraph 9 are adequate to accurately determine the sound level at each affected point of noise reception.
11. A table entitled “Acoustic Assessment Summary Table” that sets out, for each affected point of noise reception identified in sub-subparagraph 7 ii C, the following information:
- i. Column 1: Point of noise reception ID: the unique identifier mentioned in subparagraph 8 ii.
  - ii. Column 2: Point of noise reception Description: A brief description of the affected point of noise reception.
  - iii. Column 3: Time of Day: For each affected point of noise reception, set out the time periods (day/evening/night) during which the sound level must be assessed in accordance with section 6 or 7.
  - iv. Column 4: Sound Level at Point of noise reception: For each time period identified in subparagraph iii, the predicted or measured sound level at the affected point of noise reception, in terms of Leq or LLM and reported in units of dBA or dBAI. Note that if there are multiple sources of sound at the facility, the sound level at the affected point of noise reception must account for the combined effect of all sources of sound.
  - v. Column 5: Sound Level Limit: the applicable sound level limit set out in section 6 or 7.
  - vi. Column 6: Compliance with Sound Level Limit: an indication of whether the predicted sound level at the affected point of noise reception is below the applicable sound level limit mentioned in subparagraph v.
12. A statement signed by the person engaging in the prescribed activity confirming that all information given to the licensed engineering practitioner in order to prepare the report was complete and accurate.

# Chapter 4: Odour

## Definitions

1. In this Chapter,

“Class 3 area” has the same meaning as in Chapter 3 (Noise);

“coating” means a product that forms a film when it is applied to a surface but does not include a water based product that has a volatile organic compound concentration that is 50 gram/litre or less;

“cooking or drying animal products” means an industrial process that includes the heating of or removing of moisture from animal products to create animal food or other animal products. This process does not include the manufacturing of food for human consumption;

“food frying” means an industrial process in which food for human consumption is fried using edible oils or fats.

“printing” means a printing process at a commercial printing facility and includes lithographic printing, flexographic printing, digital printing, rotogravure printing, and screen printing.

“printing ink” means an ink used in a printing process but does not include an ink that has a volatile organic compound concentration that is 50 gram/litre or less;

“process using phenolic resin” means a manufacturing process in which phenolic (PF) resin is used to complete the process but does not include the manufacturing of phenolic resin.

“scented product” means a non-edible product produced for purposes that includes the discharge of odour, such as candles;

“scented product manufacturing” means a manufacturing process in which scented products are produced or used in the process;

“spraying operation” means a process in which a coating is applied to a surface by way of spraying but does not include a printing process or a process that applies a coating using a spray can, electrostatic painting or electrophoretic painting or the application of a coating as part of routine maintenance at the facility;

“wastewater treatment” means an on-site process at the facility to treat wastewater from the facility;

## Point of Odour Reception

2. For the purposes of the definition of “point of odour reception” in subsection 1 (1) of the Regulation, each of the following locations is a point of odour reception if the location is not on the same property as the facility from which the odour is or will be discharged:

1. A building or structure that contains one or more dwellings.
2. A building used for a commercial purpose that includes one or more habitable rooms used as sleeping facilities, such as a hotel or motel.
3. A building used for an institutional purpose, including an educational facility, a child care centre, a health care facility, a community centre.
4. A building used for a place of worship, other than a place of worship located on land that is zoned for commercial or industrial use.
5. A location on a vacant lot, other than an inaccessible vacant lot, that has been zoned to permit a building mentioned in paragraph 1, 2, 3 or 4.
6. A portion of a property used for recreational purposes, not including a portion used for a recreational trail.
7. A portion of a property that is used for as a campsite or campground at which overnight accommodation is provided by or on behalf of a public agency or as part of a commercial operation.

## Tables

3. (1) The following are the tables referred to in section 24 of the Regulation.

**Table 1- Odour – Activities and Setback Distances**

Column 1: Item	Column 2: NAICS Code	Column 3: NAICS Code Description	Column 4: Design Capacity of Facility	Column 5: Setback Distance (m)
1.	311119	Other animal food manufacturing	N/A	500
2.	311214	Rice Milling and Malt Manufacturing	N/A	500
3.	311230	Breakfast cereal manufacturing	N/A	300
4.	311340	Non-chocolate confectionery manufacturing	N/A	300
5.	311351	Chocolate and chocolate confectionery manufacturing from cacao beans	N/A	500

Column 1: Item	Column 2: NAICS Code	Column 3: NAICS Code Description	Column 4: Design Capacity of Facility	Column 5: Setback Distance (m)
6.	311352	Confectionery manufacturing from purchased chocolate	N/A	300
7.	311420	Fruit and vegetable canning, pickling and drying	N/A	350
8.	311511	Fluid milk manufacturing	N/A	100
9.	311515	Butter, cheese, and dry and condensed dairy product manufacturing	N/A	100
10.	311520	Ice cream and frozen dessert manufacturing	N/A	300
11.	311710	Seafood product preparation and packaging	N/A	500
12.	311821	Cookie and cracker manufacturing	N/A	300
13.	311911	Roasted nut and peanut butter manufacturing	N/A	300
14.	311919	Other snack food manufacturing	N/A	300
15.	311920	Coffee and tea manufacturing	N/A	250
16.	311930	Flavouring syrup and concentrate manufacturing	N/A	300
17.	311940	Seasoning and dressing manufacturing	N/A	300
18.	311990	All other food manufacturing	N/A	300
19.	312120	Breweries	< 20 ML/yr annual production rate	250
20.	312140	Distilleries	N/A	500

Column 1: Item	Column 2: NAICS Code	Column 3: NAICS Code Description	Column 4: Design Capacity of Facility	Column 5: Setback Distance (m)
21.	316110	Leather and hide tanning and finishing	N/A	500
22.	321114	Wood preservation	N/A	500
23.	322220	Paper bag and coated and treated paper manufacturing	N/A	500
24.	326140	Polystyrene foam product manufacturing	N/A	500
25.	326196	Motor vehicle plastic parts manufacturing	N/A	500

**Table 2 – Odour – Processes and Setback Distances**

Column 1: Item	Column 2: Odorous Process	Column 3: Setback Distance (m)
1.	Spraying Operations (<10 L/hr)	100
2.	Wastewater Treatment – Covered Clarifiers	500
3.	Scented Products Manufacturing	500
4.	Printing (printing rates > 100 kg/hr, to ≤ 400 kg/hr)	100
5.	Plastic Extrusion or Melting	100
6.	Process using Phenolic Resin	250

(2) For the purposes of Table 2,

“printing (printing rates) >100 kg/ hr to ≤ 400 kg/hr” means a printing process engaged in at a facility at which the total of the maximum hourly application rates of all printing inks used in printing processes at the facility is greater than 100 kg/hr and not greater than 400 kg/hr;

“spraying operation (<10 L/hr)” means a spraying operation engaged in at a facility at which the total of the maximum hourly application rates of all coatings used in spraying operations at the facility is less than 10 litres/hr;

“wastewater treatment – covered clarifier” means a wastewater treatment process that uses a covered clarifier but does not use a lagoon, uncovered clarifier or sludge management.

**Table 3 – Odour – Activities and Setback Distances**

Column 1: Item	Column 2: NAICS Code	Column 3: NAICS Code Description	Column 4: Design Capacity of Facility	Column 5: Setback Distance (m)
1.	311111	Dog and Cat Food Manufacturing	N/A	500
2.	311310	Sugar manufacturing	N/A	500
3.	312120	Breweries	≥ 20 ML/yr annual production rate	500

**Table 4 – Odour – Processes and Setback Distances**

Column 1: Item	Column 2: Odorous Process	Column 3: Setback Distance (m)
1.	Spraying Operations (≥10 L/hr)	500
2.	Wastewater Treatment – Lagoons, Uncovered Clarifiers, Sludge Management	1000
3.	Food Frying	500
4.	Cooking or Drying Animal Products	500

Column 1: Item	Column 2: Odorous Process	Column 3: Setback Distance (m)
5.	Printing (printing rates > 400 kg/hr)	500

(3) For the purposes of Table 4,

“printing (printing rates) > 400 kg/hr” means a printing process engaged in at a facility at which the total of the maximum hourly application rates of all printing inks used in printing processes at the facility is greater than 400 kg/hr;

“spraying operation ( $\geq 10$  L/hr)” means a spraying operation engaged in at a facility at which the total of the maximum hourly application rates of all coatings used in spraying operations at the facility is greater than or equal to 10 litres/hr;

“wastewater treatment – Lagoons, Uncovered Clarifiers, Sludge Management” means a wastewater treatment process that uses a covered clarifier but does not use a lagoon, uncovered clarifier or sludge management.

## Measuring Distances

4. For the purposes of paragraphs 3 and 5 of section 24 of the Regulation, to determine the distance between a facility and the closest point of odour reception, the distance from the closest point of discharge of odour from the facility or outdoor odour source to the property line of the closest point of odour reception must be measured.

The distance shall be measured from Point A to Point B in accordance with the following:

1. Point A is,
  - i. the point that is located on the edge of the point of discharge of odour from a building at the facility and that is closest to the property boundary of the point of odour reception, or
  - ii. if there is an outdoor source of odour located closer to the property boundary of the point of odour reception than the point mentioned in subparagraph i, the point that is located on the edge of the outdoor source of odour and that is closest to the property boundary of the point of odour reception.
2. Point B is the point that is located on the property boundary of the point of odour reception and that is closest to Point A.

There is an exception to the measurement rule set out above. If the closest point of odour reception is a dwelling or a camping area that is located in a Class 3 area, a person may use Point C instead of Point B in the measurement rule set out above, where, Point C is



the point that is located 30 meters from the exterior wall of the dwelling or edge of the camping area and closest to Point A.

However, if the distance between Point A and Point C is less than the distance between Point A and Point B, Point A and Point B must be used in the measurement rule set out above.

## **Records**

**5.** For the purpose of paragraph 9 of section 24 of the Regulation the following records shall be created and retained at the facility for a period of 20 years after the record is created:

1. A drawing that is to scale and that sets out the points used for any measurements performed for the purpose of paragraph 3 or 5 of section 24 of the Regulation.

# Chapter 5: Small Wood-fired Combustors

## Definitions

1. (1) In this Chapter,

“EN 303-5 (2012)” means the European Standard EN 303-5, published by the European Committee for Standardization in June, 2012 and entitled “Heating boilers for solid fuels, manually and automatically stoked, nominal load heat input capacity up to 500 kW – Terminology, requirements, testing and marking”;

“nominal load heat input capacity” means the design capacity of a small wood-fired combustor to combust a maximum amount of wood fuel based on the physical design of the small wood-fired combustor and is calculated by multiplying the mass flow rate of the wood fuel by the higher heating value of the wood fuel;

“nominal load heat output capacity” means the maximum continuous usable heat output as determined by the nominal load heat input capacity and design of the heat exchanger;

“oxygen lambda sensor” means a device that continuously measures the concentration of oxygen in the flue gas on a wet basis and uses the resulting measurement as an input to the oxygen trim system;

“oxygen trim system” means the components of a small wood-fired combustor that dynamically control the excess oxygen level in the flue gas through the use of an oxygen lambda sensor;

“partial load heat input capacity” means the design capacity of a small wood-fired combustor to combust a minimum amount of wood fuel based on the physical design of the small wood-fired combustor, for which air emissions can be reliably measured at steady state conditions, and is calculated by multiplying the mass flow rate of the wood fuel by the higher heating value of the wood fuel;

“partial load heat output capacity” means the minimum continuous usable heat output as determined by the partial load heat input capacity and design of the heat exchanger;

## Wood fuel specifications

2. The following are the specifications referred to in subparagraph 3 iii of subsection 2 (2) of the Regulation with respect to the fuel used in a small wood-fired combustor.

1. Wood briquettes that are grade A1, A2 or B as set out in the standard CAN/CSA-ISO 17725-3:15, published by the Canada National Standard/Canadian Standards – International Organization for Standardization standard on March 1, 2015 and

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if the system is larger than 500 kW (up to 3 MW), the boiler must be tested using the test methodology in EN 303-5 (2012) by a third party certified testing company. report is to be submitted.

entitled “Solid biofuels – Fuel specifications and classes - Part 3: Graded Wood briquettes”.

2. Wood pellets that are:
  - i. grade A1, A2 or B as set out in the standard CAN/CSA-ISO 17725-2:15, published by the Canada National Standard/Canadian Standards – International Organization for Standardization standard on March 1, 2015 and entitled “Solid biofuels – Fuel specifications and classes - Part 2: Graded Wood pellets”; or
  - ii. premium or standard grade as set out in the document entitled “Pellet Fuels Institute Standard Specifications for Residential/Commercial Densified Fuel”, published by the Pellet Fuels Institute in July 2015.

3. Wood chips that,
  - i. have a moisture content, reported on a wet basis, that is not greater than 40 percent when used as fuel; and
  - ii. if the date is after January 31, 2027, are grade A1, A2, B or C, as set out in the standard 17225-4:15, published by the Canada National Standard/Canadian Standards – International Organization for Standardization in 2015 on March 1, 2015 and entitled “Solid Biofuels – Fuel specifications and classes – Part 4: Graded wood chips”.

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currently only limitation for wood chips fuel is moisture content

International Organization for Standardization  
Solid Biofuels – Fuel

### Automated wood fuel feed system

3. An automated wood fuel feed system mentioned in paragraph 1 of section 31 of the Regulation must meet the following criteria:

1. The automated wood fuel feed system must have a computerized control system that operates in conjunction with an oxygen trim system.
2. The automated wood fuel feed system must have start-up and shut-down procedures that control the timing sequence and amount of wood fuel fed into the combustor.

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automated wood fuel feed system should be a requirement for the RFP. this language can be used in the RFP

### Wood fuel management

4. (1) A wood fuel management plan mentioned in paragraph 2 of section 31 of the Regulation must contain the following elements:

1. A list setting out, for each small wood-fired combustor at the facility, the quantity of wood fuel that is intended to be stored at the facility for use in the combustor and the specification described in section 2 that best describes the wood fuel.
2. A procedure to document the quantity of wood fuel purchased for use in each small wood-fired combustor at the facility, the date of the purchase and the source from which the fuel was purchased.

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this section is important from wood fuel management perspective

best describes the wood

for use in each small wood-fired combustor and the source from

3. If wood fuel is generated at the facility, a procedure to document each type of wood fuel generated at the facility in each calendar year for use in each small wood-fired combustor at the facility and the amount of each type of wood fuel generated during that period.
4. A procedure to ensure that each wood fuel, wood fuel storage area, and wood fuel handling and conveyance system used at the facility in relation to a small wood-fired combustor is inspected on a regular basis.
5. A procedure to ensure that wood fuel that is not considered acceptable for combustion at the facility is removed from the facility immediately or stored in a location that is separate from the wood fuel storage area until it can be removed from the facility in a timely manner. The quantity and type of wood fuel rejected as unacceptable for combustion and the reasons for the rejection must be documented.
6. A procedure setting out the steps that are to be taken to ascertain whether a wood fuel meets the applicable specifications set out in section 2 for the type of wood fuel. Such steps may include laboratory testing, requisition of documentation of third party certification provided to the wood fuel supplier, and on-site testing.
7. An indication of the maximum time that each type of wood fuel may be stored at the facility before it is used in a small wood-fired combustor. This maximum storage duration must be established in a manner that prevents degradation of the wood fuel before it is used as a fuel.
8. If a facility uses wood chips, a procedure to,
  - i. with respect to wood chip pile turn-over, ensure that the wood chips that have been at the facility for the longest are used first, and
  - ii. ensure that the wood chips fed into a small wood-fired combustor are delivered from either a heated indoor wood chip storage facility sufficient to store a minimum of one and a half days of wood chip fuel supply at nominal load heat input capacity or unheated indoor storage facility sufficient to store a minimum of three days of wood chip fuel supply at nominal load heat input capacity. The wood chips may be delivered either directly from the indoor storage facility to the combustor if both are housed in one structure, or indirectly from the storage facility into the combustor fuel hopper through a conveyance system if housed in separate structures.
9. If a facility uses wood pellets or wood briquettes, a procedure to ensure that the wood pellets and wood briquettes are covered by a weather proof enclosure.

(2) A person mentioned in section 31 of the Regulation must ensure that the wood fuel management plan is reviewed at least once every year and updated to reflect changes in wood fuel management at the facility, including any revisions required to ensure that the maximum time that each type of wood fuel may be stored at the facility as a fuel in a small wood-fired combustor.

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one of the responsibility of the operator  
"ensuring and maintaining wood fuel  
management plan"

## Design criteria

5. (1) The design criteria mentioned in paragraph 3 of section 31 of the Regulation are the following:

1. Subject to subsection (2), a small wood-fired combustor must meet the following requirements:
  - i. Subject to subparagraphs ii and iii, the small wood-fired combustor must meet the requirements of EN 303-5 (2012).
  - ii. The combustor must be designed to meet Class 5 thermal efficiency and carbon monoxide as set out in EN 303-5 (2012) at nominal load and partial load heat output capacity operating conditions.
  - iii. The combustor must be designed, taking into account any air pollution control equipment specified by the manufacturer, to meet at least one of Class 3, 4 or 5 for dust (particulate matter) as set out in EN 303-5 (2012) at nominal load and partial load heat output capacity operating conditions.
2. A small wood-fired combustor must have a multi-zone air control process with a primary combustion zone designed to facilitate gasification of the wood fuel and to ensure that solid fixed carbon has minimal carry-over of particulate matter.
3. A small wood-fired combustor must have a multi-zone air control process with a secondary combustion zone designed to achieve complete combustion of the volatilized gases and any combustible particles that may be carried over from the primary combustion zone.
4. A small wood-fired combustor must have an automated bottom ash removal system.
5. A small wood-fired combustor must have an oxygen trim system including an oxygen lambda sensor to regulate the supply of combustion air to the primary, secondary, and, where applicable, tertiary combustion zones.
6. A small wood-fired combustor must use a variable speed electric fan as the induced draft fan to maintain a minimum negative static pressure in the combustion zones.
7. A small wood-fired combustor must have a monitor that measures the static pressure in the furnace or an alarm that signals when the static pressure in the furnace is positive.
8. If the small wood-fired combustor is designed to meet Class 3 dust (particulate matter) as set out in EN 303-5 (2012), the combustor must have, in addition to any air pollution control equipment specified by the manufacturer, additional air pollution control equipment that removes at least 50% of the particulate matter entering the additional air pollution control equipment.
9. If the small wood-fired combustor is designed to meet Class 4 or 5 for dust (particulate matter) as set out in EN 303-5 (2012), the combustor must be equipped with the air pollution control equipment specified by the manufacturer as required, if any, in order for the combustor to meet Class 4 or 5 for dust (particulate matter).

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all the requirements in this design criteria section could be included to the RFP language.

complete  
s that may be

ash removal

(2) A small wood-fired combustor that would meet the criteria set out in paragraph 1 of subsection (1) but for having a nominal heat load output capacity of more than 500 kW is deemed to meet the design criteria in paragraph 1 of subsection (1).

(3) The design criteria set out in paragraph 1 of subsection (1) of a small wood-fired combustor referred to in subsection (1) or (2) must be confirmed by a person who,

- (a) does not own, operate, sell or manufacture the small wood-fired combustor, and
- (b) meets the EN ISO/IEC 17025 requirements for testing as described in EN 303-5 (2012).

## Operational parameters

6. (1) The operational parameters mentioned in paragraph 4 of section 31 of the Regulation are the following operational parameters specified by the manufacturer of the small wood-fired combustor at both nominal and partial load capacity:

- 1. The heat input capacity.
- 2. The heat output capacity.
- 3. The wood fuel feed rate.
- 4. The thermal efficiency.

(2) A person mentioned in section 31 of the Regulation must ensure of the partial load heat input and output capacity of each small wood-fired combustor as a percentage of the corresponding nominal load heat input and output capacity.

(3) A person mentioned in section 31 of the Regulation must ensure that a small wood-fired combustor only operates if,

- (a) the heat input is above the partial load heat input capacity mentioned in subsection (2);
- (b) the heat output is above the partial load heat output capacity mentioned in subsection (2);
- (c) the excess oxygen in the flue gas of the small wood-fired combustor is at least 5.5 percent by volume on a wet basis block-averaged over a one-hour period;
- (d) the static pressure in the small wood-fired combustor is negative; and
- (e) the air pollution control equipment mentioned in paragraphs 8 and 9 of subsection 5 (1) is operational.

## Monitoring operational parameters

7. (1) For the purpose of paragraph 5 of section 31 of the Regulation, a person mentioned in that section must ensure that the following parameters are measured and that the measurements are recorded as block-averages over every five minutes.

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Note the similarities between the parameters in this operational list (to comply with ON regulation) and the list being developed for the monitoring and verification protocol by the Project team.

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this should be another requirement in the RFP; the supplier should provide a way of recording the measurements according to the requirements stated here

1. The concentration of oxygen in the flue gas as measured by an oxygen lambda sensor, expressed as percent by volume on a wet basis.
2. An induced draft fan parameter, for example the fan speed or percent of maximum fan speed.
3. A fuel input or energy output parameter, for example, the percentage of the nominal input/output capacity at which the small wood-fired combustor is operating.
4. The flue gas temperature.

(2) ) A person mentioned in section 31 of the Regulation must ensure that each piece of monitoring equipment used to measure the parameters set out in subsection (1) is properly maintained, inspected and calibrated in accordance the manufacturer's recommendations.

(3) The person must ensure that the records that are required by subsection (1) are retained for at least a 12-month period after the date the measurement was taken.

## Installation test

8. (1) The statement mentioned in paragraph 6 of section 31 of the Regulation must confirm that the installation test was conducted in accordance with the

1. The test was performed no later than 90 days after the date the fired combustor is first used.
2. The test was performed by a technician trained by the manufacturer of the wood-fired combustor to observe the installation and commissioning of the wood-fired combustor to determine if any problems occur with the operation of the small wood-fired combustor.
3. The small wood-fired combustor was tested to confirm that it operates in accordance with the manufacturer's specifications and the test was performed for a minimum of three continuous hours at nominal load heat input and output capacity and for a minimum of three continuous hours at partial load heat input and output capacity, for each type of wood fuel that is intended to be used in the small wood-fired combustor.
4. The concentration of carbon monoxide and oxygen in the flue gas of the small wood-fired combustor was measured with a calibrated portable combustion gas analyser for each of the three-hour intervals described in paragraph 3.
5. Each piece of monitoring equipment mentioned in section 7 was assessed to determine that it functions correctly for each of the three-hour intervals described in paragraph 3.
6. Any necessary adjustments or repairs were made to ensure that the measurements obtained in accordance with paragraph 4 indicate the following concentrations:
  - i. the concentration of carbon monoxide averaged over each three-hour interval described in paragraph 3 is,

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this should be included to the RFP as part of the installation and commissioning requirements by the Supplier

the installation or

operates in

- A. less than 100 parts per million by volume (ppmv) corrected to 11 percent oxygen for nominal load heat input and output capacity, and
  - B. less than 200 ppmv corrected to 11 percent oxygen for partial load heat input and output capacity; and
  - ii. the concentration of oxygen averaged over each three-hour interval described in paragraph 3 is at least 5.5 percent by volume.
7. The results of the measurements obtained in accordance with paragraph 4, subject to any necessary adjustments or repairs identified in paragraph 6, were reviewed and correlated with the results of the measurements obtained in accordance with section 7 over the same period of time to determine if the small wood-fired combustor is performing well.

(2) The statement must set out the results of the test, including the five-minute block averages for each of the three hour intervals described in paragraph 3 of subsection (1) of the parameters set out in paragraph 4 of subsection (1) and section 7, a description of any problems that occurred with the installation or operation of the combustor during the test and any necessary adjustments or repairs made to address those problems and ensure that the small wood-fired combustor is operating in accordance with the manufacturer's recommendations and the requirement of the Regulation.

(3) The person mentioned in section 31 of the Regulation must ensure that a statement mentioned in paragraph 6 of section 31 of the Regulation must be retained for a period of 5-years after the date on which the small wood-fired combustor ceases to be used at the facility.

### **Routine Inspections or Remote Connection**

9. (1) A person engaging in a prescribed activity that involves the use of a small wood-fired combustor must ensure that each small wood-fired combustor at

- (a) physically inspected at least once a week in accordance with the manufacturer's recommendations, if any, by a person who has received training for the purposes of conducting such inspections; or
- (b) equipped with a 24-hour per day remote connection to either a staff member or a service contractor.

(2) ) A remote connection referred to in clause (1) (b) must be capable of communicating error or fault alarms, messages and notifications from the facility in the event of a malfunction of the small wood-fired combustor to enable a response in a timely manner to trouble-shoot and correct the malfunction by either attending to the combustor in person or engaging in two-way communication remotely with the combustor.

(3) A person engaging in a prescribed activity that involves the use of a small wood-fired combustor must ensure that the following records are created and retained at the facility for a period of five years from the date of its creation:

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this is a section for the operator of the boiler

the manufacturer's  
for the purposes of  
designated facility



1. A record each inspection, including the date of the inspection and any maintenance activities performed.
2. Each record of a communication mentioned in subsection (2).

## Performance Assessment

10. (1) The performance assessment mentioned in paragraph 7 of section 7 of the Regulation must include the following actions:

1. Inspection of the following items while the small wood-fired combustor is operating,
  - i. fuel conveyance and handling equipment,
  - ii. indoor wood fuel storage area
  - iii. heat exchanger, air pollution control equipment, combustion air and flue gas ductwork,
  - iv. fans and dampers,
  - v. continuous monitoring devices,
  - vi. combustion chamber air injection nozzles, grates and refractory, and
  - vii. bottom ash and fly ash.
2. While the small wood-fired combustor is operating at or between nominal and partial heat load, measure the carbon monoxide and oxygen emission levels in the flue gas of the small wood-fired combustor over at least a 30-minute period using a calibrated portable combustion gas analyser and record the levels of those parameters.
3. Complete any necessary adjustments or repairs to ensure that the measurements obtained in accordance with paragraph 2 indicate the following concentrations:
  - i. the concentration of carbon monoxide averaged over the test period described in paragraph 2 is less than 100 parts per million by volume (ppmv) corrected to 11 percent oxygen and
  - ii. the concentration of oxygen averaged over the test period described in paragraph 2 is at least 5.5 percent by volume.
4. Determine if the small wood-fired combustor is performing well by reviewing:
  - i. the results of the measurements required by paragraph 2, subject to any necessary adjustments or repairs, and correlating those results with the results of the measurements obtained in accordance with section 7 over the same period;
  - ii. the maintenance, inspection and calibration records for each piece of continuous monitoring equipment mentioned in section 7.

(2) If the determination required by paragraph 4 of subsection (1) indicates that the small wood-fired combustor is not performing well, the person engaging in the activity must ensure that necessary adjustments or repairs are made in a manner that will ensure the small wood-fired combustor is operating in accordance with the manufacturer's recommendations and the requirements of the Regulation.

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this list is extensive and can be used as a list for identifying what to include to the acceptance sheet before taking the ownership of the boiler.

(3) For greater certainty, subsection (1) does not replace any inspection or preventative maintenance program recommended by the manufacturer and such recommendations must be implemented in addition to the requirements in subsection (1).

(4) The person engaging in the activity must ensure that a record of the results of each assessment is created and retained for a five-year period after the record is completed.

(5) A record created for the purpose of subsection (4) shall include the date on which the performance assessment is performed, the observed conditions of the items set out in paragraph 1 of subsection (1), the measurements made in accordance with paragraph 2 of subsection (1), a summary of the determination made in accordance with paragraph 4 of subsection (1) and a description of any adjustments or repairs made for the purpose of subsection (2).

## Records

11. (1) For the purpose of paragraph 8 of section 31 of the Regulation mentioned in that section must, in respect of each small wood-fired combustor at the facility, retain a copy of the confirmation required by subsection 5(3) at the facility at all times while engaging in the activity indicating whether any air pollution control equipment is required in order for the small wood-fired combustor to meet the design criteria set out in paragraph 1 of subsection 5(1).

(2) For the purpose of paragraph 8 of section 31 of the Regulation, a person mentioned in that section must ensure that the following records are created and retained for the applicable time period:

1. A tabulated summary of the types and specifications of wood fuels that have been or are intended to be stored and intended for use in each small wood-fired combustor at the facility must be created, maintained and retained at the facility. The summary must be retained at the facility at all times while engaging in the activity.
2. A tabulated summary of the design (including air pollution control equipment and EN 303-5 (2012) dust classification rating of Class 3, 4 or 5), operating and continuous monitoring aspects of each small wood-fired combustor at the facility must be created and retained at the facility at all times while engaging in the activity.
3. A copy of the manufacturer's design specifications, guaranteed emission limits and operating recommendations for each small wood-fired combustor must be retained at the facility for a period of five years after the date on which the small wood-fired combustor ceases to be used at the facility.
4. A copy of the wood fuel management plan and updates to the plan, if any, must be retained at the facility for at least five years after the day the plan is no longer being implemented at the facility.

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this will be part of responsibility of the operator.  
combustor that is used  
5 (3) at the facility at  
pollution control  
meet the design

5. The following records created in accordance with a procedure set out in the wood fuel management plan must be retained at the facility for a period of five years after the date the record is created:
  - i. A record of the quantity and specification of each type of wood fuel purchased for use in each small wood-fired combustor at the facility, the date of the purchase, the date of the fuel delivery to the facility and the source from which the fuel was purchased.
  - ii. A record of the type and specification of each type of wood fuel generated at the facility in each calendar year for use in a small wood-fired combustor at the facility and the amount of each type of wood fuel generated during that period.
  - iii. A record of the amount and intended specification of each type of wood fuel rejected as unacceptable for combustion at the facility in each calendar year and the reasons for the rejection, the date the wood fuel was rejected and the date it was removed from the facility.
  - iv. A record of the steps taken to ascertain whether wood fuel meets the applicable specifications, including the wood fuel type, the date the steps were taken and the results of the steps.
  - v. A record of each inspection conducted for the purpose of paragraph 4 of subsection 4 (1), including the date of the inspection, observations made during inspections and any steps taken to address any problems observed.
6. A record of the maintenance, inspection and calibration records for each piece of continuous monitoring equipment used to measure the parameters set out in subsection 7(1) which shall be retained at the facility for at least 12 months after the record is created.

# Appendix A: Record of Publications

Version 1.0 - Environmental Activity and Sector Registry - Limits and Other Requirements (December, 2016)

Tracking	Date	Publishing Ministry
Version 1.0 Environmental Activity and Sector Registry - Limits and Other Requirements	Created December, 2016	Environment and Climate Change

## **Guideline for the Control of Air Emissions from Small Wood-Fired Combustors (< 3 MW)**

Guideline A-14

January 2017



**TABLE OF CONTENTS**

<b>1.0 INTRODUCTION</b>	<b>2</b>
<b>2.0 DEFINITIONS AND ABBREVIATIONS</b>	<b>3</b>
<b>3.0 APPLICABILITY</b>	<b>6</b>
<b>4.0 WOOD FUEL PARAMETERS</b>	<b>7</b>
<b>5.0 COMBUSTOR DESIGN AND PERFORMANCE</b>	<b>9</b>
<b>6.0 INSTALLATION AND SOURCE TESTING</b>	<b>12</b>
<b>7.0 PERFORMANCE MONITORING</b>	<b>14</b>
<b>8.0 PERFORMANCE ASSESSMENT</b>	<b>16</b>
<b>9.0 DOCUMENTATION</b>	<b>18</b>

**LIST OF APPENDICES**

- Appendix A: Tabulated Summary of Guideline A-14 Expectations**
- Appendix B: Tabulated Summary of Documentation Expectations**
- Appendix C: Emission Conversions and Calculations**
- Appendix D: Information Pertaining to Environmental Compliance Approvals Process**
- Appendix E: Additional Technical Information**
- Appendix F: Summary of Wood Fuel Specifications and NRCan Bulletins**

### 1.0 INTRODUCTION

The purpose of Guideline A-14: Guideline for the Control of Air Emissions from Small Wood-Fired Combustors (< 3 MW) is to establish the minimum expectations necessary to control air emissions from small wood-fired combustors with a nominal load heat input capacity of less than 3 megawatts (MW) in Ontario. This guideline complements Guideline A-13: Guideline for the Control of Air Emissions from Large Wood-Fired Combustors (≥ 3 MW). Together, these two air quality guidelines serve to replace the Interim Design and Review Guidelines for Wood Fired Combustors published by the Ministry in 1990.

The intended audience for this guideline includes persons applying for an environmental compliance approval (ECA) under section 20.2 of the *Environmental Protection Act*, R.S.O. 1990 (the “EPA”), persons that own or operate small wood-fired combustors, and manufacturers and distributors of small wood-fired combustors.

The intended audience for this guideline does not include a person engaging in the installation, use, operation, replacement or modification a small wood-fired combustor where that activity is a prescribed activity for the purposes of section 20.21 (1) of the EPA. Persons engaging in prescribed activities that involve the use of a small wood-fired combustor are referred to O. Reg. 01/17 “Registrations under Part II.2 of the Act – Activities Requiring Assessment of Air Emissions” made under the EPA and the EASR publication, in particular chapters 1 and 5 of the EASR publication.

During the review of an application for an ECA and when considering issuing an order, the Director<sup>1</sup> considers the requirements set out in relevant regulations as well as all applicable Ontario Ministry of the Environment and Climate Change (Ministry) guidelines and policies. To the extent that this document sets out that something is “required” or “shall” be done or sets out a “requirement” or “limit”, it does so only to identify minimum expectations, the application of which remain subject to the discretion of the Director. The expectations set out in this guideline are compulsory to the extent that they are contained in conditions of an ECA or other legally binding instrument, such as an order. Information pertaining to the ECA process is provided in Appendix D.

As a complement to the minimum expectations for small wood-fired combustors set out in this guideline, additional technical information is provided in Appendix E. This information could be considered before purchasing a small wood-fired combustor.

While every effort has been made to ensure the accuracy of the information contained in this guideline, it should not be construed as legal advice. In the event of a conflict with requirements of the EPA, O. Reg. 419/05 or any other regulation, the legislative requirements shall determine the appropriate approach.

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<sup>1</sup> Reference to a Director in this guideline refers to a Director appointed under section 5 of the EPA for the purpose of a section authorizing the issuance of an order or ECA.

## 2.1 DEFINITIONS AND ABBREVIATIONS

The following definitions apply for the purposes of this guideline:

“air pollution control equipment” means equipment that is designed to decrease emissions to the air of one or more contaminants that are present in the flue gas stream;

“CAN/CSA-ISO 17225-2:15” means the standard CAN/CSA-ISO 17225-2:15, published by the Canada National Standard/Canadian Standards – International Organization for Standardization on March 1, 2015 and entitled “Solid biofuels – Fuel specifications and classes - Part 2: Graded Wood pellets”;

“CAN/CSA-ISO 17225-3:15” means the standard CAN/CSA-ISO 17225-3:15, published by the Canada National Standard/Canadian Standards – International Organization for Standardization on March 1, 2015 and entitled “Solid biofuels – Fuel specifications and classes - Part 3: Graded Wood briquettes”;

“CAN/CSA-ISO 17225-4:15” means the standard CAN/CSA-ISO 17225-4:15, published by the Canada National Standard/Canadian Standards – International Organization for Standardization on March 1, 2015 and entitled “Solid Biofuels – Fuel specifications and classes – Part 4: Graded wood chips”;

“certified small wood-fired combustor” means a small wood-fired combustor that meets the following criteria:

1. Subject to paragraphs 2 and 3, the combustor meets the requirements of EN 303-5 (2012).
2. The combustor is designed to meet the Class 5 thermal efficiency and carbon monoxide requirements set out in EN 303-5 (2012) at nominal load and partial load heat output capacity operating conditions.
3. The combustor is designed, taking into account any air pollution control equipment specified by the manufacturer, to meet at least one of Class 3, 4 or 5 for dust (particulate matter) as set out in EN 303-5 (2012) at nominal load and partial load heat output capacity operating conditions.
4. The criteria set out in paragraphs 1 to 3 must be confirmed by a person who,
  - i. does not own, operate, sell or manufacture the small wood-fired combustor, and
  - ii. meets the EN ISO/IEC 17025 requirements for testing as described in EN 303-5 (2012);

“combustor” means a device in which combustible material is oxidized resulting in release of heat and products of combustion;

“commissioning period” means the 90-day period following the first start-up of a small wood-fired combustor;

“cyclone” means a piece of air pollution control equipment that uses centrifugal force to separate particulate matter from the flue gas;

“ECA” means environmental compliance approval, as defined in subsection 1(1) of the *Environmental Protection Act*;

“EN 303-5 (2012)” means European Standard EN 303-5, published by the European Committee for Standardization in June, 2012 and entitled “Heating boilers – Part 5: Heating boilers for solid fuels, manually and automatically stoked, nominal heat output of up to 500 kW – Terminology, requirements, testing and marking”;

“existing small wood-fired combustor” means a non-reassessed small wood-fired combustor,



## Guideline for the Control of Air Emissions from Small Wood-Fired Combustors (<3 MW)

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- (a) that was installed on or before January 31, 2017, or
- (b) for which an application for an ECA was made on or before January 31, 2017;

“existing ECA” means an Environmental Compliance Approval issued by the Director for a small wood-fired combustor on or before January 31, 2017;

“flue gas” means a gas that is generated from a combustion process;

“furnace” means a part of a combustor where combustion takes place and may be comprised of primary, secondary and tertiary combustion chambers;

“Guideline A-13” means Guideline for the Control of Air Emissions from Large Wood-Fired Combustors ( $\geq 3$  MW) published by the Ministry in January 2015 (as amended);

“higher heating value” means the amount of heat released during the complete combustion of a unit quantity of fuel and includes the latent heat of vapourization of the water vapour formed by the combustion;

“mg/Rm<sup>3</sup>” means milligrams per cubic metre at reference conditions;

“Minister” means the Minister of the Environment and Climate Change or such other member of the Executive Council as may be assigned the administration of the *Environmental Protection Act*, R.S.O. 1990 under the *Executive Council Act*;

“Ministry” means the ministry of the Minister;

“moisture content” means the total moisture content of a sample of wood fuel, as-fired, reported on a wet basis as a percentage;

“MW” means megawatt and is equal to 3,600 megaJoules per hour;

“new small wood-fired combustor” means a small wood-fired combustor, the installation of which began after January 31, 2017 and in respect of which, no application for an ECA was made on or before January 31, 2017;

“nominal load heat input capacity” means the design capacity of a small wood-fired combustor to combust a maximum amount of wood fuel based on the physical design of the small wood-fired combustor and is calculated by multiplying the mass flow rate of the wood fuel by the higher heating value of the wood fuel;

“nominal load heat output capacity” means the maximum continuous usable heat output as determined by the nominal load heat input capacity and design of the heat exchanger;

“oxygen lambda sensor” means a device that continuously measures the concentration of oxygen in the flue gas on a wet basis and uses the resulting measurement as an input to the oxygen trim system;

“oxygen trim system” means the components of a small wood-fired combustor that dynamically control the excess oxygen level in the flue gas through the use of an oxygen lambda sensor;

“partial load heat input capacity” means the design capacity of a small wood-fired combustor to combust a minimum amount of wood fuel based on the physical design of the small wood-fired combustor, for which air emissions can be reliably measured at steady state conditions, and is calculated by multiplying the mass flow rate of the wood fuel by the higher heating value of the wood fuel;

## Guideline for the Control of Air Emissions from Small Wood-Fired Combustors (<3 MW)

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“partial load heat output capacity” means the minimum continuous usable heat output as determined by the partial load heat input capacity and design of the heat exchanger;

“particulate matter” means particulate matter in the flue gas downstream of any air pollution control equipment, prior to discharge to the air, that has an aerodynamic diameter of less than 44 microns;

“reassessed small wood-fired combustor” means an existing small wood-fired combustor at a facility for which an application for an ECA in respect to an activity engaged in at the facility has been made after January 31, 2017;

“record” includes a written procedure, a measurement result, a written notification, a table, a report, a document, electronic data, a written practice, and an update to any of the preceding;

“reference conditions” mean conditions at which the temperature is 25 degrees Celsius and the pressure is 101.3 kilopascals;

“small wood-fired combustor” means a wood-fired combustor that has,

- (a) a nominal load heat input capacity of less than three megawatts, and
- (b) a nominal load heat output capacity of greater than 50 kilowatts;

“thermal efficiency” means the ratio of the delivered useful heat output to the heat input as derived from the wood fuel, expressed as a percentage;

“uncertified small wood-fired combustor” means a small wood-fired combustor that does not meet the requirements set out in the definition of a “certified small wood-fired combustor”;

“ungraded wood material” means woody biomass that has not been processed into a wood briquette, wood pellet or wood chip;

“wood briquette” means a densified wood fuel with a diameter of more than 25 millimetres produced by compressing woody biomass as defined by CAN/CSA-ISO 17225-3:15;

“wood chip” means a piece of wood within a defined size range, cut or chipped from a larger piece of wood as defined by CAN/CSA-ISO 17225-4:15;

“wood-fired combustor” means a combustion source designed to burn wood fuel and does not include a wood-fuel gasifier connected to an internal combustion engine;

“wood pellet” means a densified wood fuel made by compressing woody biomass into a cylindrical form as defined by CAN/CSA-ISO 17225-2:15.

### 3.1 APPLICABILITY

This guideline applies to small wood-fired combustors that are designed to burn wood fuel set out in this guideline (i.e., wood pellets, wood briquettes or wood chips<sup>2</sup>) rated to a nominal load heat input capacity of less than 3 MW and a nominal load heat output capacity of greater than 50 kW. This guideline does not apply to a combustor that burns ungraded wood fuel or fuel other than wood fuel (e.g. agricultural sourced biomass). Please refer to Guideline A-13 (Guideline for the Control of Air Emissions from Large Wood-Fired Combustors  $\geq 3$  MW) for the Ministry's expectations regarding wood-fired combustors that use ungraded wood material or up to 7.5 percent municipal waste (that is predominantly wood) material as a fuel.

Certain expectations set out in this guideline vary according to whether the small wood-fired combustor is: (i) a new small wood-fired combustor; (ii) a reassessed small wood-fired combustor; or (iii) an existing small wood-fired combustor. Unless exempt from section 9 of the EPA, it is an offence under the EPA to operate a small wood-fired combustor without an ECA and an application for an ECA should be made forthwith. It should be noted that the following are the ministry's expectations with respect to such an ECA application:

1. If the operation of the small wood-fired combustor commenced before January 31, 2017, it is expected that the person will follow the expectations set out for a reassessed small wood-fired combustor.
2. If the operation of the small wood-fired combustor commenced after January 31, 2017, it is expected that the person will follow the expectations set out for a new small wood-fired combustor.

This guideline also distinguishes between small wood-fired combustors that are certified (i.e. have been independently tested and have documentation to demonstrate compliance with European Standard EN 303-5 (2012), including Class 5 for thermal efficiency and carbon monoxide emissions and either Class 3, 4 or 5 for dust) and those that are uncertified. A certified small wood-fired combustor will be considered uncertified if it is modified to be equipped with a direct contact heat exchanger (e.g., direct contact grain dryer).

The expectations set out in this guideline for certified small wood-fired combustors also apply to a small wood-fired combustor that meets the following criteria:

- If a small wood-fired combustor has a nominal load heat output capacity of more than 500 kW, it meets all four of the criteria of the definition of "certified small wood-fired combustor" other than having a nominal load heat output capacity of less than or equal to 500 kW (note that EN 303-5 (2012) is limited to nominal load heat output capacity of up to 500 kW), and
- If the small wood-fired combustor has a non-contact air-to-air heat exchanger, the small wood-fired combustor meets the criteria set out in paragraph 1 of the definition of "certified small wood-fired combustor" and meets the criteria set out in paragraph 2 with respect to carbon monoxide and meets the criteria set out in paragraphs 3 and 4 of that definition.

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<sup>2</sup> Please note that at the time of the writing of this guideline, the ISO wood fuel quality standard for thermally treated and densified wood fuels, such as torrefied wood briquettes and pellets is under development. After the ISO fuel quality standard 17225-8 has been adopted by CSA Group, thermally treated and densified wood will be considered by the Ministry to be wood fuels and this guideline will be updated accordingly. In the interim, a small wood-fired combustor that uses thermally treated and densified wood is expected to meet the requirements of Guideline A-13.

## 4.0 WOOD FUEL PARAMETERS

A small wood-fired combustor is expected to use the wood fuel that the manufacturer designed it to use, subject to the specifications outlined below.

### 4.1 Wood Fuel Specifications

#### New and Reassessed Small Wood-Fired Combustors

A new or reassessed small wood-fired combustor is expected to use wood fuel that meets one or more of the following specifications:

#### Wood pellets:

- i. **CAN/CSA-ISO 17225-2:15:** Type A1, A2 or B graded wood pellets for commercial and residential applications (ISO 17225-2 has superseded EN 14961-2);
- ii. **Pellet Fuels Institute:** premium or standard grade as set out in the document entitled “Pellet Fuels Institute Standard Specifications for Residential/Commercial Densified Fuel”, published by the Pellet Fuels Institute in July 2015.

#### Wood chips:

- i. moisture content is 50 percent or less, and
- ii. **CAN/CSA-ISO 17225-4:15:** Type A1, A2, B1 or B2 graded wood chips (ISO 17225-4 has superseded EN 14961-4).

#### Wood briquettes:

- i. **CAN/CSA-ISO 17225-3:15:** Type A1, A2 or B

For wood chips, the expectation of the 50 percent or less moisture content will begin on January 31, 2017, but the specification set out in clause ii will be considered voluntary until January 31, 2027 after which compliance with the specification will be expected. Refer to Appendix F for more detailed descriptions of the above-noted wood fuel specifications.

Please note that a person responsible for a small wood-fired combustor that seeks to use a form of wood fuel other than wood briquettes, wood pellets or wood chips, when applying for an ECA on or after January 31, 2017, is expected to meet the requirements of Guideline A-13.

#### Existing Small Wood-Fired Combustors

For an existing small wood-fired combustor, it is considered good practice to use a wood fuel quality specification that optimizes combustion efficiency and minimizes air emissions. Using the wood fuel types described above is a recommended best practice.

### 4.2 Automated Wood Fuel Feed Systems for New and Reassessed Small Wood-Fired Combustors

An automated wood fuel feed system inserts wood fuel into a combustor furnace under the control of a computational algorithm that operates in conjunction with the oxygen trim system. Such a system is anticipated to assist in ensuring consistently effective combustion, as compared with manually fed systems.

Automated wood fuel feed systems have start-up and shut down procedures that control the timing sequence and amount of combustion air and wood fuel fed into the combustor. Having these procedures incorporated

into the system assists in minimizing air emissions by limiting the time for start-up and shut down as compared with manually operated systems.

Accordingly, new and reassessed small wood-fired combustors are expected to have an automated wood feed system that includes automated start-up and shutdown procedures.

### 4.3 Wood Fuel Management

Wood fuel quality is a critical parameter for ensuring efficient combustion and thereby minimizing air emissions. In order to ensure that each type of wood fuel being supplied to a small wood-fired combustor is of satisfactory quality and is managed in a manner that maintains the quality and characteristics of the fuel, it is expected that the person responsible for a small wood-fired combustor prepare, implement and maintain a Wood Fuel Management Plan.

#### New and Reassessed Small Wood-Fired Combustors

A Wood Fuel Management Plan for a new or reassessed small wood-fired combustor is expected to have the following elements:

- a) A list of the type of each wood fuel that may be stored at the facility with the intent to be burned in the small wood-fired combustor (e.g., wood briquettes, wood chips, wood pellets) and which specification in Chapter 4.1 best describes the wood fuel.
- b) A procedure to document the quantity of wood fuel purchased by the facility and the source from which it was purchased, and, if applicable, the quantity of wood fuel generated at the facility.
- c) A procedure to document how each wood fuel, wood fuel storage area and wood fuel handling and conveyance system at the facility is inspected on a regular basis.
- d) A procedure to ensure that wood fuel that is not considered acceptable for combustion at the facility is removed from the facility immediately or stored separately from the wood fuel storage until it can be removed from the facility in a timely manner. The quantity of wood fuel rejected and the reasons for the rejection should be documented.
- e) A procedure to document what steps have been taken to ascertain wood fuel quality. Such steps may include laboratory testing, documentation of third party certification provided to the wood fuel supplier, and on-site testing.
- f) An indication of the maximum time that each wood fuel may be stored at the facility. This maximum storage duration is intended to prevent degradation of the wood fuel before it is used as a fuel.
- g) If a facility uses wood chips, a procedure to,
  - i) document the wood chip pile turn-over to ensure that the wood chips that have been at the facility for the longest are used first, and
  - ii) ensure that the wood chips fed into the small wood-fired combustor are delivered from either a heated indoor wood chip storage facility sufficient to store a minimum of 1.5 days of wood chip fuel supply at nominal load heat input capacity or unheated indoor storage facility sufficient to store a minimum of three days of wood chip fuel supply at nominal load heat input capacity. The wood chips may be delivered either directly from the indoor storage facility to the combustor if both are housed in one structure, or indirectly from the storage facility into the combustor fuel hopper through a conveyance system if housed in separate structures.
- h) If a facility uses wood pellets or wood briquettes, a procedure to ensure that the wood pellets and wood briquettes are covered by a weather proof enclosure.

### Existing Small Wood-Fired Combustors

The Ministry considers it a best practice for a Wood Fuel Management Plan pertaining to an existing small wood-fired combustor to have the elements described above.

## 5.0 COMBUSTOR DESIGN AND PERFORMANCE

This guideline distinguishes between small wood-fired combustors that are certified or uncertified. Note that the expectations set out in this guideline for certified small wood-fired combustors apply to a wood combustor that is described in Chapter 3.0 “Applicability”. Emission conversion and calculations are provided in Appendix C.

### 5.1 Design of New Small Wood-Fired Combustors

A new small wood-fired combustor is expected to have the following design elements:

- a) The small wood-fired combustor is to have a multi-zone air control combustion process that includes the following elements (optional elements are noted as “good practice”):
  - i) The multi-zone air control combustion process is to have a primary combustion zone with a fuel bed and is to introduce primary combustion air. The primary combustion zone is to be designed to facilitate the drying and gasification of the wood fuel. It is also to be designed to ensure that solid fixed carbon is combusted with minimal carry-over of particulate matter.
  - ii) The multi-zone air control combustion process is to have a secondary combustion zone and is to introduce secondary combustion air. The secondary combustion zone is to be designed to achieve complete combustion of the volatilized gases and any combustible particles that may be carried over from the primary combustion zone.
  - iii) The multi-zone air control combustion process is to have an automated bottom ash removal system.
  - iv) It is considered good practice for the multi-zone air control combustion process to have an automated fly ash removal system in the heat exchanger.
  - v) It is considered good practice for the multi-zone air control combustion process to have a tertiary combustion zone to introduce tertiary combustion air to complete the combustion of volatilized gases.
  - vi) It is considered good practice for the multi-zone air control combustion process to have a flue gas recirculation system that directs a portion of the flue gases from the outlet of the induced draft fan back into the combustion air injection points.
- b) The small wood-fired combustor is to have an oxygen trim system including an oxygen lambda sensor to regulate the supply of combustion air to the primary, secondary, and, where applicable, tertiary combustion zones.
- c) The small wood-fired combustor is to use a variable speed electric fan as the induced draft fan to maintain a minimum negative static pressure in the combustion zones.
- d) The small wood-fired combustor is to have a monitor that measures the static pressure in the furnace or an alarm that signals when the static pressure in the furnace is positive.
- e) The small wood-fired combustor is to be designed to operate in a manner that results in the concentration of particulate matter in the flue gas of the discharge stack of a small wood-fired combustor, downstream of any air pollution control equipment being less than 75 mg/Rm<sup>3</sup> at 11% oxygen (dry basis). The person responsible for the small wood-fired combustor is expected to obtain documentation from the

## Guideline for the Control of Air Emissions from Small Wood-Fired Combustors (<3 MW)

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manufacturer confirming that the small wood-fired combustor (and its air pollution control equipment as described below) is capable of achieving this emission level.

- f) The small wood-fired combustor is expected to have the following air pollution control equipment:
- If the combustor is a certified<sup>3</sup>-small wood-fired combustor:
    - Where a certified small wood-fired combustor is certified to EN 303-5 (2012) Class 3 for dust,
      - if air pollution control equipment is not required to meet Class 3 dust emission level in EN 303-5 (2012), add air pollution control equipment capable of reducing the emissions of suspended particulate matter to the air by at least 50% when the small wood-fired combustor is operating at nominal load heat input capacity.
      - if air pollution control equipment is required to meet Class 3 dust emission level in EN 303-5 (2012), add an additional piece of air pollution control equipment capable of reducing the emissions of suspended particulate matter to the air by at least 50% when the small wood-fired combustor is operating at nominal load heat input capacity.
    - Where a certified small wood-fired combustor is certified to EN 303-5 (2012) Class 4 or 5 for dust, air pollution control equipment specified by the manufacturer, if necessary, to meet the Class 4 or 5 certification emission level for dust.
  - If the combustor is an uncertified small wood-fired combustor, air pollution control equipment capable of reducing the emissions of suspended particulate matter to the air by at least 50% when the small wood-fired combustor is operating at nominal load heat input capacity.
- g) The small wood-fired combustor is to be designed so that it is capable of measuring the process control parameters set out in Chapter 7.1.

### 5.2 Operation of New Small Wood-Fired Combustors

A new small wood-fired combustor is expected to operate at a load that is within an operating range specified by the manufacturer (i.e., at a load that is above the partial load and below the nominal load). Similarly a new small wood-fired combustor is expected to operate at wood fuel feed rates specified by the manufacturer and operate within the range of thermal efficiencies specified by the manufacturer. These three parameters are to be documented by the person responsible for the small wood-fired combustor, based on information received from the manufacturer.

For a certified<sup>4</sup> new small wood-fired combustor the partial load heat output capacity is typically 30 percent of the nominal load heat output capacity, as described in EN 303-5 (2012), and third party certification emission testing for partial load is typically conducted at 30 percent of the nominal load heat output capacity.

However, for an uncertified new small wood-fired combustor, the person responsible for the small wood-fired combustor must document, based on information received from the manufacturer, the partial load heat input and output capacity as a percentage of the corresponding nominal load heat input and output capacity. The person responsible for the small wood-fired combustor is expected to have a written record of the partial load heat input and output capacity specifications.

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<sup>3</sup> This applies also to a wood combustor that is described in Chapter 3.0 “Applicability”.

<sup>4</sup> This applies also to a wood combustor that is described in Chapter 3.0 “Applicability”.

## Guideline for the Control of Air Emissions from Small Wood-Fired Combustors (<3 MW)

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It is important to note that a new small wood-fired combustor is not to operate “in idle mode” below the partial load heat input and output capacity - it is expected to operate at or above the partial load heat input and output capacity or otherwise be shut down.

As well, a new small wood-fired combustor is expected to operate in manner that ensures that the static pressure in the furnace is negative. Ensuring the furnace is drafting air and, therefore, is negatively pressurized will prevent the migration of flue gases into the structure housing the small wood-fired combustor.

It is expected that any air pollution control equipment required to be installed as a component of the small wood-fired combustor as described in Chapter 5.1 will operate at all times while the small wood-fired combustor is operational.

### 5.3 Flue Gas Concentration Limits<sup>5</sup>

#### New Small Wood-Fired Combustors

The concentration of carbon monoxide in the flue gas of a new small wood-fired combustor is expected to be less than 400 parts per million by volume (ppmv) at 11% oxygen on a dry basis and reference conditions averaged over a 24-hour calendar day. When calculating the daily average carbon monoxide concentration, a person may omit up to 120 non-consecutive minutes of carbon monoxide measurements while the small wood-fired combustor is operational. As well, a person may omit any carbon monoxide measurements taken after the induced draft fan shuts off following the shutdown of a small wood-fired combustor. Records of the measurements (including those that were omitted) are to be kept at the facility for a minimum of 12 months from the date the measurement was taken (see also Chapter 7).

The concentration of oxygen in the flue gas of a new small wood-fired combustor is expected to be at least six percent by volume on a dry basis at reference conditions block-averaged over a one-hour period. Note however, that the concentration of oxygen in the flue gas of a certified<sup>6</sup> new small wood-fired combustor is expected to be at least 5.5 percent by volume on a wet basis averaged over a one-hour period as measured by the oxygen lambda sensor. Note that a dry oxygen measurement is not required because a continuous carbon monoxide monitor is not required for certified new small wood-fired combustors (See Chapter 7.2).

#### Reassessed and Existing Small Wood-Fired Combustors

It is expected that a person responsible for a reassessed or existing small wood-fired combustor will meet the flue gas carbon monoxide and oxygen limits set out in their ECA. Note that the ministry will have regard to the limits for carbon monoxide and oxygen set out above in issuing or amending ECAs after January 31, 2017. It is also expected that a person responsible for a reassessed or existing small wood-fired combustor will operate in a manner that results in the concentration of particulate matter in the flue gas of the discharge stack of a small wood-fired combustor, downstream of any air pollution control equipment meeting the limit set out in their ECA. Similarly, the ministry will have regard to a concentration limit of less than 90 mg/Rm<sup>3</sup> at 11% oxygen (dry basis) for particulate matter with respect ECAs issued or amended after January 31, 2017.

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<sup>5</sup> Note that air standards in Ontario Regulation 419/05 are also applicable.

<sup>6</sup> This applies also to a wood combustor that is described in Chapter 3.0 “Applicability”.



## **6.0 INSTALLATION AND SOURCE TESTING**

### **6.1 Installation Test for New Small Wood-Fired Combustors**

During the 90-day period following the first start-up of a new small wood-fired combustor it is expected that an installation test be performed to ensure the small wood-fired combustor was installed and is operating according to the manufacturer's design. As part of the installation test, the person responsible for the small wood-fired combustor is to ensure that a technician trained by the manufacturer inspects how the small wood-fired combustor was installed and observes the operation of the small wood-fired combustor to determine if any problems occur. The person responsible for the small wood-fired combustor is to ensure that the technician corrects any problems and is to document the work done by the technician upon successful completion of the installation test.

When performing the installation test, it is expected that the person responsible for the small wood-fired combustor ensures that the technician determines if the performance monitoring equipment (as described in Chapter 7) is functioning properly. The monitoring equipment is to be assessed for a minimum of three continuous hours at each of the following operating conditions: (i) at nominal load heat input and output capacity and (ii) at partial load heat input and output capacity. The data generated by the process monitoring devices described in Chapter 7.1 are expected to be recorded as part of the installation test. This test is intended to ensure the satisfactory performance of the performance monitoring equipment and to demonstrate that the equipment is ready to operate at steady state conditions for subsequent source testing as described in Chapter 6.2 below.

The installation test is to be performed for each type of wood fuel that is intended to be used in the small wood-fired combustor (i.e., wood pellets, wood chips and/or wood briquettes). For a small wood-fired combustor that may use wood pellets or wood briquettes, the installation test is to be performed using wood pellets or wood briquettes with the highest ash content that may be used in the small wood-fired combustor. For a small wood-fired combustor that may use wood chips, the installation test is to be performed using wood chips with the highest moisture content and ash content that may be used in the small wood-fired combustor.

As part of the installation test, the person responsible for the small wood-fired combustor must ensure that the technician uses a calibrated portable combustion gas analyzer to measure and record carbon monoxide and oxygen emission levels in the flue gas for each three-hour period concurrent with the assessment of the performance monitoring equipment at nominal load and partial load heat input and output capacity. As such, it is recommended that all new small wood-fired combustors have readily accessible emission testing ports to allow for the use of a calibrated portable combustion gas analyzer.

It is expected that the concentration of carbon monoxide measured during the installation testing be: (i) less than 100 ppmv at 11% oxygen for nominal load heat input and output capacity, and (ii) less than 200 ppmv at 11% oxygen for partial load heat input and output capacity. It is expected that the concentration of oxygen in the flue gas measured during installation testing be at least 5.5 percent by volume.

The person responsible for the small wood-fired combustor is to ensure that the technician compares the measurement results to the limits set out above and any other applicable limits (e.g. in an ECA). The person responsible for the small wood-fired combustor is to ensure that the technician makes any necessary adjustments or repairs to ensure that the measurement results are compliant with the limits set out above. If the small wood-fired combustor has a continuous carbon monoxide or oxygen monitor, the person responsible for the small wood-fired combustor must ensure that the technician compares the measurement results of the portable combustion gas analyzer to the measurements of the continuous monitor.

The person responsible for the small wood-fired combustor is to ensure that the technician reviews and correlates the results of the measurements described above from the process monitoring devices and combustion gas analyzer, subject to any adjustments or repairs, to determine if the small wood-fired combustor is performing well in accordance with the manufacturer's recommendations.

It is expected that the person responsible for the small wood-fired combustor will document the results of an installation test and that a report be prepared and retained at the facility for a period of five years after the date on which the small wood-fired combustor ceases to be used at the facility. The report shall include the calibration records of the portable combustion gas analyzer.

### **6.2 Source Testing for Small Wood-Fired Combustors**

In this guideline, a source test generally means the measurement of carbon monoxide, oxygen and particulate matter in the flue gas of the discharge stack of a small wood-fired combustor, downstream of any air pollution control equipment.

A source test is to be performed for each type of wood fuel that is intended to be used in the small wood-fired combustor at the facility (i.e., wood pellets, wood chips and/or wood briquettes). For a small wood-fired combustor that may use wood pellets or wood briquettes, the source test is to be performed using wood pellets or wood briquettes with the highest ash content that may be used in the small wood-fired combustor. For a small wood-fired combustor that may use wood chips, the source test is to be performed using wood chips with the highest moisture content and ash content that may be used in the small wood-fired combustor.

The source test report is to include a summary of the process control monitoring data described in Chapter 7 that was measured during the source test.

#### **New Small Wood-Fired Combustors**

A source test is expected to be performed no later than six months after the completion of an installation test with respect to a new small wood-fired combustor.

The source test is to measure particulate matter, carbon monoxide and oxygen in the flue gas of the new small wood-fired combustor. These parameters are to be measured at both nominal load heat input and output capacity and partial load heat input and output capacity<sup>7</sup>; however, a certified new small wood-fired combustor need only measure carbon monoxide and oxygen at nominal load heat input and output capacity and partial load heat input and output capacity.

It is expected that the concentration of particulate matter, as measured in the flue gas after the air pollution control equipment during source testing, be less than 75 mg/Rm<sup>3</sup> at 11% oxygen (dry basis) averaged over a period determined in accordance with the Ontario Source Testing Code.

It is expected that the concentration of carbon monoxide measured during source testing be: (i) less than 100 ppmv at 11% oxygen on a dry basis and reference conditions averaged over a one-hour period for nominal load heat input and output capacity, and (ii) less than 200 ppmv at 11% oxygen on a dry basis and reference conditions averaged over a one-hour period for partial load heat input and output capacity.

It is expected that the concentration of oxygen in the flue gas measured during source testing be at least six percent by volume on a dry basis and reference conditions averaged over a one-hour period. Note that measuring the concentration of oxygen on a dry basis enables the oxygen correction of the carbon monoxide

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<sup>7</sup> Chapter 5.2 sets out that the partial load heat input capacity is to be set out in a written record for uncertified small wood-fired combustors.

## Guideline for the Control of Air Emissions from Small Wood-Fired Combustors (<3 MW)

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measurements. The dry oxygen level determined during source testing must be measured separately from the wet oxygen level determined by the oxygen lambda sensor.

If a new small wood-fired combustor undergoes a significant modification, it is expected that the person responsible for the small wood-fired combustor would seek an amendment to the ECA, after which another source test will be completed according to the requirements set out in the ECA.

### Reassessed and Existing Small Wood-Fired Combustors

Source testing at nominal load heat input and output capacity operating conditions is expected to be performed, in accordance with the terms and conditions of an ECA. Note that for ECAs issued or amended after January 31, 2017, the ministry will have regard to the following expectations:

- (i) if it has been five years (or more) since the last source test was conducted for the small wood-fired combustor at the time when it is reassessed, source testing may be required no later than six months after the issuance of an ECA pertaining to the reassessed combustor, or
- (ii) if the small wood-fired combustor has been modified in such a way that it no longer conforms to the existing ECA conditions and requires an amendment to the ECA (e.g., change induced draft fan size, flow or pressure ratings, change wood fuel type and associated feed system), source testing may be required no later than six months after the commissioning period of the modified combustor, or
- (iii) with respect to an application for an ECA with respect to an existing small wood-fired combustor that has been operating without an ECA, where one is required, source testing is expected to be performed no later than six months after the issuance of an ECA pertaining to the existing small wood-fired combustor.

It is expected that the concentration of particulate matter in the flue gas measured downstream of any air pollution control equipment during source testing be less than 90 mg/Rm<sup>3</sup> at 11% oxygen (dry basis) averaged over a period determined in accordance with the Ontario Source Testing Code.

It is expected that the concentration of carbon monoxide measured during source testing be less than 100 ppmv at 11% oxygen on a dry basis and reference conditions averaged over a one-hour period.

It is expected that the concentration of oxygen in the flue gas measured during source testing be at least six percent by volume on a dry basis and reference conditions averaged over a one-hour period.

A summary of the source testing expectations are provided in Appendix A.

## 7.0 PERFORMANCE MONITORING

### 7.1 Process Control Monitoring for Small Wood-Fired Combustors

#### New Small Wood-Fired Combustors

The Ministry expects that certain process control parameters will be monitored and recorded while a new small wood-fired combustor is operating. For the purposes of data recording, the process control monitors should measure and record for a minimum of two hours after a shutdown procedure has commenced.

The Ministry expects the following parameters to be measured continuously and that the measurements be block-averaged over every five minute period:

## Guideline for the Control of Air Emissions from Small Wood-Fired Combustors (<3 MW)

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1. The concentration of oxygen in the flue gas as measured by the oxygen lambda sensor (percent by volume on a wet basis)
2. An induced draft fan parameter (e.g., fan speed or percent of maximum)
3. A fuel input or energy output parameter (e.g., percent of nominal load to ensure that the small wood-fired combustor does not operate below the partial load heat input capacity – see Chapter 5.2)
4. The flue gas temperature.

The Ministry expects that each measurement be recorded and retained at the facility for at least 12 months from the date the measurement was taken.

### Reassessed and Existing Small Wood-Fired Combustors

The Ministry considers it a best practice for a reassessed or existing small wood-fired combustor to have process control monitoring as described above.

## 7.2 Flue Gas Monitoring for Small Wood-Fired Combustors

### New Small Wood-Fired Combustors

A new small wood-fired combustor is to be equipped with a monitor that continuously measures and records the concentration of carbon monoxide and oxygen in the flue gas. **Note that such monitoring is not expected if the new small wood-fired combustor is certified.**

In particular, it is expected that the following parameters be measured continuously and that the measurements be block-averaged over every five minute period:

1. The undiluted concentration of carbon monoxide, reported on a dry basis and corrected to 11 percent oxygen and reference conditions, in the flue gas.
2. The undiluted percentage of oxygen by volume, reported on a dry basis and reference conditions, in the flue gas.

For new uncertified small wood-fired combustors, it is recommended that the measurements of oxygen and carbon monoxide are conducted at the same location and that the carbon monoxide monitor be configured as a dual range application with automatic range change capabilities to accurately measure emissions during both start-up and shut down operations as well as normal operations.

The process control monitoring data is intended to assist in interpreting this flue gas emission monitoring data. As such, it is expected that the times and dates for each monitor and data recording system (for both flue gas and process control monitors) be synchronized to within one minute of each other.

The Ministry expects that each carbon monoxide and oxygen measurement be recorded and retained at the facility for at least 12 months from the date the measurement was taken.

Prior to installing a new uncertified small wood-fired combustor, it is strongly recommended that a person submit a plan for the installation, operation and maintenance of the above-noted continuous flue gas monitoring devices to the Manager of Technology Standards Section, Standards Development Branch at the Ministry.

### Reassessed and Existing Small Wood-Fired Combustors

The Ministry expects that a person responsible for a reassessed or existing small wood-fired combustor will comply with the terms and conditions of their ECA with regards to flue gas monitoring. Note that for ECAs issued or amended after January 31, 2017, the ministry will have regard to the expectation that a small wood-

fired combustor be equipped with a monitor that continuously measures and records the concentration of carbon monoxide, oxygen and temperature in the flue gas. The Ministry also expects that each carbon monoxide, oxygen and temperature measurement be recorded and retained at the facility for at least 12 months from the date the measurement was taken.

### **7.3 Routine Inspections or Remote Connection**

#### New and Reassessed Small Wood-Fired Combustors

To minimize the potential for operational malfunction of a small wood-fired combustor and associated air emissions, it is expected that new and reassessed small wood-fired combustors be (i) inspected regularly or (ii) equipped with a remote connection.

If the small wood-fired combustor is to be inspected regularly, it is expected that the routine physical inspections be performed at least once per week in accordance with recommendations of the manufacturer by a person who has received training for the purposes of conducting such inspections. The Ministry expects the results of each inspection to be recorded and maintenance activities to be performed as needed.

If a small wood-fired combustor is to be equipped with a remote connection, it is expected that the small wood-fired combustor be equipped with a 24-hour per day remote connection to either a designated facility staff member or service contractor. The remote connection should communicate error or fault alarms, messages and notifications from the facility in the event of a malfunction to enable a response in a timely manner to trouble-shoot and correct the malfunction by either attending to the combustor in person or engaging in two-way communication remotely with the combustor. The Ministry expects the results of each remote communication to be recorded and maintenance activities to be performed as needed.

#### Existing Small Wood-Fired Combustors

The Ministry considers it a best practice to adopt a routine inspection program or remote connection as described above for existing small wood-fired combustors.

## **8.0 PERFORMANCE ASSESSMENT**

#### New and Reassessed Small Wood-Fired Combustors

The Ministry expects that the person responsible for the small wood-fired combustor will ensure that a technician who is competent in heating, ventilation, and air conditioning (HVAC) technologies conducts a performance assessment at least once per year with respect to a new or reassessed small wood-fired combustor. The performance assessment is expected to include the following actions:

1. Inspection of the following items while the small wood-fired combustor is not operating,
  - i. fuel conveyance and handling equipment (e.g., is the wood fuel conveyance equipment visibly damaged?),
  - ii. indoor wood fuel storage area (e.g., is the indoor wood fuel storage area dry or is there evidence of water leaking in from the outdoors?),
  - iii. heat exchanger, air pollution control equipment, combustion air and flue gas ductwork (e.g., are the heat exchanger tubes free of corrosion and fly ash deposits, and is the ductwork free from leakage due to rust or holes?),
  - iv. fans and dampers (e.g., are any of the fans or dampers visibly damaged?),

## Guideline for the Control of Air Emissions from Small Wood-Fired Combustors (<3 MW)

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- v. continuous monitoring devices (e.g., is the oxygen lambda sensor installed correctly or has it been removed?),
  - vi. combustion chamber air injection nozzles, grates and refractory (e.g., is there surplus bottom ash on the grate that has not been removed in a timely manner?), and
  - vii. bottom ash and fly ash (e.g., does the bottom ash contain a significant amount of blackened fuel particles that still have a recognizable shape because they did not burn completely?).
2. While the small wood-fired combustor is operating at or between nominal and partial heat load, measure the carbon monoxide and oxygen emission levels in the flue gas of the small wood-fired combustor over at least a 30-minute period using a calibrated portable combustion gas analyser and record the levels of those parameters.
  3. Complete any necessary adjustments or repairs to ensure that the measurements obtained in accordance with paragraph 2 indicate the following concentrations:
    - i. the concentration of carbon monoxide averaged over the test period described in paragraph 2 is less than 100 parts per million by volume (ppmv) corrected to 11 percent oxygen, and
    - ii. the concentration of oxygen averaged over the test period described in paragraph 2 is at least 5.5 percent by volume.
  4. Determine if the small wood-fired combustor is performing well by reviewing:
    - i. the results of the measurements required by paragraph 2, subject to any necessary adjustments or repairs, and correlating those results with the results of the measurements obtained in accordance with Chapter 7.1 over the same period;
    - ii. the maintenance, inspection and calibration records for each piece of continuous monitoring equipment mentioned in Chapter 7.1.

If the determination described by paragraph 4 above indicates that the small wood-fired combustor is not performing well, the person responsible for the small wood-fired combustor must ensure that necessary adjustments or repairs are made in a manner that will ensure the small wood-fired combustor is operating in accordance with the manufacturer's recommendations and the requirements of any conditions of an ECA or other legally binding instrument.

For greater certainty, the actions described above do not replace any inspection or preventative maintenance program recommended by the manufacturer and such recommendations are expected to be implemented in addition to the actions described above. Also, the actions expected to be performed while the small wood-fired combustor is operating can be performed on a different day than the actions expected to be performed while the small wood-fired combustor is not operating, within the same year.

The person responsible for the small wood-fired combustor is expected to ensure that a record of the results of each performance assessment is created and retained for a five-year period after the record is completed. A record created is expected to include the date on which the performance assessment is performed, the observed conditions of the items to be inspected while the small wood-fired combustor is not operating, the measurements made while the small wood-fired combustor is operating, a summary of the determination made as to whether the small wood-fired combustor is performing well and a description of any adjustments or repairs made to correct the small wood-fired combustor so that it does perform well.

### Existing Small Wood-Fired Combustors

The Ministry considers it a best practice to perform performance assessments for existing small wood-fired combustors as described above.

### 9.0 DOCUMENTATION

This chapter sets out the information that is expected to be submitted in an ECA application and, with respect to a new small wood-fired combustor, documented prior to the installation of a new small wood-fired combustor. The following information on wood fuel parameters, combustor design and performance will assist the Director in assessing whether the small wood-fired combustor meets the expectations set out in this guideline (where applicable):

- a) A tabulated summary of the types and specifications of wood fuels that are proposed to be stored and intended to be used at the facility (see expectations set out in Chapter 4.1).
- b) A tabulated summary of the design, operating and performance monitoring aspects of the small wood-fired combustor and air pollution control equipment (see expectations set out in Chapters 5 and 7).
- c) A side-sectional schematic of the combustor including an illustration of the automated method of introduction of wood fuel into the furnace that meets the expectations set out in Chapter 4.2; the combustion zones (e.g., primary, secondary) and identification of points of introduction of combustion air and, where applicable, flue gas recirculation air (see expectations set out in Chapter 5).
- d) A copy of the original equipment manufacturers combustor design and operating documentation<sup>8</sup> that includes the following information (where available):
  - i) The make and model number and nominal load heat input and output capacity and other related design features such as the air pollution control equipment (e.g., cyclone).
  - ii) The partial load heat input and output capacity as a percent of the nominal load heat input and output capacity.
  - iii) The types of wood fuels capable of being used in the unit, including wood briquettes, pellets and/or chips with a provision for wood chip units that the maximum fuel moisture content is 50%.
  - iv) A description of the automated start-up and shutdown procedures.
  - v) A description of the combustion process control parameters outlined in Chapter 7.1, including the data acquisition system capabilities.
  - vi) Specifications for the oxygen lambda sensor.
  - vii) The design operating range for excess oxygen in the flue gas and how the oxygen trim system maintains the excess oxygen at the desired level.
  - viii) Recommendations for operator training, routine visual inspections, remote connections and monitoring, preventative maintenance plans, spare parts, trouble-shooting, operational adjustment either on-site or remotely and periodic combustor cleaning, maintenance and tune ups.
- e) A tabulated summary of the expected air emission performance of the small wood-fired combustor for both nominal load and partial load heat input and output operating conditions (see expectations set out in Chapters 5.2 and 5.3), that includes the following information:
  - i) Range of anticipated 1-hour block average oxygen concentrations (percent by volume, dry and wet basis) in the flue gas and typical set-point for each wood fuel proposed for use at the facility.
  - ii) Maximum anticipated 24-hour daily average carbon monoxide concentration (ppmv, dry basis at 11% oxygen and reference conditions) in the flue gas.
  - iii) Maximum anticipated flue gas concentration of particulate matter (mg/Rm<sup>3</sup> at 11% oxygen, dry basis) measured at a point after any air pollution control equipment.

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<sup>8</sup> If the manufacturer's documentation is not available, a copy of the tender documents used to procure a small wood-fired combustor may be submitted instead.

## Guideline for the Control of Air Emissions from Small Wood-Fired Combustors (<3 MW)

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- f) Air emission documentation that validates the above-noted maximum anticipated outlet concentrations of carbon monoxide and particulate matter for the small wood-fired combustor and air pollution control equipment that is to be included in the application for ECA. In particular:
- i) For a certified<sup>9</sup> small wood-fired combustor at least one of the following is considered acceptable if it identifies the emissions of dust (particulate matter) and demonstrates compliance with the requirements of EN 303-5 (2012) Class 5 for thermal efficiency and carbon monoxide as well as Class 3, 4 or 5 for dust at both nominal load and partial load heat input and output capacity operating conditions:
    - 1. the manufacturer's guaranteed emission limits,
    - 2. a copy of an independent testing agency's report.
  - ii) For an uncertified small wood-fired combustor, an air emission test report from an operating small wood-fired combustor in another jurisdiction that has been accepted by an environmental regulatory agency (e.g., an American State or Canadian Provincial regulator) is preferred over published emission factors. Emission data at nominal load heat input and output capacity is expected and emission data at partial load heat input and output capacity is also desired where available.
- g) Documentation summarizing the proposed continuous flue gas monitoring devices, installation location, operation and maintenance for uncertified small wood-fired combustors (see expectations set out in Chapter 7.3).

Refer to Table A-1 in Appendix A for a summary of the expectations for new and reassessed small wood-fired combustors. Table A-1 includes related notes to distinguish expectations based on certification status. Refer also to Table B-1 in Appendix B for an example of a format that would assist in providing the above-listed information.

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<sup>9</sup> This applies also to a wood combustor that is described in Chapter 3.0 "Applicability".



**APPENDIX A**

**Tabulated Summary of Guideline A-14 Expectations**

## Guideline for the Control of Air Emissions from Small Wood-Fired Combustors (<3 MW)

**Table A-1: Summary of Expectations for Small Wood-Fired Combustors**

A person responsible for a small wood-fired combustor that has an ECA must meet the requirements set out in the ECA. For existing small wood-fired combustors that have an ECA the items listed in Table A-1 under the column entitled “Reassessed” are considered best practices. Please refer to the notes below Table A-1 with regards to distinguishing expectations for certified new small wood-fired combustors.

Parameter		Guideline A-14 Expectations	
		New	Reassessed
<b>Wood Fuel</b>			
1.	Select wood fuel specifications	Yes	Yes
2.	Develop wood fuel management plan	Yes	Yes
3.	Automated start-up, shut down and feed system	Yes	Yes
<b>Design Parameters</b>			
4.	Nominal load heat input capacity	<3 MW	<3 MW
5.	Partial load heat input capacity (% of nominal load)	As provided by the manufacturer <sup>A</sup>	N/A
6.	Air Pollution Control Equipment	Yes <sup>E</sup>	N/A
7.	Multi-zone air control with oxygen trim system	Yes	N/A
8.	Maximum particulate matter in the flue gas, downstream of any air pollution control equipment <sup>D</sup>	< 75 mg/Rm <sup>3</sup>	< 90 mg/Rm <sup>3</sup> <sup>F</sup>
<b>Flue Gas Limits</b>			
9.	Minimum oxygen (1-hour block average)	> 6.0% dry basis <sup>B</sup>	> 6.0% dry basis
10.	Maximum carbon monoxide (daily average) <sup>D</sup>	< 400 ppmv	< 400 ppmv
11.	<b>Installation Test</b>	Yes	N/A
<b>Source Testing Objectives</b>			
12.	Particulate Matter – nominal load <sup>D</sup>	< 75 mg/Rm <sup>3</sup> <sup>C</sup>	< 90 mg/Rm <sup>3</sup>
13.	Particulate Matter – partial load <sup>D</sup>	< 75 mg/Rm <sup>3</sup> <sup>C</sup>	N/A
14.	Carbon Monoxide – nominal load (1-hour average) <sup>D</sup>	< 100 ppmv	< 100 ppmv
15.	Carbon Monoxide – partial load (1-hour average) <sup>D</sup>	< 200 ppmv	N/A
16.	Minimum oxygen (1-hour average)	> 6.0% dry basis	> 6.0% dry basis
<b>Performance Monitoring</b>			
17.	Oxygen lambda sensor (% by volume, wet basis)	Yes	Best Practice
18.	Induced draft fan parameter	Yes	Best Practice
19.	Fuel input or energy output (% of nominal load)	Yes	Best Practice
20.	Flue gas temperature	Yes	Yes
21.	Carbon monoxide (ppmv) <sup>D</sup>	Yes <sup>C</sup>	Yes
22.	Oxygen (% by volume, dry basis)	Yes <sup>C</sup>	Yes
23.	Retain performance monitoring data for at least 12 months (maximum 5-minute block averaging)	Yes	Yes
<b>Inspection and Maintenance</b>			
24.	Routine inspection log and/or remote connection	Yes	Yes
25.	Performance assessment	Yes	Yes

### Notes:

- <sup>A</sup> The partial load heat capacity for a new certified small wood-fired combustors is typically tested at **30%**.
- <sup>B</sup> The minimum excess oxygen (1-hour block average) for a new certified small wood-fired combustor may be **5.5% on a wet basis** as recorded by the oxygen lambda sensor.
- <sup>C</sup> Not applicable for a new certified small wood-fired combustor.
- <sup>D</sup> Corrected to 11% oxygen, dry basis, reference conditions.
- <sup>E</sup> Refer to Chapter 5.1 (f) for details of air pollution control equipment expectations, depending on the EN 303-5 (2012) Class 3, 4 or 5 rating for dust (particulate matter) and whether air pollution control equipment is required to meet the dust Class rating as specified by the manufacturer.
- <sup>F</sup> This limit for particulate matter is a flue gas limit for reassessed small wood-fired combustors, not a design parameter, but it is shown here for ease of comparison with new small wood-fired combustors.

**APPENDIX B**

**Tabulated Summary of Documentation Expectations**

**Table B-1: Summary of Documentation Expectations regarding Combustor Design and Performance**

1	<b>Make and Model Number of Small Wood-Fired Combustor:</b>	
2a	<b>Certified<sup>10</sup> to EN 303-5 (2012) Class 5 for Thermal Efficiency and Carbon Monoxide (Yes/No):</b>	
2b	<b>Certified to EN 303-5 (2012) Class 3, 4 or 5 for Dust (Yes/No, if Yes specify):</b>	
3a	<b>Identify whether Guideline A-13 or Guideline A-14 applies to the small wood-fired combustor:</b>	
3b	<b>If Guideline A-14 applies, identify whether the small wood-fired combustor is existing, reassessed or new:</b>	
4	Wood Fuel Type(s) (Pellet, Briquette and/or Wood Chip):	
5	Wood Fuel Specification(s):	
6	Equivalent days of indoor storage for wood chips at nominal load (heated or unheated):	
7	Maximum Wood Fuel Moisture Content for each intended fuel type:(% by weight, wet basis):	
8	Maximum Wood Fuel Ash content according to specification for each intended fuel type (% by weight, if applicable):	
9	Maximum fuel flow at nominal load operating condition for each intended fuel type (kg/hr):	
10	Maximum fuel flow at partial load operating condition for each intended fuel type (kg/hr):	
11	Nominal Load Heat Input and Output Capacity (kW):	
12	Partial Load Heat Input and Output Capacity (% of Nominal Load):	
13a	Testing report/documentation compliant to	

<sup>10</sup> This applies also to a wood combustor that is described in Chapter 3.0 “Applicability”.

## Guideline for the Control of Air Emissions from Small Wood-Fired Combustors (<3 MW)

	EN 303-5 (2012) Class 5 for Thermal Efficiency and Carbon Monoxide (Yes/No):	
13b	Testing report/documentation compliant to EN 303-5 (2012) Class 5 for Carbon Monoxide, equipped with an air-to-air heat exchanger (Yes/No):	
13c	Testing report/documentation compliant to EN 303-5 (2012) Class 3, 4 or 5 for Dust (Yes/No, if Yes specify):	
14	Includes multi-zone air control (Yes/No):	
15	Includes oxygen trim system? (Yes/No):	
16	Includes tertiary combustion air (Yes/No):	
17	Includes flue gas recirculation (Yes/No):	
18	Side-sectional schematic of combustor included (Yes/No):	
19a	Oxygen lambda sensor type and operating range (% by volume – wet):	
19b	Induced draft fan parameter and operating range:	
19c	Fuel input or energy output parameter and operating range:	
19d	Flue gas temperature measurement operating range:	
20	Maximum anticipated suspended particulate matter outlet concentration (mg/Rm <sup>3</sup> @ 11% O <sub>2</sub> -dry):	
21	Maximum anticipated carbon monoxide outlet concentration at nominal load, partial load and 24-hour daily average (ppm-v @ 11% O <sub>2</sub> -dry):	
22	Includes air pollution control equipment specified by combustor manufacturer (Yes/No) if yes please describe:	
23	Includes other air pollution control equipment as described in Chapter 5.1 (f) (Yes/No) if yes please describe:	

**Guideline for the Control of Air Emissions from Small Wood-Fired Combustors (<3 MW)**

24	Supporting documentation included for
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**Guideline for the Control of Air Emissions from Small Wood-Fired Combustors (<3 MW)**

	anticipated outlet concentrations of particulate matter and carbon monoxide (Yes/No):	
25	Includes testing port(s) for particulate matter and carbon monoxide emission testing (Yes/No):	
26	Supporting documentation included for flue gas emission monitoring devices (where applicable) (Yes/No):	

**Notes:**

- i) mg/Rm<sup>3</sup> @ 11% O<sub>2</sub>-dry means milligrams per reference cubic metre corrected to 11% by volume (dry basis) oxygen content in the flue gas;
- ii) ppm-v @ 11% O<sub>2</sub>-dry means ppmv corrected to 11% by volume (dry basis) oxygen content in the flue gas; and
- iii) reference conditions are 25 degrees Celsius and 101.3 kilopascals atmospheric pressure.



**APPENDIX C**

**Emission Conversions and Calculations**

**Table C-1: Conversion Between Imperial and Metric Systems**

<b>From</b>	<b>To</b>	<b>Multiply by</b>	<b>References</b>
Btu	J	1055.1	Perry's Chemical's Engineer Handbook (50 <sup>th</sup> Anniversary Edition, 1984) Table 1-6, pages 1-15 to 1-17.
Btu/hr	kJ/hr	1.0551	
Btu/hr	W	0.29307	
MM Btu/hr	MW	0.29307	
Pounds-mass	Kilograms	0.45359	

**Notes:**

- i) MM = 1 million in US customary units and Imperial British Units (e.g., 1 MM Btu = 1 million Btu).
- ii) M = 1 million in metric units (e.g., 1 MW = 1 megawatt or 1 million watts).
- iii) G = 1 billion in metric units (e.g., 1 GJ = 1 billion Joules).

**Table C-2: Emission Conversions**

- a. **Converting from parts per million by volume of a gaseous contaminant to milligrams per cubic metre at the same Conditions:**

$$\text{Emission Concentration (mg/m}^3\text{)} = 21.9 \times [\text{ppmv}] \times \frac{\text{MW}}{(1.8 \times T + 492)}$$

T is the temperature, in °C, of the flue gases that corresponds to the (ppmv) measurement  
MW= Molecular weight of contaminant

Note: In the above-noted formula, the converted emission concentration (mg/m<sup>3</sup>) is on the same dry or wet basis and at the same flue gas conditions (e.g., % oxygen and/or % carbon dioxide) as the measured concentration (ppmv).

- b. **Converting from parts per million by volume of a gaseous contaminant to pounds per cubic foot at the same Conditions:**

$$\text{Emission Concentration (pounds/ft}^3\text{)} = [\text{ppmv}] \times \frac{1.369 \times \text{MW}}{[1\text{E}6 \times (T+460)]}$$

T is the temperature, in °F, of the flue gases that corresponds to the (ppm-v) measurement  
MW= Molecular weight of contaminant

Note: In the above-noted formula, the converted emission concentration (pounds/ft<sup>3</sup>) is on the same dry or wet basis and at the same flue gas conditions (e.g., % oxygen and/or % carbon dioxide) as the measured concentration (ppmv).

- c. **Converting from pounds per standard cubic foot of a gaseous contaminant to milligrams per reference cubic metre at the same oxygen level and same wet/dry basis:**

$$\text{Emission Concentration (mg/Rm}^3\text{)} = [\text{pounds/Scf}] \times (35.315/2.2046) \times (1\text{E}6) \times (20+273)/(25+273)$$

$$\text{Therefore, Emission Concentration (mg/Rm}^3\text{)} = [\text{pounds/Scf}] \times (1.575\text{E}7)$$

Notes:

- i) Standard conditions (with respect to "standard ft<sup>3</sup>" or Scf) are at 68 °F or 20 °C and reference conditions (with respect to Rm<sup>3</sup>) are at 25 °C.
- ii) In the above-noted formula, the converted emission concentration (mg/Rm<sup>3</sup>) is on the same dry or wet basis and at the same flue gas conditions (e.g., % oxygen and/or % carbon dioxide) as the measured concentration (pounds/Scf).

d. Converting a measured concentration from one level of volumetric percentage of oxygen-dry in flue gas to a different volumetric percentage of oxygen in flue gas:

$$\text{Emission Concentration}_B = [\text{Original Concentration}]_A \times \frac{(20.9 - \%O_{2B})}{(20.9 - \%O_{2A})}$$

$\%O_{2B}$  = percent, by volume-dry, oxygen at the new concentration

$\%O_{2A}$  = percent, by volume-dry, oxygen at the original concentration

Example: converting 80 ppmv (dry) at 3% oxygen-dry to a concentration at 11% oxygen-dry:

$$\text{Emission concentration at 11\% oxygen} = (80 \text{ ppmv-dry}) \times [(20.9-11)/(20.9-3)] = \underline{44 \text{ ppmv-dry}}$$

e. Converting a measured concentration from one level of volumetric percentage of carbon dioxide-dry in flue gas to a different volumetric percentage of carbon dioxide in flue gas:

$$\text{Emission Concentration}_B = [\text{Original Concentration}]_A \times \frac{(\%CO_{2B})}{(\%CO_{2A})}$$

$\%CO_{2B}$  = percent, by volume-dry, carbon dioxide at the new concentration

$\%CO_{2A}$  = percent, by volume-dry, carbon dioxide at the original concentration

Example: converting 100 ppmv-dry at 10% by volume-dry carbon dioxide to a concentration at 12% carbon dioxide:

$$\text{Emission concentration at 12\% carbon dioxide} = (100 \text{ ppmv-dry}) \times [(12)/(10)] = \underline{120 \text{ ppmv-dry}}$$

f. Converting a measured concentration (in mg/m<sup>3</sup>) from one flue gas temperature to another:

$$\text{Emission Concentration}_B = [\text{Original Concentration}]_A \times \frac{(T_A+273)}{(T_B+273)}$$

$T_B$  = Temperature, in °C, at the new concentration

$T_A$  = Temperature, in °C, at the original concentration

Example: converting 10 mg/m<sup>3</sup> at 0 °C to a concentration at 25 °C

$$\text{Emission Concentration at 25 °C} = (10 \text{ mg/m}^3) \times [(0+273)/(25+273)] = \underline{9.2 \text{ mg/m}^3}$$

Note: There is no need for a temperature correction for a concentration in ppmv because both the numerator and denominator are volume-based.

**g. Converting from pounds per million Btu (a common emission factor metric used in the United States) to milligrams per reference cubic metre**

When measurements of contaminant concentration ( $F_d$ ) and oxygen ( $\%O_{2d}$ ) are both on a dry basis, then the following conversion formula can be used:

**Note:** This involves the following two step conversion process:

- i) First, converting from pounds per million Btu to pounds per standard cubic foot where standard conditions are defined as 68 °F (ie., 20 °C) and 760 mm Hg (ie., 101.3 kPa); and
- ii) Second converting pounds per standard cubic foot to milligrams per Reference cubic metre where, for the purposes of this document, reference temperature and pressure are defined as 25 °C and 101.3 kPa.

**Step 1: Convert pounds per million Btu to pounds per standard cubic foot:**

$$C_d = [\text{Emission Factor in pounds per million Btu}] \times \frac{(20.9 - \%O_{2d})}{(20.9 \times F_d)}$$

- $C_d$ : contaminant concentration, dry basis, pounds per standard cubic foot
- $\%O_{2d}$ : percent by volume oxygen, dry basis, that corresponds to the contaminant concentration,  $C_d$
- $F_d$ : Fuel factor (volumes of combustion components per unit heat content)

$$F_d = \frac{[1E6] \times [3.64x(\%H) + 1.53x(\%C) + 0.57x(\%S) + 0.14x(\%N) - 0.46x(\%O)]}{HHV}$$

- $\%H$ : percent by weight hydrogen (as-fired, from ultimate analysis of fuel)
- $\%C$ : percent by weight carbon (as fired, from ultimate analysis of fuel)
- $\%S$ : percent by weight sulphur (as fired, from ultimate analysis of fuel)
- $\%N$ : percent by weight nitrogen (as fired, from ultimate analysis of fuel)
- $\%O$ : percent by weight oxygen (as fired, from ultimate analysis of fuel)
- HHV: Higher heating value of fuel, as fired, Btu/lb

**Step 2: Convert pounds per standard cubic foot to milligrams per reference cubic metre**

$$C_d \text{ in mg/Rm}^3 = [C_d \text{ in lb/Scf}] \times (35.315/2.2046) \times (1E6) \times (273+20)/(273+25)$$

$$C_d \text{ in mg/Rm}^3 = [C_d \text{ in lb/Scf}] \times (1.575E7)$$

Where, standard conditions (with respect to Scf) are at 68 °F or 20 °C and reference conditions (with respect to Rm<sup>3</sup>) are at 25 °C.

**Table C-3: Summary Table of Typical Fuel Factors (F<sub>d</sub>):**

Fuel Type	F <sub>d</sub> (dry standard cubic foot/million Btu heat input)
Coal:	
Anthracite:	10,100
Bituminous:	9,780
Lignite:	9,860
Oil:	9,190
Gas (natural gas, propane, butane):	8,710
Wood:	9,240
Wood Bark:	9,600
Municipal Solid Waste:	9,570

Note: The above fuel factors (F<sub>d</sub>) are determined at standard conditions:  
**20 °C (68 °F) and 101.3 kPa (760 mm Hg)**

**Reference for Fuel Factor Conversion Information and Typical Fuel Factors:**

- US EPA, Method 19 – Determination of Sulphur Dioxide Removal Efficiency and Particulate Matter, Sulfur Dioxide and Nitrogen Oxide Emission Rates
- See <http://www.epa.gov/ttn/emc/methods/method19.html>

**Appendix D**

**Information Pertaining to Environmental Compliance Approvals Process**

## Guideline for the Control of Air Emissions from Small Wood-Fired Combustors (<3 MW)

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The websites listed below may contain information that may assist proponents to develop a small wood-fired combustor project in Ontario.

Environmental Compliance Approval in Ontario

<https://www.ontario.ca/page/environmental-compliance-approval>

[Guide to applying for Environmental Compliance Approval](#)

<https://www.ontario.ca/document/guide-applying-environmental-compliance-approval>

Checklist of technical requirements for completing an Environmental Compliance Approval submission

<https://www.ontario.ca/document/checklist-technical-requirements-complete-environmental-compliance-approval-submission>

Guideline A-10: Procedure for preparing an Emission Summary and Dispersion Modelling (ESDM) report

<https://www.ontario.ca/document/guideline-10-procedure-preparing-emission-summary-and-dispersion-modelling-esdm-report>

[Guideline A-11: Air dispersion modelling guideline for Ontario](#)

<https://www.ontario.ca/document/guideline-11-air-dispersion-modelling-guideline-ontario>

Acoustic Assessment Report checklist

<https://www.ontario.ca/document/acoustic-assessment-report-checklist>



**APPENDIX E**  
**Additional Technical Information**

## Guideline for the Control of Air Emissions from Small Wood-Fired Combustors (<3 MW)

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During the development of this guideline, a significant amount of technical information was reviewed that was not used to develop regulatory instruments but may improve project performance if considered before purchasing a small wood-fired combustor. The additional technical information is summarized below for information purposes and may assist a person considering the use of a small wood-fired combustor. The rationale document prepared to accompany this guideline also contains a significant amount of technical and jurisdictional information that may be informative.

1. Reference documents such as “Biomass Heating Project Analysis Chapter” (RetSCREEN®), “Biomass Heating” (CIBSE AM15:2014), “Emission Controls for Small Wood-Fired Boilers” (RSG Inc./BERC, May 2010) and “Particulate Matter Emissions-Control Options for Wood Boiler Systems” (BERC, 2011) are freely accessible on the internet.
2. Where available, wood fuel with independent, third-party certification is preferred. Retaining documentation from a wood fuel supplier demonstrating compliance with a fuel standard is one approach to complying with this guideline.
3. A project proponent should assess the availability of wood fuel and associated quantity and quality guarantees in their area. For example, having more than one wood fuel supplier within 100 km of a project site would be considered prudent if a facility does not produce its own wood fuel.
4. For facilities seeking to use wood chips as a fuel, it is recommended that an on-site testing capability be developed to measure the moisture content of the wood chips on a periodic basis. The purpose of developing this capability is based on the fact that wood fuel moisture can be lost during sample storage and transit before analysis at an off-site laboratory and the moisture content no longer represents the “as fired” reported basis. The most widely used approach in Europe consists of using an aluminum foil pan, small oven and scale. Retaining documentation of periodic on-site wood fuel moisture tests is one approach to complying with this guideline. Refer to Figure E1 below for a description of a procedure used to measure the moisture content of wood fuel prepared by FPIInnovation.
5. Wood chips that have been dried or “seasoned” to a moisture content of 25 to 35 percent typically have better combustion properties as compared with wet or “green” wood chips at 50 percent moisture content.
6. A small wood-fired combustor designed to burn 50 percent moisture content wood chips may be able to burn lower moisture content wood chips with high efficiency but a combustor designed to burn 35 percent moisture content wood chips may encounter operational difficulties if 50 percent moisture content wood chips are used as a fuel.
7. A combustor designed with automated continuous de-ashing is preferred, as compared with automated batch de-ashing designs, as they don’t require the combustor to temporarily cease operating to open the grate(s) to discharge the bottom ash. The automated batch de-ashing designs may emit increased levels of carbon monoxide when the grate(s) are open.
8. To accommodate the installation of appropriate emission testing port(s) the minimum exhaust stack inner diameter should be no less than 0.15 m and a minimum diameter of 0.20 m is preferred. The Ontario Source Testing Code (June 2010, as amended) contains information pertaining to the design configuration of emission testing ports as a component of an exhaust stack.
9. When performing a site acceptance test or tune-up, using a portable hand held combustion gas analyzer that has been designed for solid fuel burning devices is important due to the presence of particulate matter. An example of this type of analyzer is the Testo 380 that has been designed specifically to accommodate particulate matter in the flue gas.
10. Air emissions from small wood-fired combustors can increase at partial load operation and during start-up and shut down conditions. As such, it is desirable to maintain steady state operation at or near the nominal load heat input capacity as much of the time as possible. To achieve this objective, the heating system design of a facility should be considered beyond just the small wood-fired combustor. A heating system

design should include a description of how the integrated heating system components at the facility are designed to operate to meet the peak heat load as well as non-peak heat loads. This could be achieved by dividing the peak heat load into two small wood-fired combustors and/or using other devices that operate in conjunction with the small wood-fired combustor(s), such as a thermal storage tank, an auxiliary heating system and/or a peaking heating system. The description should include the estimated peak heat load served by the small wood-fired combustor(s) and the estimated monthly design heat loads to demonstrate how the small wood-fired combustor(s) is/are anticipated to modulate between nominal and partial loads or otherwise be shut down when the thermal storage tank is full or when the auxiliary heating system is operating.

11. Certified<sup>11</sup> small wood-fired combustors are tested at partial load, which typically represents 30% of the nominal load according to EN 303-5 (2012). This emission data is informative because small wood-fired combustors used for comfort heating in a building will typically experience variable heat load demand and should be able to modulate the heat input capacity between nominal and partial load without creating significant increases in air emissions.

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<sup>11</sup> This applies also to a wood combustor that is described in Chapter 3.0 “Applicability”.

## Analyzing the Moisture Content of Biomass Samples

**Objective:** to find the moisture content percentage  $mc$  (%) (% by weight, wet basis) of a biomass sample.

**Work space:** This procedure should be performed in laboratory conditions.

### Materials and equipment:

- ❑ Digital scale with a capacity of at least 2000 g and accuracy of 0.1g (from \$350)
- ❑ Forced air convection oven (from \$700)
- ❑ Clean sample weighing tray, able to hold at least 300 g of biomass
- ❑ 6 L (>1 kg) of biomass sample (3 replicates of at least 300 g each)

### Procedures:

#### Step 1

Follow the procedures for *Separating Biomass Samples* to separate 3 replicates of at least 300 g each from one sample of at least 1 kg of biomass.



#### Step 2

Weigh the empty sample tray and record its weight (*tare*)  $m_t$ .



#### Step 3

Load the material of a replicate into a weighing tray. Weigh the loaded tray and record the weight  $m_{wet}$ .



#### Step 4

Load the tray into the oven and set to 105°C. Keep the tray in the oven until constant mass is obtained<sup>1</sup>.

#### Step 5

Weigh the loaded tray and record the weight of the dry material  $m_{dry}$ .

#### Step 6

Calculate moisture content  $mc$  (%) according to the following formula:  
 $mc (\%) = [(m_{wet} - m_{dry}) / (m_{wet} - m_t)] \times 100$

#### Step 7

Analyze the 3 replicates and report the average.

<sup>1</sup> Mass constancy is obtained when the mass lost between two weights taken 60 minutes apart is not exceeding 0.2% of the total lost in mass (EN-TS 14774-1:2009). The drying time will depend on the particle size and the thickness of the sample in the tray, and may vary between 5 and 24 hours (overnight).

## **APPENDIX F**

### **Summary of Wood Fuel Specifications and NRCan Bulletins**

## WOOD PELLETS

### **STANDARDS**

#### **CAN/CSA-ISO 17225-2:15, as amended**

Solid biofuels – Fuel Specifications and classes – Part 2: Graded wood pellets – standard must be purchased.

This standard is a voluntary National Standard of Canada that is produced by the CSA Group. The standard was adopted without modification from the International Organization for Standardization's Standard 17225-2:2014, first edition 2014-05-01. It is intended to be used in conjunction with CAN/CSA-ISO 17225-1:15 (as amended), Solid biofuels - Fuel specifications and classes – Part 1: General requirements (adopted from ISO 17225-1:2014).

Accessed through the CSA Group's website: <http://shop.csa.ca/en/canada/fuel-burning-equipment/canca-iso-17225-215/inv/27038012015> (accessed November 2015).

#### **United States Pellet Fuels Institute (PFI) Standards Program**

PFI is a non-profit North American trade association that represents the densified biomass fuel industry. The PFI Standards Program is available for voluntary use in Canada. It is a third party accredited program that provides specifications for residential and commercial-grade fuel.

Documents that outline the PFI Standards Program can be accessed through the PFI website: <http://www.pelletheat.org/> (accessed November 2015)

### **CERTIFICATION SYSTEMS**

The Wood Pellet Association of Canada (WPAC) is the Canadian Licensor for the ENplus wood pellet certification system. The CANplus wood pellet trademark is owned by WPAC and was launched in 2013. The CANplus system is to certify wood pellets developed in Canada. Third party certification is recognized in Canada, the United States and Europe.

Details of each certification system are summarized in handbooks which can be accessed through WPAC's website: <http://www.pellet.org> (accessed November 2015).

## WOOD CHIPS

### **STANDARDS**

#### **CAN/CSA-ISO 17225-4:15, as amended**

Solid biofuels - Fuel specifications and classes - Part 4: Graded wood chips – standard must be purchased.

This standard is a voluntary National Standard of Canada that is produced by the CSA Group. It is an adoption without modification of the identically titled International Organization for Standardization's Standard 17225-4, first edition, 2014-05-01. It is intended to be used in conjunction with CAN/CSA-ISO 17225-1:15 (as amended), Solid biofuels - Fuel specifications and classes – Part 1: General requirements (adopted from ISO 17225-1:2014).

Accessed through the CSA Group's website: <http://shop.csa.ca/en/canada/fuel-burning-equipment/canca-iso-17225-415/inv/27038032015> (accessed November 2015).

## WOOD BRIQUETTES

### **STANDARD**

#### **CAN/CSA-ISO 17225-3:15, as amended**

Solid biofuels - Fuel specifications and classes - Part 3: Graded wood briquettes – standard must be purchased.

This standard is a voluntary National Standard of Canada that is produced by the CSA Group. It is an adoption without modification of the identically titled International Organization for Standardization's Standard 17225-4, first edition, 2014-05-01. It is intended to be used in conjunction with CAN/CSA-ISO 17225-1:15 (as amended), Solid biofuels - Fuel specifications and classes – Part 1: General requirements (adopted from ISO 17225-1:2014). Requires payment.

Accessed through the CSA Group's website: <http://shop.csa.ca/en/canada/fuel-burning-equipment/canca-iso-17225-315/invt/27038022015> (accessed November 2015).

### **NATURAL RESOURCES CANADA SOLID BIOFUELS BULLETINS**

The NRCan bulletins for wood pellets, wood chips and wood briquettes are included in the following pages of this appendix, and all seven bulletins are available through the NRCan website:

<https://www.nrcan.gc.ca/energy/renewable-electricity/bioenergy-systems/19069> (accessed October 2016)



## Solid Biofuels Bulletin No. 4

# GRADED WOOD PELLETS



This bulletin, fourth in a series of bulletins, introduces the different grades of wood pellets, their appropriate use and the important parameters that can affect the fuel characteristics. It provides information on the graded wood pellets as specified in the CAN/CSA-ISO 17225 Part 2: Graded wood pellets.

Wood pellets are a highly consistent biomass fuel allowing for easy handling and storage, as well as efficient energy conversion.

As a globally traded commodity, wood pellets are used for space heating in residential appliances, boilers, district heating plants and for electricity generation in large coal-burning power plants.

Wood pellets are small densified cylindrical granules produced by compression of sawdust. As a result, wood pellets are a consistent fuel that can easily be transported and suited to automated fuel handling systems.

## Origins and Sources

Wood pellets are mainly produced from the by-products of traditional forest operations such as sawmills and finished wood products manufacturing. Harvest residues are also used as raw material though to a much lesser extent. The highest quality sources tend to come from mill and manufacturing residues with little or no bark or ash content.

The CAN/CSA-ISO 17225 Part 2 Standard<sup>1</sup> classifies several grades of wood pellets based on the origins and source of raw materials. Raw biomass used in the production of high grade wood pellets, Grades A1 and A2 (residential or commercial applications), primarily comes from mill residues including sawdust, shavings and cut-offs (classification 1.2.1) and stem wood (classification 1.1.3). In addition to the above sources, Grade A2 allows for the use of logging residues (classification 1.1.4) and whole trees without roots (classification 1.1.1)<sup>2</sup>.

Sources of the raw biomass impacts fuel specifications. For example, A1 grade wood pellets contain low ash and nitrogen contents, while Grade A2 wood pellets have slightly higher ash and nitrogen content.

Grade B wood pellets are manufactured from more diverse sources, over and above those used for Grade A wood pellets, and can include bark (classification 1.1.6), residues from thinning, pruning, and arboriculture operations in city parks (classification 1.1.7), and chemically untreated used wood (classification 1.3.1).

Wood Pellets





The CAN/CSA-ISO 17225 Part 2 Standard also specifies Industrial Grade (I1, I2, I3) wood pellets based on origins, sources and properties, but these are outside the scope for this bulletin.

Both softwood and hardwood tree species can be sourced for wood pellets. It is anticipated that purposely grown woody crops such as poplar and willow grown on marginally productive land may be sourced for wood pellet production in the future. For further details on the origins and sources, refer to Natural Resources Canada Solid Biofuels Bulletin No.2 – Primer for Solid Biofuels<sup>2</sup>.

## Key Properties

The production of pellets starts with size reduction (if necessary) of the raw biomass source followed by drying. The material is then extruded under high pressure in pellet machines coming out as small cylinders typically with a 6 or 8 mm diameter, and a length of up to 40 mm. Small amounts of additives and binders can be blended with biomass material to improve the quality of wood pellets, but this is not common in Canada.

A buyer or user of graded wood pellets should consider several quality characteristics:

- **Diameter and Length (D and L)** – tested in the lab or production site. Two alternative diameters are produced: 6 mm and 8 mm ( $\pm 1$  mm). The length of the individual wood pellets should be larger than 3.15 mm, and less than or equal to 40 mm ( $3.15 < L \leq 40$  mm) with the maximum length not exceeding 45mm. The quantity of pellets longer than 40 mm can be 1% in weight. The quantity of pellets shorter than 10 mm (weight %) is stated by the producer.
- **Durability (DU) and Fines (F)** – determined in the lab by tumbling and screening the pellets. After tumbling, the quantity of pellets (in weight %) staying on the screening with the screen opening size greater than 3.15 mm determines the durability. The quantity of pellets passing through the screen with less than 3.15 mm opening size is defined as fines. Pellets handled in large quantities (bulk) experience some attrition, resulting in higher content of fines.
- **Bulk Density (BD)** – tested in the lab to provide guidance for sizing the storage space based on energy consumption needs. Minimum bulk density should be greater than or equal to 600 kg/m<sup>3</sup>. The actual bulk density of the pellets is often stated by the producer on the packaging. Rough estimates of bulk density can be made by weighing a known volume. When testing density, attempts should be made to minimize the void space between pellets by shaking and tapping pellets well.
- **Calorific value (Q) and Moisture Content (M)** – measured by lab testing. All grades of wood pellets must have moisture content less than 10% and a high calorific value greater than or equal to 18.6 MJ/kg (or low heating value of greater than or equal to 16.5 MJ/kg).
- **Ash Content (A)** – tested in the lab. For residential and commercial applications, ash content is low and increases from Grade A1 to A2 to B (Table 1). For residential stoves, furnaces and boilers, it is recommended to use wood pellets with low ash content.

**TABLE 1.** Key specifications of graded wood pellets based on the CAN/CSA-ISO 17225 Part 2 Standard

Property Class	Unit	Grade A1*	Grade A2*	Grade B*
Diameter, D	mm	6 ± 1 or 8 ± 1	6 ± 1 or 8 ± 1	6 ± 1 or 8 ± 1
Length**, L	mm	3.15 ≤ L ≤ 40	3.15 ≤ L ≤ 40	3.15 ≤ L ≤ 40
Moisture, M	% of weight	≤ 10	≤ 10	≤ 10
Ash, A	% of weight	≤ 0.7	≤ 1.2	≤ 2.0
Durability, DU	% of weight	≥ 97.5	≥ 97.5	≥ 96.5
Fines Content, F	% of weight	≤ 1	≤ 1	≤ 1
High Calorific Value, Q	MJ/kg	≥ 18.6	≥ 18.6	≥ 18.6
Bulk Density, BD	kg/m <sup>3</sup>	600 ≤ BD ≤ 750	600 ≤ BD ≤ 750	600 ≤ BD ≤ 750

\* Suitable for residential and commercial applications.

\*\*Maximum length of wood pellets shall be ≤ 45 mm. Amount of pellets longer than 40 mm can be 5% weight.

Further restrictions may be stipulated by the supplier of the combustion equipment regarding ash characteristics of the pellets, such as ash melting temperature, to minimize damage to equipment.

## Specifications of Properties for Graded Wood Pellets

Graded wood pellets conform to specific feedstock sources as well as the quality requirements as stipulated in the CAN/CSA-ISO 17225 Part 2 Standard. Table 1 shows various properties and specific for Graded wood pellets as detailed in the CAN/CSA-ISO 17225 Part 2: Graded wood pellets. A family of CAN/CSA-ISO testing standards is available to confirm compliance of the wood pellets with the grade, see Bulletin No.7 – CAN/CSA-ISO Solid Biofuels Standards<sup>2</sup>.

## Certification of Wood Pellets

The European certification ENplus<sup>3</sup> for wood pellets was adopted in Canada in 2013 under the acronym CANplus<sup>4</sup>. The ENplus and CANplus seals account for the whole wood pellet supply chain, from production to delivery to the final customer, to ensure high quality. Both ENplus and CANplus schemes define wood pellet quality classes following the ISO 17225 Part 2 Standard: A1, A2 and B. Examples of the two certification system logos are shown below:



Pellet Fuel Institute (PFI) in the USA has also developed standard specifications for residential and commercial grade wood pellets<sup>5</sup>. The PFI wood pellet standard forms the basis of a third party accredited certification program. The certification under ENplus and CANplus are currently voluntary in Europe and Canada, while the PFI certification is mandatory in the USA.

## Safe Handling and Storage of Wood Pellets

Wood pellets require closed storage, such as silos or storage tanks to keep them dry. During storage, chemical, physical and biological processes can take place including water absorption, off-gassing, oxygen depletion and self heating. Off-gassing can lead to production of toxic gases including carbon monoxide (CO) which is a poisonous,

odorless, tasteless and non-irritating gas. As a result, bulk storage spaces need to be well ventilated with exhaust away from areas where people are present. As additional safety measure, CO detectors should be installed in and around the storage area. Personal protective equipment should be worn if entry into large storage areas is necessary.

Temperature measurements in large storage piles are recommended to monitor heat build up.

Dust can be generated while handling wood pellets. In large volumes dust may cause respiratory problems if inhaled, and constitutes a risk for fires and explosions. An extensive Safety Data Sheet (SDS) is available for wood pellets in bags and there is a separate SDS for wood pellets in bulk. SDS documents contain information on the potential hazards (health, fire reactivity and environmental) and how to work safely with wood pellets.

Standards and guidelines for safe handling and storage of wood pellets of all scales are currently under development by ISO/Technical Committee 238<sup>6</sup>.

## References & Links

1. CSA Group - [www.csagroup.org](http://www.csagroup.org) for the CAN/CSA-ISO 17225 Solid Biofuels-Fuel specifications and classes – Part 1 General Requirements and Part 2 Graded wood pellets.
2. Natural Resources Canada – [www.nrcan.gc.ca](http://www.nrcan.gc.ca) for the Solid Biofuels Bulletins Series.
3. European Pellet Council <http://www.pelletcouncil.eu>
4. Wood Pellet Association of Canada <http://www.pellet.org>
5. Pellet Fuels Institute <http://www.pelletheat.org>
6. ISO Technical Committee 238 Solid Biofuels [http://www.iso.org/iso/iso\\_technical\\_committee%3Fcommid%3D554401](http://www.iso.org/iso/iso_technical_committee%3Fcommid%3D554401)

## Acknowledgement

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## Solid Biofuels Bulletin No. 5

# GRADED WOOD BRIQUETTES



This bulletin, fifth in a series of bulletins, introduces different grades of wood briquettes, their appropriate use and the important parameters that can affect the fuel characteristics. The information on the graded wood briquettes is based on the CAN/CSA-ISO 17225 Part 3: Graded wood briquettes.

Wood briquettes for heat generation have been used in residential space heaters, boilers and in district heating for several decades.

Wood briquettes come in a variety of dimensions depending on the manufacturer. In general, they can be found in two sizes: larger, such as bricks or logs, and smaller, such as pucks (which fit in your hand) or cubes. As a densified fuel product, briquettes are a consistent solid biomass fuel similar to wood pellets. In comparison to wood pellets, briquettes are less dense, constituent

particles are larger and typically require less drying leading to less power consumption in manufacturing and hence lower cost.

## Origins and Sources

CAN/CSA-ISO 17225 Part 3 Standard<sup>1</sup> classifies three grades of wood briquettes based on origins and sources: Grades A1 and A2 are intended for heating of residential and commercial buildings; Grade B briquettes are for larger-scale combustors, such as district heating and electricity production.

Raw biomass used to produce Grade A2 briquettes include sources used for Grade A1 and residues left behind from logging operations (tree tops, branches and low grade small dimension logs—classification 1.1.4) and whole trees without roots (classification 1.1.1)<sup>2</sup>. Raw biomass used to produce Grade A2 briquettes include sources used for Grade A1 and residues left behind from logging operations (such as tree tops and branches and low-grade small dimension logs—classification 1.1.4) and whole trees without roots (classification 1.1.1)<sup>2</sup>. Grade A1 briquettes contain low ash and nitrogen levels, while Grade A2 have slightly higher ash and nitrogen content.

Grade B further expands the briquette source material<sup>2</sup> to include residues from tree thinnings, prunings and arboriculture operations in city parks (classification 1.1.7), bark (classification 1.1.6), and chemically untreated used wood (classification 1.3.1). Grade B also includes chemically treated wood by-products (classification 1.2.2), as long as they do not contain heavy metals or halogenated organic compounds from treatment with wood

### Various shapes and sizes of wood briquettes



**TABLE 1.** Key specification of graded wood briquettes based on the CAN/CSA-ISO 17225 Part 3 Standard

Property Class	Unit	Grade A1	Grade A2	Grade B
Moisture, M	% of weight	≤ 12	≤ 15	≤ 15
High Calorific Value, Q	MJ/kg as received	≥ 17.5	≥ 17.3	≥ 16.8
Ash, A	% of weight	≤ 1.0	≤ 1.5	≤ 3.0
Particle Density, DE	g/cm <sup>3</sup> as received	≥ 1.0	≥ 0.9	≥ 0.9

preservatives or coatings. Sources are expected to be free of contaminants such as stones, glass, metal, sand, plastics and rubber.

Both softwood and hardwood species can be sourced for wood briquettes. It is anticipated that purposely grown woody crops, such as poplar and willow, grown on marginally productive land will be sourced for wood briquettes production in the future. For further details on the origins and sources, refer to Natural Resources Canada Solid Biofuels No.2 – Primer for Solid Biofuels<sup>2</sup>.

## Key Properties

The production of briquettes starts with size reduction of the raw feedstock and drying. Next, the material is compressed or extruded under high pressure in briquette machines before coming out in a variety of shapes and sizes as logs, bricks, cylinders, nuts or pucks. In Canada, additives and binders blended with biomass material to improve the quality of wood briquettes are not common.

Wood briquettes are distributed and transported in large plastic bags or stacked on pallets with plastic wrapping or cardboard packaging for distribution by truck or by shipping containers.

Wood briquettes, like wood pellets, are a highly consistent biomass fuel type which allows easy handling and storage, as well as efficient energy conversion.

A buyer of/user of wood briquettes should consider several quality characteristics, the most important of which are as follows (see Table 1):

- **Moisture content (M) and calorific value (Q)** – measured by lab testing.

- **Ash content (A)** – any restrictions regarding ash content and ash melting temperature as stipulated by the supplier of the combustion equipment need to be considered to minimize combustion equipment operational issues (clinker/slugging).
- **Particle density (DE)** – depending on the physical shape of the briquettes, particle density is used by some suppliers in lieu of bulk density to assist in estimating storage volume required.
- **Physical size of the briquettes** – recommended by the equipment supplier to avoid clogging the hoppers and augers that are used to feed the briquettes in automated systems.

## Specifications of Properties for Graded Wood Briquettes

The term “graded” means that the feedstock as well as the quality of the briquettes have to comply with certain requirements as stipulated in the CAN/CSA-ISO 17225-3 Standard<sup>1</sup>. Table 1 is an excerpt from the CAN/CSA-ISO 17225 Part 3: Graded wood briquettes. It provides standards for three graded property classes: A1, A2 and B. The source materials as well as the briquettes are tested for compliance in accordance with a family of CAN/CSA-ISO testing standards, see NRCan Solid Biofuels Bulletin No.3 – CAN/CSA-ISO Solid Biofuels Standards<sup>2</sup>.

For example, a label stating wood briquettes’ specific of M9.0, A2.5 and Q17.0 indicates that the wood briquettes contain ≤ 9% moisture, ≤ 2.5 ash with a minimum calorific value of 17 MJ/kg. Based on these fuel property values, this wood briquettes is classified as Grade B.

## Safe Handling and Storage of Wood Briquettes

Wood briquettes need to be kept dry during storage to maintain their mechanical integrity and fuel quality.

Bulk storage spaces should be well ventilated and away from areas where people are present.

Dust can be created during handling of large volumes of briquettes, which may cause respiratory problems if inhaled, and increase risk of fires and explosions. Wood briquettes piles may self-heat, and temperature measurements in large storage spaces are therefore recommended to monitor heat build up.

A Safety Data Sheet (SDS) for wood briquettes is available with information on the potential hazards (health, fire, reactivity and environmental) and how to work safely with wood briquettes.

## References & Links

1. CSA Group - [www.csagroup.org](http://www.csagroup.org) for CAN/CSA-ISO 17225 Solid Biofuels-Fuel specifications and classes – Part 1: General requirements, and, – Part 3: Graded wood briquettes.
2. Natural Resources Canada – [www.nrcan.gc.ca](http://www.nrcan.gc.ca) for the Solid Biofuels Bulletins Series.

## Acknowledgement

This bulletin was prepared in collaboration with Canadian Institute of Forestry, FPInnovations, Ontario Ministry of Natural Resources and Forestry, Pembina Institute, Wood Pellet Association of Canada, Wood Waste to Rural Heat.





## Solid Biofuels Bulletin No. 6

# GRADED WOOD CHIPS



This bulletin, sixth in a series of bulletins, introduces the different grades of wood chips, their appropriate use and the important parameters that can affect the fuel characteristics. It provides information on graded wood chips as specified in the CAN/CSA-ISO 17225 Solid Biofuels—Fuel specifications and classes—Part 4 Graded Wood Chips.

Wood chips have been widely used as fuel for space heating in buildings for several decades. As a locally available fuel with minimal processing, wood chips offer a less costly fuel option compared to wood briquettes or pellets.

Wood chips are typically produced by grinding or chipping operations followed by screening and air drying of the chips. Screening is necessary to produce the desired wood chip quality (particle size, ash and fines content).

## Origins and Sources

The major sources for wood chips are by-products and residues from wood processing operations in the forest

sector (slabs, bark or shavings). The highest quality wood chip sources tend to be from milling and manufacturing operations. According to the CAN/CSA-ISO 17225 Part 4 Standard<sup>1</sup>, classification is based on origins and sources and provides for four different grades of wood chips. Grade A (A1 and A2) are high quality wood chips that are sourced primarily from stem wood (classification 1.1.3) and by-products and residues from milling (classification 1.2.1) and logging operations (classification 1.1.4). A1 grade wood chips are dried and contain lower ash and no or little bark. A2 grade contains slightly higher ash and/or moisture content.

Sources for Grade B1 wood chips include materials from tree trimmings, prunings and arboriculture operations in city parks (classification 1.1.7).

In addition to the sources that are used for Grades A and B1, sources for Grade B2 wood chips include chemically treated by-products and residues from wood processing facilities (classification 1.2.2) and chemically untreated used wood (classification 1.3.1). B2 grade wood chips do not contain heavy metals or halogenated organic compounds from wood preservatives or coatings. For further details on classification by the origin and sources, refer to Natural Resources Canada Solid Biofuels Bulletin No.2 – Primer for Solid Biofuels<sup>2</sup>.

Hog fuel – coarse and varying in size wood chips



High grade wood chips  
(pulp chips)



Grade A classified wood chips are suitable for smaller bioenergy systems (assuming they meet the equipment's specifications) used in schools, public and commercial buildings. Larger bioenergy systems typical of industrial operations (such as sawmills, pulp mills, commercial greenhouses and large district energy systems) are able to use the lower quality Grade B1 and B2 wood chips.

## Key Properties

While a number of different parameters are important for small-scale bioenergy systems, the most critical properties to consider when buying and using wood chips are moisture content (M), particle size (P), and ash content (A) (Tables 1 and 2)<sup>2</sup>. Bark content, extraneous material (stones, sand, and dirt) and contamination (such as glass, metal, plastics) lead to an increase in ash content causing higher equipment maintenance costs. Particle size specifies both the acceptable size range for the diameter and length of wood chips and the minimum allowable amounts of acceptable sized material (main fraction in weight %). Each grade of wood chips also defines specific limits for the amounts of both undersize (fine fraction) and oversize materials (coarse fraction). Fines are defined as particles

less than 3.15 mm (less than 1/8 inch). Increased amount of fine and/or coarse fractions can have a significant impact on the fuel handling and operation (efficiency and emissions) of the bioenergy system.

It is highly recommended that the moisture, size and ash properties be tested on a regular basis to confirm contractual requirements for wood chips quality are met. This will also ensure that the biomass fuel is appropriate for efficient and economical operation of the heat or energy system.

It is possible to determine particle size using a sieve test. A hand-held moisture meter can be used to quickly measure moisture; however, an oven-dry analysis gives more accurate measurement and is preferred.

The standard test methods for determining moisture content and particle size distribution are provided in the CAN/CSA-ISO 18134-1 or -2 and CAN/CSA-ISO 17827-1, respectively. The detailed list of testing protocols is available in Natural Resources Canada Solid Biofuels No.3 – CAN/CSA-ISO Standards for Solid Biofuels.

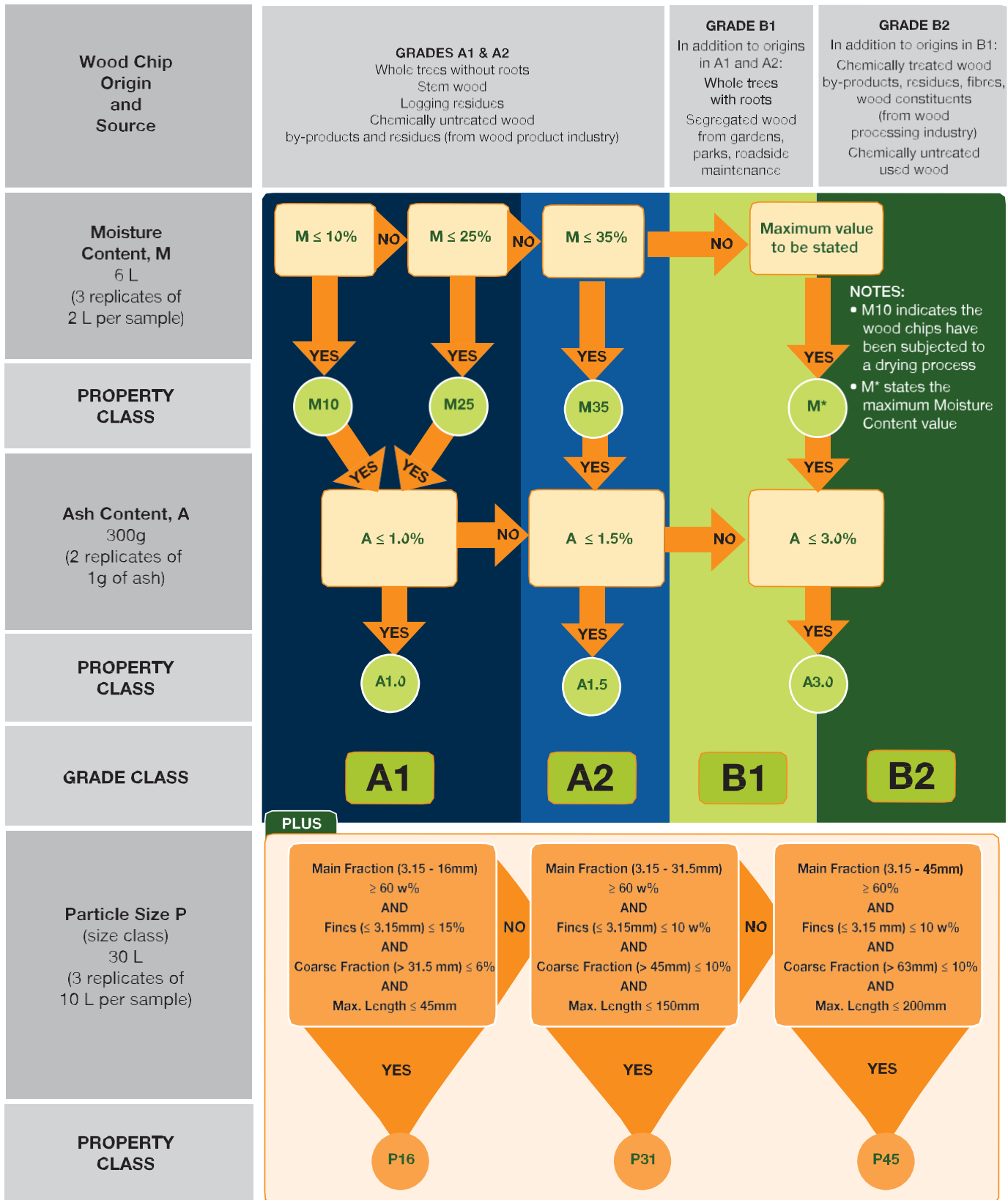
**Table 1.** Key specifications of properties for graded wood chips based on CAN/CSA-ISO 17225 Part 4

Property Class	Unit	Grade A1	Grade A2	Grade B1	Grade B2
Moisture (M)	weight %	M10 ≤10	M35 ≤35	Maximum value to be stated	Maximum value to be stated
Ash (A)	weight %, dry	A1.0 ≤1.0	A1.5 ≤1.5	A3.0 ≤3.0	A3.0 ≤3.0

**Table 2.** Classification of particle sizes for graded wood chips based on CAN/CSA-ISO 17225 Part 4\*

Particle Size (P)	Main Fraction (min. 60 % weight)	Fine Fraction weight %, (≤ 3.15 mm)	Coarse Fraction weight % (length of particle)	Max. Length of Particle
P16S	3.15 mm to 16 mm	≤ 15 %	≤ 6 % (>31.5 mm)	≤ 45 mm
P31S	3.15 mm to 31.5 mm	≤ 10 %	≤ 6 % (> 45 mm)	≤ 150 mm
P45S	3.15 mm to 45 mm	≤ 10 %	≤ 10 % (> 63 mm)	≤ 200 mm

\* Test method for determining particle size is ISO 17827-1 or -2



NOTES:

- This diagram highlights the most critical wood chip property classes. Other classes exist that were not included, such as bulk density and chemical composition.
- A classification code may be generated using these classes, such as: A1-P16, B2-P31, etc.
- An appropriate wood chip sample amount should be separated from the wood chip lot (e.g., pile, chip van) for which the classification is done. The sample amount required for analysis depends on the attributes being tested, and indicated under each attribute title. For sample collection procedures, refer to ISO 17827-1 for Particle Size (P); ISO 18134-1, ISO 18134-2 for Moisture Content (M); and ISO 18122 for Ash Content (A).

**Figure 1.** Wood Chip Classifi Diagram, prepared by FPInnovations based on the CAN/CSA-ISO 177225 Part 4: Graded Wood Chips.





**Figure 2.** Covered storage for wood chip piles

## Specifications of Properties for Graded Wood Chips

The use of common names (such as hog fuel, shavings) is neither quantitative nor sufficiently specific, and should not be used when developing biomass fuel supply agreements. CAN/CSA-ISO 17225 Part 4 provides measurable parameters for the sale of wood chips (Tables 1 and 2).<sup>1</sup> Current forestry by-products and residues commonly sold as wood chips may not meet grade specifications without further processing and may not be appropriate for a specific bioenergy application. Variability of wood chips should be minimized to ensure proper bioenergy system operation.

When sourcing wood chips, the nomenclature should include at minimum source class, particle size (P), moisture content (M) and ash content (A). For example, wood chips specification label would show:

**Origin:** Logging residues (1.1.4).

**Properties:** Dimensions P45S, Moisture M40, Ash A1.5.

This label states that the minimum 60% weight of the wood chips is sized between 3.15 mm and 45 mm, has moisture content of less than 40% and contains less than 1.5% ash. Figure 1 is a schematic diagram of specifications of properties for graded wood chips.

## Safe Handling and Storage of Wood Chips

Protection of the wood chips pile from rain and snow with covered storage is critical to maintain fuel quality (Figure 2).

During storage of wood chips, chemical, physical and biological processes can occur. Microbial activities might be cultivated, dry fuel mass might degrade and the pile can heat up. In the worst case this can lead to self ignition. Particle size within a pile of wood chips affects rate of moisture absorption, heat build-up and heat dissipation. Large amounts of fines in a pile causes greater amounts of water to be absorbed, leading to faster heat up and even possibly spontaneous combustion. In contrast, large wood chunks heat up more slowly due to large void volumes between particles allowing more air flow. Microbial action also takes place at lower rates. To minimize the impact of these processes on the quality of the wood chips, it is highly recommended the storage period is kept to minimum.

The Ontario Office of the Fire Marshal has a technical guideline that recommends maximum sizes for outdoor piles of wet wood chips from storm debris<sup>4</sup>. For wood chips to be stored for more than three months, the recommended maximum height, width, and volume are 4 meters (13 feet), 8 meters (26 feet), and 1000 cubic meters (1,300 cubic yards), respectively. For periods less than three months, the recommended maximum height is 7.5 meters (25 feet).

Maintaining a low moisture and fines content in the wood chip pile will help minimize the risks of microbial activity, composting and self ignition. Storing low moisture pile under covered area is therefore a good practice.

To minimize the possibility of inadvertently transporting invasive species, care should also be taken when sourcing wood chips from other locations.

## References & Links

1. CSA Group – [www.csagroup.org](http://www.csagroup.org) for the CAN/CSA-ISO Standard 17225 Solid biofuels – Fuel specifications and classes Part 4: Graded wood chips, and, – Part 1: General requirements.
2. Natural Resources Canada – [www.nrcan.gc.ca](http://www.nrcan.gc.ca) for the Solid Biofuels Bulletins Series.
3. FPInnovations, “Basic procedures for sampling and analyzing woody biomass”, Advantage report Vol. 15, No.5, 2015.
4. Ontario Office of Fire Marshal Technical Guideline for wood chips storage, [www.mcscs.jus.gov.on.ca/english/firemarshal/legislation/technicalguidelinesandreports/TG-1998-03.html](http://www.mcscs.jus.gov.on.ca/english/firemarshal/legislation/technicalguidelinesandreports/TG-1998-03.html).

## Acknowledgement

This bulletin was prepared in collaboration with Canadian Institute of Forestry, FPInnovations, Ontario Ministry of Natural Resources and Forestry, Pembina Institute, Wood Pellet Association of Canada, and Wood Waste to Rural Heat.



## Wood Chip Fuel Specifications as per the CAN/CSA-ISO 17225 part 4 Graded Wood Chips

Table 1. Specifications for Fuel Particle Size Dimension

Dimensions (mm), ISO 17827-1				
Main fraction <sup>a</sup> (minimum 60 w-%), mm	Fines fraction, w- % (≤3,15 mm)	Coarse fraction, w- %, (length of particle, mm)	Max. length of particles <sup>b</sup> , mm	Max. cross sectional area of the coarse fraction <sup>c</sup> , cm <sup>2</sup>
P31S	<b>3,15 mm &lt; P ≤ 31,5</b>	<b>≤ 10 %</b>	<b>≤ 6 % (&gt;45 mm)</b>	<b>≤ 150   m ≤ 4 cm<sup>2</sup></b>
P45S	<b>3,15 mm &lt; P ≤ 45</b>	<b>≤ 10 %</b>	<b>≤ 10 % (&gt;63 mm)</b>	<b>≤ 200   m ≤ 6 cm<sup>2</sup></b>

<sup>a</sup> The numerical values (P-class) for dimension refer to the particle sizes passing through the mentioned round hole sieve size (ISO 17827-1). The lowest possible class should be stated. Only one class shall be specified for wood chips.

<sup>b</sup> Length and cross sectional area only have to be determined for those particles, which are to be found in the coarse fraction.

Maximum 2 pieces of about 10 l sample may exceed the maximum length, if the cross sectional area is < 0,5 cm<sup>2</sup>.

<sup>c</sup> For measuring the cross sectional area it is recommended to use a transparent set square, place the particle orthogonally behind the set square and estimate the maximum cross sectional area of this particle with the help of the cm<sup>2</sup>-pattern.

**Property Class Chips should minimum be B1, as per table below (ISO 17225-1)**

Table 2. Property Class Chips (ISO 17225-1)

Property class, Analysis method	Unit	Grade B	
		1	2
Origin and source, ISO 17225-1		<b>1.1 Forest, plantation and other virgin wood</b> <sup>b</sup> <b>1.2.1 Chemically untreated wood residues</b>	1.1 Forest, plantation and other virgin wood <sup>b</sup> 1.2. By-products and residues from wood processing industry 1.3.1. Chemically untreated used wood
Particle size, P ISO 17827-1	mm	<b>P31S or P45S</b>	
Moisture, M <sup>c</sup> , ISO 18134-1 ISO 18134-2	w-%	<b>Maximum value to be stated, between 35 to 50%</b>	
Ash, A ISO 18122	w-% dry	<b>A3.0 ≤ 3.0</b>	
Bulk density, BD <sup>d</sup> , ISO 17828	kg/loose m <sup>3</sup> as received	<b>Minimum value to be stated</b>	

**Table 3. Specification of graded wood chips, Grade B1**

Property class, Analysis method	Unit	Grade B	
		1	2
Nitrogen, N ISO 16948	w-% dry	N1.0 ≤ 1.0	
Sulfur, S ISO 16994	w-% dry	S0.1 ≤ 0,1	
Chlorine, Cl ISO 16994	w-% dry	Cl0.05 ≤ 0.05	
Arsenic, As ISO 16968	mg/kg dry	≤ 1	
Cadmium, Cd ISO 16968	mg/kg dry	≤ 2.0	
Chromium, Cr ISO 16968	mg/kg dry	≤ 10	
Copper, Cu ISO 16968	mg/kg dry	≤ 10	
Lead, Pb ISO 16968	mg/kg dry	≤ 10	
Mercury, Hg ISO 16968	mg/kg dry	≤ 0.1	
Nickel, Ni ISO 16968	mg/kg dry	≤ 10	
Zinc, Zn ISO 16968	mg/kg dry	≤ 100	



**MP1 Montant à payer – Généralités**

1.1 Sous réserve de toutes autres dispositions du Contrat, Sa Majesté paie à l'Entrepreneur, aux dates et de la manière énoncées ci-après, le montant par lequel:

1.1.1 l'ensemble des montants prévus à l'article MP2 excède,

1.1.2 l'ensemble des montants prévus à l'article MP3

et l'Entrepreneur accepte le paiement comme paiement final de tout ce qu'il a fourni et fait relativement aux travaux auxquels le paiement se rapporte.

**MP2 Montants payables à l'Entrepreneur**

2.1 Les montants mentionnés à l'alinéa MP1.1.1 sont l'ensemble :

2.1.1 des montants prévus dans les Articles de convention; et

2.1.2 le montant, s'il en est, payable à l'Entrepreneur conformément aux Conditions générales.

**MP3 Montants payables à Sa Majesté**

3.1 Les montants mentionnés à l'alinéa MP1.1.2 sont l'ensemble des montants, s'il en est, que l'Entrepreneur est tenu de payer à Sa Majesté en vertu du Contrat.

3.2 Dans tout paiement fait à l'Entrepreneur, le fait pour Sa Majesté d'omettre de déduire d'un montant mentionné à l'article MP2 un montant mentionné au paragraphe MP3.1 ne peut constituer un abandon de son droit de faire une telle déduction, ni une reconnaissance de l'absence d'un tel droit lors de tout paiement ultérieur à l'Entrepreneur.

**MP4 Date de paiement**

4.1 Dans les présentes modalités de paiement :

4.1.1 «période de paiement» signifie un intervalle de 30 jours consécutifs ou tout autre intervalle plus long convenu entre l'Entrepreneur et le représentant ministériel;

4.1.2 un montant est «dû et payable» lorsqu'il doit être versé à l'Entrepreneur par Sa Majesté selon les paragraphes MP4.4, MP4.7 ou MP4.10;

4.1.3 un montant est en souffrance lorsqu'il demeure impayé le premier jour suivant le jour où il est dû et payable;

4.1.4 «date de paiement» signifie la date du titre négociable d'un montant dû et payable par le Receveur général du Canada et émis aux fins de paiement;

4.1.5 «taux d'escompte» signifie le taux d'intérêt, fixé par la Banque du Canada, en vigueur à l'ouverture des bureaux à la date de paiement.

4.2 À l'expiration d'une période de paiement, l'Entrepreneur doit remettre au représentant ministériel



une demande d'acompte par écrit et y décrire toute partie achevée des travaux et tous les matériaux livrés aux lieux des travaux, mais non incorporés aux travaux, durant la période de paiement faisant l'objet de la demande d'acompte.

- 4.3 Le représentant ministériel, dans les dix jours suivant réception d'une demande d'acompte mentionnée au paragraphe MP4.2 :
- 4.3.1 fait l'inspection de la partie des travaux et des matériaux qui y sont décrits, et
  - 4.3.2 présente un rapport sur le progrès des travaux, dont le représentant ministériel envoie une copie à l'Entrepreneur, indiquant la valeur de la partie des travaux et des matériaux décrits dans la demande d'acompte que, selon le représentant ministériel :
    - 4.3.2.1 sont conformes aux dispositions du Contrat, et
    - 4.3.2.2 n'étaient visés par aucun autre rapport concernant des travaux du Contrat.
- 4.4 Sous réserve de l'article MP1 et du paragraphe MP4.5, Sa Majesté, au plus tard 30 heures après la réception par le représentant ministériel de la demande d'acompte mentionnée au paragraphe MP4.2, paie à l'Entrepreneur :
- 4.4.1 une somme égale à 95% de la valeur indiquée dans le rapport sur le progrès des travaux mentionné à l'alinéa MP4.3.2, si l'Entrepreneur a fourni un cautionnement pour le paiement de la main-d'œuvre et des matériaux, ou
  - 4.4.2 un montant égal à 90% de la valeur indiquée dans le rapport sur le progrès des travaux mentionné à l'alinéa 4.3.2, si l'Entrepreneur n'a pas fourni un cautionnement pour le paiement de la main-d'œuvre et des matériaux.
- 4.5 Il est essentiel, pour que Sa Majesté s'acquitte de son obligation mentionnée au paragraphe MP4.4, que l'Entrepreneur fasse et remette au représentant ministériel,
- 4.5.1 une déclaration conforme à celle décrite au paragraphe MP4.6, pour les travaux et matériaux visés dans la demande d'acompte prévue au paragraphe MP4.2,
  - 4.5.2 dans le cas de la première demande d'acompte de l'Entrepreneur, un calendrier d'exécution conformément aux parties pertinentes des Devis, et
  - 4.5.3 si un calendrier est exigé, sa mise à jour aux moments précisés dans les parties pertinentes des Devis.
- 4.6 Dans la déclaration mentionnée au paragraphe MP4.5, l'Entrepreneur atteste :
- 4.6.1 qu'au jour de la demande d'acompte de l'Entrepreneur, l'Entrepreneur s'est acquitté de toutes ses obligations légales aux termes des Conditions de travail, et
  - 4.6.2 qu'au jour de la précédente demande d'acompte, l'Entrepreneur s'est acquitté de toutes ses obligations légales envers ses sous-entrepreneurs et ses fournisseurs de matériaux en ce qui concerne les travaux visés par le Contrat.



- 4.7 Sous réserve de l'article MP1 et du paragraphe MP4.8, Sa Majesté verse à l'Entrepreneur, dans les 30 jours suivant la date de délivrance du Certificat provisoire d'achèvement mentionné au paragraphe CG44.2, la somme mentionnée à l'article MP1, moins l'ensemble :
- 4.7.1 de tous les paiements effectués conformément au paragraphe MP4.4;
  - 4.7.2 du montant égal au coût pour Sa Majesté, estimé par le représentant ministériel de la correction de toutes déficiences dans les travaux et décrites dans le Certificat provisoire d'achèvement; et
  - 4.7.3 du montant égal au coût pour Sa Majesté, estimé par le représentant ministériel de l'achèvement de toute partie des travaux décrite dans le Certificat provisoire d'achèvement ne comportant pas la correction des déficiences visées par l'alinéa MP4.7.2.
- 4.8 Il est essentiel, pour que Sa Majesté s'acquitte de son obligation mentionnée au paragraphe MP4.7, que l'Entrepreneur fasse et remette au représentant ministériel,
- 4.8.1 une déclaration conforme à celle décrite au paragraphe MP4.9 relativement au Certificat provisoire d'achèvement mentionné au paragraphe CG44.2, et
  - 4.8.2 s'il est précisé dans les parties pertinentes des Devis, une mise à jour du calendrier d'exécution mentionné à l'alinéa MP4.5.2 qui, en plus des exigences énoncées, soit suffisamment détaillé concernant l'achèvement des travaux non-terminés et la correction de tous les défauts, le tout à la satisfaction du représentant ministériel.
- 4.9 Dans la déclaration mentionnée au paragraphe MP4.8, l'Entrepreneur atteste qu'au jour de l'émission du Certificat provisoire d'achèvement :
- 4.9.1 l'Entrepreneur s'est acquitté de toutes ses obligations légales aux termes des Conditions de travail;
  - 4.9.2 l'Entrepreneur s'est acquitté de toutes ses obligations légales envers ses sous-entrepreneurs et ses fournisseurs de matériaux en ce que concerne les travaux visés par le Contrat; et
  - 4.9.3 l'Entrepreneur s'est acquitté de toutes ses obligations mentionnées au paragraphe CG14.6.
- 4.10 Sous réserve de l'article MP1 et du paragraphe MP4.11, Sa Majesté verse à l'Entrepreneur, dans les 60 jours suivant la date de délivrance du Certificat définitif d'achèvement mentionné au paragraphe CG44.1, la somme mentionnée à l'article MP1, moins l'ensemble :
- 4.10.1 de tous les paiements effectués conformément au paragraphe MP4.4, et
  - 4.10.2 de tous les paiements effectués conformément au paragraphe MP4.7.
- 4.11 Il est essentiel, pour que Sa Majesté s'acquitte de son obligation mentionnée au paragraphe MP4.10, que l'Entrepreneur fasse et remette au représentant ministériel une déclaration conforme



à celle décrite au paragraphe MP4.12.

- 4.12 Dans la déclaration mentionnée au paragraphe MP4.11, l'Entrepreneur atteste, outre les mentions requises en vertu du paragraphe MP4.9, que l'Entrepreneur s'est acquitté de toutes ses obligations légales et qu'il a satisfait à toutes les réclamations légales formulées contre lui par suite de l'exécution des travaux.

**MP5 Le rapport sur le progrès des travaux et le paiement y afférent ne lient pas Sa Majesté**

- 5.1 Ni le rapport sur le progrès des travaux mentionné au paragraphe MP4.3, ni les paiements effectués par Sa Majesté en conformité des Modalités ne doivent être interprétés comme une admission que les travaux et les matériaux sont, en totalité ou en partie, complets, satisfaisants ou conformes au Contrat.

**MP6 Retard du paiement**

- 6.1 Nonobstant l'article CG7, le retard apporté par Sa Majesté à faire un paiement à sa date d'exigibilité en vertu du présent Contrat, ne constitue pas un bris du Contrat.
- 6.2 Sa Majesté versera, sans que l'Entrepreneur le demande, des intérêts simples au taux d'escompte plus 1 ¼ p. 100 sur les montants en souffrance en vertu de l'alinéa MP4.1.3, intérêts qui s'appliquent à compter du premier jour de retard jusqu'au jour précédant la date de paiement, sauf que
- 6.2.1 les intérêts se seront ni exigibles ni versés à moins que le montant dont il est question au paragraphe MP6.2 ait été en souffrance pendant plus de 15 jours suivant :
- 6.2.1.1 la date à laquelle ladite somme est devenue due et payable, ou
- 6.2.1.2 la date de réception par le représentant ministériel de la déclaration conforme à celle décrite aux paragraphes MP4.5, MP4.8 ou MP4.11;
- selon la plus avancée de ces deux dates, et
- 6.2.2 les intérêts ne seront ni exigibles ni versés sur les paiements anticipés en souffrance, le cas échéant.

**MP7 Droit de compensation**

- 7.1 Sans restreindre tout droit de compensation ou de retenue découlant explicitement ou implicitement de la loi ou d'une disposition quelconque du Contrat, Sa Majesté peut opérer compensation de toute somme due par l'Entrepreneur à Sa Majesté en vertu du Contrat ou de tout contrat en cours, à l'encontre des sommes dues par Sa Majesté à l'Entrepreneur en vertu du Contrat.
- 7.2 Pour les fins du paragraphe MP7.1, l'expression «contrat en cours» signifie un contrat entre Sa Majesté et l'Entrepreneur :
- 7.2.1 en vertu duquel l'Entrepreneur est légalement obligé d'exécuter ou de fournir du travail,





de la main-œuvre ou des matériaux; ou

- 7.2.2 à l'égard duquel Sa Majesté a, depuis la date à laquelle les présents Articles de convention sont intervenus, exercé le droit de retirer à l'Entrepreneur les travaux faisant l'objet du contrat.

**MP8 Paiement en cas de résiliation**

- 8.1 En cas de résiliation du Contrat conformément à l'article CG41, Sa Majesté paie à l'Entrepreneur le plus tôt possible eu égard aux circonstances, tout montant qui lui est légalement dû et payable.

**MP9 Intérêts sur les réclamations réglées**

- 9.1 Sa Majesté versera à l'Entrepreneur des intérêts simples sur le montant d'une réclamation réglée, au taux d'escompte moyen plus q  $\frac{1}{4}$  p. 100 à compter du premier jour de retard jusqu'au jour précédant la date de paiement.
- 9.2 Aux fins du paragraphe MP9.1:
- 9.2.1 une réclamation est réputée être réglée lorsqu'une entente par écrit est signée par le représentant ministériel et l'Entrepreneur et fait état du montant de la réclamation à verser par Sa Majesté et des travaux pour lesquels ledit montant doit être versé;
- 9.2.2 le «taux d'escompte moyen» signifie le taux d'intérêt moyen, fixé par la Banque du Canada, en vigueur à la fin de chaque mois civil au cours de la période pendant laquelle la réclamation réglée était impayée;
- 9.2.3 une réclamation réglée est réputée être impayée à compter de la journée qui suit immédiatement la date à laquelle la réclamation était due et payable conformément au Contrat, s'il n'y avait pas eu contestation.
- 9.3 Aux fins de l'Article MP9, une réclamation signifie tout montant faisant l'objet d'un litige et assujéti à des négociations entre Sa Majesté et l'Entrepreneur en vertu du Contrat.



Article	Page	Titre
CG1	1	Interpretation
CG2	2	Sucesseurs et ayants droit
CG3	2	Cession du Contrat
CG4	2	Sous-traitance par l'Entrepreneur
CG5	2	Modifications
CG6	3	Nulle obligation implicite
CG7	3	Caractère essentiel des délais et échéances
CG8	3	Indemnisation par l'Entrepreneur
CG9	3	Indemnisation par Sa Majesté
CG10	3	Interdiction aux députés de la Chambre des communes de tirer profit d'un contrat
CG11	4	Avis
CG12	4	Matériaux, outillage et biens immobiliers fournis par Sa Majesté
CG13	5	Matériaux, outillage et biens immobiliers devenus propriété de Sa Majesté
CG14	5	Permis et taxes payables
CG15	6	Exécution des travaux sous la direction du représentant ministériel
CG16	6	Coopération avec d'autres Entrepreneurs
CG17	7	Vérification des travaux
CG18	7	Déblaiement de l'emplacement
CG19	8	Surintendant de l'Entrepreneur
CG20	8	Sécurité nationale
CG21	8	Ouvriers inaptes
CG22	9	Augmentation ou diminution des coûts
CG23	9	Main-d'œuvre et matériaux canadiens
CG24	10	Protection des travaux et des documents
CG25	10	Cérémonies publiques et enseignes
CG26	10	Précautions contre les dommages, la transgression des droits, les incendies, et les autres dangers
CG27	11	Assurances
CG28	11	Indemnité d'assurance
CG29	12	Garantie du contrat
CG30	13	Modifications aux travaux
CG31	13	Interprétation du Contrat par le représentant ministériel
CG32	14	Garantie et rectification des défauts des travaux
CG33	15	Défaut de l'Entrepreneur
CG34	15	Protestations des décisions du représentant ministériel
CG35	15	Changement des conditions du sol – Négligence ou retard de la part de Sa Majesté
CG36	16	Prolongation de délai
CG37	17	Dédommagement pour retard d'exécution
CG38	17	Travaux retirés à l'Entrepreneur
CG39	18	Effet du retrait des travaux à l'Entrepreneur
CG40	19	Suspension des travaux par le Ministre
CG41	19	Résiliation du Contrat
CG42	20	Réclamations contre et obligations de la part de l'Entrepreneur ou d'un sous-entrepreneur
CG43	22	Dépôt de garantie – Confiscation ou remise
CG44	22	Certificats du représentant ministériel
CG45	24	Remise du dépôt de garantie
CG46	24	Précision du sens des expressions figurant aux articles CG47 à CG50
CG47	24	Additions ou modifications au Tableau des prix unitaires
CG48	25	Établissement du coût – Tableau des prix unitaires
CG49	25	Établissement du coût – Négociation
CG50	26	Établissement du coût en cas d'échec des négociations
CG51	27	Registres à tenir par l'Entrepreneur
CG52	27	Conflits d'intérêts
CG 53	28	Situation de l'Entrepreneur

## **CG1 Interpretation**

### 1.1 Dans le Contrat:

- 1.1.1 tout renvoi à une autre partie du Contrat désignée par des numéros précédés de lettres est censé renvoyer à la partie du Contrat qui est désignée par cette combinaison de lettres et de chiffres, de même qu'à toute autre partie du Contrat qui y est mentionnée ;
- 1.1.2 « Contrat » signifie les documents mentionnés dans les Articles de convention;
- 1.1.3 « garantie du contrat » signifie toute garantie fournie à Sa Majesté par l'Entrepreneur conformément au Contrat;
- 1.1.4 « le représentant ministériel » signifie l'officier ou l'employé de Sa Majesté désigné aux Articles de convention et toute personne autorisée spécialement par le représentant ministériel à accomplir, en son nom, n'importe laquelle des fonctions qui lui sont confiées en vertu du Contrat, et signalée comme tel par écrit à l'Entrepreneur;
- 1.1.5 « matériaux » comprend toutes les marchandises, articles et choses à être fournies par ou pour l'Entrepreneur en vertu du Contrat, pour être incorporés dans les travaux;
- 1.1.6 « Ministre » comprend une personne agissant pour ou, si la charge est sans titulaire, à la place du Ministre ou des personnes lui succédant, de même que son ou leurs adjoints ou représentants dûment nommés aux fins du Contrat;
- 1.1.7 « personne » comprend, sauf lorsque le contexte exige une interprétation différente, une société, une entreprise, une firme, une co-entreprise, un consortium et une corporation;
- 1.1.8 « outillage » comprend les animaux, outils, instruments, machines, véhicules, bâtiments, ouvrages, équipements et marchandises, articles et choses autres que les matériaux, qui sont nécessaires à l'exécution des travaux;
- 1.1.9 « sous-entrepreneur » signifie une personne à qui l'Entrepreneur a, conformément à l'article CG4, confié l'exécution des travaux en tout ou en partie;
- 1.1.10 « surintendant » signifie l'employé de l'Entrepreneur désigné par ce dernier pour remplir les fonctions décrites à l'article CG19;
- 1.1.11 « travaux » comprend, sous réserve de toute stipulation expressément contraire dans le Contrat, tout ce que l'Entrepreneur doit faire, fournir, livrer ou accomplir pour l'exécution du Contrat.

1.2 Sauf quant à ceux apparaissant aux Plans et devis, les en-têtes apparaissent dans le Contrat, ne font pas partie du Contrat, mais y sont uniquement pour fin d'utilité pratique.

1.3 Aux fins de l'interprétation du Contrat, en cas de contradiction ou de divergence entre les Plans et devis et les Conditions générales, les Conditions générales prévalent.

1.4 Dans l'interprétation des Plans et devis, en cas de contradiction ou de divergence entre :

- 1.4.1 les Plans et les devis, les devis prévalent;
- 1.4.2 les plans, les plans tracés à l'échelle la plus grande prévalent; et
- 1.4.3 les dimensions exprimées en chiffres et les dimensions à l'échelle, les dimensions exprimées en chiffres prévalent.

## **CG2 Successeurs et ayants droit**

- 2.1 Le Contrat est au bénéfice des parties au Contrat, de même que de leurs héritiers légaux, exécuteurs, administrateurs, successeurs et ayants droit, qui sont tous par ailleurs liés par ses dispositions.

## **CG3 Cession du Contrat**

- 3.1 L'Entrepreneur ne peut céder le Contrat, en tout ou en partie, sans le consentement écrit du Ministre.

## **CG4 Sous-traitance par l'Entrepreneur**

- 4.1 Sous réserve des Conditions générales, l'Entrepreneur peut sous-traiter une partie quelconque des travaux.
- 4.2 L'Entrepreneur doit aviser le représentant ministériel par écrit de son intention de sous-traiter.
- 4.3 L'avis mentionné au paragraphe CG4.2 doit identifier le sous-entrepreneur de même que la partie des travaux qu'il entend lui confier.
- 4.4 Le représentant ministériel peut s'objecter à la sous-traitance projetée en avisant par écrit l'Entrepreneur dans les six jours suivant la réception par le représentant ministériel de l'avis mentionné au paragraphe CG4.2.
- 4.5 Si le représentant ministériel s'oppose à une sous-traitance en vertu du paragraphe CG4.4, l'Entrepreneur ne peut procéder à la sous-traitance envisagée.
- 4.6 L'Entrepreneur ne peut, sans la permission écrite du représentant ministériel, remplacer un sous-entrepreneur dont il a retenu les services conformément aux Conditions générales.
- 4.7 Tout contrat entre l'Entrepreneur et un sous-entrepreneur doit comporter tous les termes et conditions du Contrat qui sont d'application générale.
- 4.8 Nul contrat entre l'Entrepreneur et un sous-entrepreneur ou nul consentement de le représentant ministériel à tel contrat sera interprété comme relevant l'Entrepreneur de quelque obligation en vertu du Contrat ou comme imposant quelque responsabilité à Sa Majesté.

## **CG5 Modifications**

- 5.1 Nulle modification ou changement à quelque disposition du Contrat aura d'effet avant que d'avoir été consignée par écrit.

**CG6 Nulle obligation implicite**

- 6.1 Il ne découlera du Contrat aucune disposition ou obligation implicite de la part de Sa Majesté; seules les dispositions expresses du Contrat, stipulées par Sa Majesté, doivent servir de fondement à tout droit contre Sa Majesté.
- 6.2 Le présent Contrat remplace toutes communications, négociations et ententes, écrites ou verbales, concernant les travaux et qui auraient en lieu avant la date du Contrat.

**CG7 Caractère essentiel des délais et échéances**

- 7.1 Le temps est l'essence même du Contrat.

**CG8 Indemnisation par l'Entrepreneur**

- 8.1 L'Entrepreneur doit tenir Sa Majesté indemne et à couvert de toutes réclamations, demandes, pertes, frais, dommages, actions, poursuites ou procédures de la part de quiconque, fondés, découlant, reliés, occasionnés ou attribuables aux activités de l'Entrepreneur, de ses employés, agents, sous-entrepreneurs et sous-entrepreneurs de ces derniers dans l'exécution des travaux faisant l'objet du Contrat, incluant toute contrefaçon ou prétendue contrefaçon d'un brevet d'invention ou de toute autre forme de propriété intellectuelle.
- 8.2 Aux fins du paragraphe CG8.1, le terme « activités » comprend tout acte ou omission, de même que tout retard à accomplir un acte.

**CG9 Indemnisation par Sa Majesté**

- 9.1 Sa Majesté, sous réserve des dispositions de la Loi sur la responsabilité de la Couronne, de la Loi sur les brevets et de toute autre loi affectant les droits, pouvoirs, privilèges ou obligations de Sa Majesté, doit tenir l'Entrepreneur indemne et à couvert de toutes réclamations, demandes, pertes, frais, dommages, actions, poursuites ou procédures découlant de ses activités en vertu du Contrat et directement attribuables à :
- 9.1.1 une absence ou un vice, actuel ou allégué, dans le titre de Sa Majesté concernant l'emplacement des travaux, ou
- 9.1.2 une contrefaçon ou prétendue contrefaçon par l'Entrepreneur de tout brevet d'invention ou de toute autre forme de propriété intellectuelle, dans l'exécution de tout acte aux fins de Contrat, comportant l'utilisation d'un modèle, d'un plan, d'un dessin ou de toute autre chose fournis par Sa Majesté à l'Entrepreneur aux fins des travaux.

**CG10 Interdiction aux députés de la Chambre des communes de tirer profit d'un contrat**

- 10.1 Conformément à la Loi sur le Parlement du Canada, il est expressément interdit à tout membre de la Chambre des communes de posséder quelque part ou intérêt dans le Contrat, ou d'en tirer quelque bénéfice ou profit.

**CG11 Avis**

- 11.1 Tout avis, consentement, ordre, décision, directive ou communication autre qu'un avis suivant le paragraphe CG11.4, qui peut être donné à l'Entrepreneur conformément au Contrat, peut être donné de quelque manière que ce soit.
- 11.2 Tout avis, consentement, ordre, décision, directive ou autre communication devant être donné par écrit à une partie ou une autre conformément au Contrat, sera, sous réserve du paragraphe CG11.4, réputé avoir été effectivement donné :
- 11.2.1 à l'Entrepreneur, s'il a été livré personnellement à l'Entrepreneur ou au surintendant de l'Entrepreneur, ou s'il a été envoyé par la poste, par télex ou par télécopieur à l'Entrepreneur, à l'adresse indiquée au paragraphe A4.1; ou
- 11.2.2 à Sa Majesté, s'il a été livré personnellement au représentant ministériel, ou s'il a été envoyé par la poste, par télex ou par télécopieur au représentant ministériel, à l'adresse indiquée à l'alinéa A1.2.1.
- 11.3 Tout avis, consentement, ordre, décision, directive ou autre communication donné conformément au paragraphe CG11.2 sera réputé avoir été reçu par l'une ou l'autre des parties :
- 11.3.1 le jour où il a été livré, s'il lui a été livré personnellement; ou
- 11.3.2 le jour de sa réception ou le sixième jour après son envoi par la poste, selon la première de ces deux dates, s'il lui a été envoyé par la poste, et
- 11.3.3 dans les 24 heures suivant sa transmission, s'il lui a été envoyé par télex ou par télécopieur.
- 11.4 S'il est livré personnellement, un avis donné en vertu de l'alinéa CG38.1.1 et des articles CG40 et CG41 sera remis à l'Entrepreneur ou, si l'Entrepreneur est une société, une firme, une co-entreprise ou une corporation, à un agent de l'administration ou à un cadre supérieur.

**CG12 Matériaux, outillage et biens immobiliers fournis par Sa Majesté**

- 12.1 Sous réserve du paragraphe CG12.2, l'Entrepreneur est responsable envers Sa Majesté de toute perte ou dommage, aux matériaux, à l'outillage ou aux biens immobiliers que Sa Majesté a fournis ou placés sous la garde et le contrôle de l'Entrepreneur aux fins du Contrat, que la perte ou le dommage soit attribuable ou non à des causes indépendantes de la volonté de l'Entrepreneur.
- 12.2 L'Entrepreneur n'est pas responsable envers Sa Majesté de toute perte ou dommage aux matériaux, à l'outillage ou aux biens immobiliers dont il est question au paragraphe CG12.1, si

cette perte ou ce dommage est imputable et directement attribuable à l'usure causée par un usage raisonnable.

- 12.3 L'Entrepreneur doit utiliser les matériaux, l'outillage ou les biens immobiliers dont il est question au paragraphe CG12.1, uniquement pour l'exécution du Contrat et pour aucune autre fin.
- 12.4 Lorsqu'après avoir été requis de le faire par le représentant ministériel, l'Entrepreneur n'a pas, dans un délai raisonnable, indemnisé Sa Majesté pour une perte ou un dommage dont il est responsable en vertu du paragraphe CG12.1, le représentant ministériel peut y pouvoir aux frais de l'Entrepreneur, et ce dernier est dès lors responsable envers Sa Majesté des frais en l'occurrence qu'il devra sur demande payer à Sa Majesté.
- 12.5 L'Entrepreneur doit tenir des registres que le représentant ministériel peut de temps à autre exiger des matériaux, de l'outillage et des biens immobiliers visés par le paragraphe CG12.1 et doit, lorsque le représentant ministériel le l'exige, établir à la satisfaction de ce dernier que les matériaux, l'outillage et les biens immobiliers sont à l'endroit et dans l'état dans lequel ils devraient être.

### **CG13 Matériaux, outillage et biens immobiliers devenus propriété de Sa Majesté**

- 13.1 Sous réserve du paragraphe CG14.7, tous les matériaux et l'outillage, de même que tout droit de l'Entrepreneur sur tous les biens immobiliers, permis, pouvoirs et privilèges achetés, ou utilisés par l'Entrepreneur pour les travaux deviennent, à compter de l'époque où ils ont été achetés ou utilisés, la propriété de Sa Majesté aux fins des travaux et continuent de l'être :
- 13.1.1 dans le cas des matériaux, jusqu'à ce que le représentant ministériel déclare qu'ils ne sont plus requis pour les travaux; et
- 13.1.2 dans le cas de l'outillage, des biens immobiliers, des permis, des pouvoirs et des privilèges, jusqu'à ce que le représentant ministériel déclare que le droit dévolu à Sa Majesté en l'espèce n'est plus requis pour les travaux.
- 13.2 Les matériaux ou l'outillage appartenant à Sa Majesté en vertu du paragraphe CG13.1 ne doivent pas être enlevés des lieux des travaux, utilisés ou aliénés, sauf pour les travaux, sans le consentement écrit du représentant ministériel.
- 13.3 Sa Majesté n'est pas responsable de toute perte ou de tout dommage aux matériaux ou à l'outillage visés par le paragraphe CG13.1 quelle qu'en soit la cause et l'Entrepreneur est responsable de toute perte ou de tout dommage bien que ces matériaux ou outillage appartiennent à Sa Majesté.

### **CG14 Permis et taxes payables**

- 14.1 L'Entrepreneur doit, dans les 30 jours de la date du Contrat, offrir à l'administration municipale, un montant égal à tous les droits et frais qui seraient payables à l'administration municipale pour les permis de construction, si les travaux étaient exécutés pour une personne autre que Sa Majesté.

- 14.2 Dans les dix jours qui suivent l'offre mentionnée au paragraphe CG14.1, l'Entrepreneur avise le représentant ministériel de sa démanche et du montant de cette offre et lui fait savoir si elle a été acceptée ou non par l'administration municipale.
- 14.3 Si l'administration municipale n'a pas accepté la somme offerte aux termes du paragraphe CG14.1, l'Entrepreneur remet ce montant à Sa Majesté dans les six jours suivant l'expiration du délai fixe au paragraphe CG14.2.
- 14.4 Aux fins des paragraphes CG14.1 et CG14.3, l'expression « administration municipale » signifie une administration qui aurait compétence pour autoriser la construction de l'ouvrage si le propriétaire n'en était pas Sa Majesté.
- 14.5 Nonobstant le lieu de résidence de l'Entrepreneur, l'Entrepreneur versera toute taxe applicable découlant de l'exécution des travaux visés par le Contrat.
- 14.6 Conformément à la déclaration mentionnée au paragraphe MP4.9, l'Entrepreneur dont ni le lieu de résidence ni la place d'affaires n'est dans la province où sont effectués les travaux visés par le Contrat, fournira à Sa Majesté une preuve d'enregistrement auprès des autorités provinciales responsables de la taxe de vente dans ladite province.
- 14.7 Aux fins du paiement de la taxe applicable ou de la fourniture d'une garantie de paiement de la taxe applicable découlant de l'exécution des travaux visés par le Contrat, l'Entrepreneur doit, malgré le fait que tous les matériaux et outillage, de même que des droits de l'Entrepreneur sur tous les biens immobiliers, permis, pouvoirs et privilèges, sont devenus la propriété de Sa Majesté après la date d'achat, payer, en tant qu'utilisateur ou consommateur, toute taxe applicable payable au moment de l'utilisation desdits matériaux, outillage ou droits de l'Entrepreneur à titre d'utilisateur, conformément aux lois pertinentes, ou fournir une garantie de paiement à cet égard.

#### **CG15 Exécution des travaux sous la direction du représentant ministériel**

- 15.1 L'Entrepreneur doit :
- 15.1.1 permettre au représentant ministériel d'avoir accès aux travaux et au chantier en tout temps au cours de l'exécution du Contrat;
  - 15.1.2 communiquer au représentant ministériel tous renseignements qu'il demande concernant l'exécution du Contrat; et
  - 15.1.3 fournir au représentant ministériel toute l'assistance possible dans l'accomplissement de son devoir de veiller à ce que les travaux soient exécutés conformément au Contrat, de même que dans l'accomplissement de tout autre devoir et dans l'exercice de tout pouvoir qui lui incombe ou qui lui est conféré par le Contrat.

#### **CG16 Coopération avec d'autres Entrepreneurs**

- 16.1 Lorsque, de l'avis du représentant ministériel, il est nécessaire d'affecter aux travaux ou au chantier d'autres entrepreneurs ou ouvriers, avec ou sans outillage et matériaux, l'Entrepreneur doit, à la satisfaction du représentant ministériel, leur donner accès aux travaux et coopérer avec



eux dans l'accomplissement de leurs fonctions et obligations.

16.2 Si :

16.2.1 l'affectation aux travaux d'autres entrepreneurs ou ouvriers en vertu du paragraphe CG16.1 ne pouvait être raisonnablement prévue par l'Entrepreneur au moment de la conclusion du Contrat; et

16.2.2 de l'avis du représentant ministériel, l'Entrepreneur a encouru des dépenses additionnelles afin de se conformer au paragraphe CG16.1; et

16.2.3 l'Entrepreneur a donné au représentant ministériel un avis écrit de sa réclamation avant l'expiration d'un délai de 30 jours à compter de l'affectation d'autres entrepreneurs ou ouvriers aux travaux ou au chantier;

Sa Majesté rembourse à l'Entrepreneur les frais encourus, calculés conformément aux articles CG48 à CG50, pour le travail, de l'outillage et des matériaux additionnels requis.

**CG17 Vérification des travaux**

17.1 Si, à un moment quelconque après le début des travaux mais avant l'expiration de la période de garantie, le représentant ministériel a des motifs de croire que les travaux en partie de ceux-ci n'ont pas été exécutés conformément au Contrat, il peut demander qu'une vérification de ces travaux soit effectuée par un expert qu'il désigne.

17.2 Si, par suite d'une vérification conformément au paragraphe CG17.1, il est établi que les travaux n'ont pas été exécutés suivant le Contrat, l'Entrepreneur doit, sur demande, payer à Sa Majesté tous les coûts et toutes les dépenses raisonnables que cette vérification lui aura occasionnés, en plus et sans préjudice aux droits et recours de Sa Majesté sous le Contrat, en droit ou en équité.

**CG18 Déblaiement de l'emplacement**

18.1 L'Entrepreneur garde les travaux et leur emplacement propres, sans rebuts, ni débris, et respecte à cet égard toute directive du représentant ministériel.

18.2 Avant l'émission du Certificat provisoire mentionné au paragraphe CG44.2, l'Entrepreneur enlève tout l'outillage et tous les matériaux non requis à l'exécution du reste des travaux. Il enlève également tous rebuts et débris et fait en sorte que les travaux et leur emplacement soient propres et convenables pour leur occupation par les employés de Sa Majesté, sauf indication contraire dans le Contrat.

18.3 Avant l'émission du Certificat définitif d'achèvement mentionné au paragraphe CG44.1, l'Entrepreneur retire des travaux et leur emplacement, l'excédant de l'outillage et des matériaux, de même que tous les rebuts et débris.

18.4 Les obligations qu'imposent à l'Entrepreneur les paragraphes CG18.1 à CG18.3 ne s'appliquent pas aux rebuts et aux débris laissés par les employés de Sa Majesté, ou par les autres entrepreneurs et leurs employés visés au paragraphe CG16.1.

### **CG19 Surintendant de l'Entrepreneur**

- 19.1 L'Entrepreneur désigne sans délai un surintendant après l'adjudication du Contrat.
- 19.2 L'Entrepreneur communique sans délai au représentant ministériel le nom, l'adresse et le numéro de téléphone du surintendant désigné en vertu du paragraphe CG19.1.
- 19.3 Le surintendant désigné en vertu du paragraphe CG19.1 à l'entière responsabilité des opérations de l'Entrepreneur dans l'exécution des travaux et il est en outre autorisé à recevoir au nom de l'Entrepreneur, tous avis, consentement, ordre, directive, décision ou toute autre communication qui peut lui être donné en vertu du Contrat.
- 19.4 Pendant les heures de travail et jusqu'à l'achèvement des travaux, l'Entrepreneur doit garder sur les lieux des travaux un surintendant compétent.
- 19.5 À la demande du représentant ministériel, l'Entrepreneur retire tout surintendant qui, de l'avis du représentant ministériel, est incompetent ou s'est conduit de façon malséante, et il remplace sans délai le surintendant ainsi retiré par un autre surintendant que le représentant ministériel estime acceptable.
- 19.6 Sous réserve du paragraphe CG19.5, l'Entrepreneur ne peut remplacer le surintendant sans le consentement écrit du représentant ministériel.
- 19.7 En cas de contravention par l'Entrepreneur au paragraphe CG19.6, le représentant ministériel peut refuser l'émission de tout Certificat mentionné à l'article CG44 jusqu'à ce que le surintendant ait été réintégré dans ses fonctions ou qu'un autre surintendant acceptable au représentant ministériel l'ait remplacé.

### **CG20 Sécurité nationale**

- 20.1 Si le Ministre estime que la sécurité nationale le requiert, il peut ordonner à l'Entrepreneur :
- 20.1.1 de lui fournir tout renseignement sur des personnes engagées ou devant l'être aux fins du Contrat, et
- 20.1.2 de retirer des travaux et de leur emplacement toute personne dont l'emploi peut en l'occurrence, de l'avis du Ministre, comporter un risque pour la sécurité nationale.
- 20.2 Les contrats que l'Entrepreneur pourra conclure avec les personnes qui seront affectées à l'exécution des travaux, doivent contenir des dispositions qui lui permettront de s'acquitter de toute obligation qui lui incombent en vertu des articles CG19, CG20 et CG21.
- 20.3 L'Entrepreneur doit obéir à tout ordre donné par le Ministre suivant le paragraphe CG20.1.

### **CG21 Ouvriers inaptes**

- 21.1 À la demande du représentant ministériel, l'Entrepreneur retire des travaux toute personne engagée par l'Entrepreneur aux fins des travaux qui, de l'avis du représentant ministériel, est incompétente ou s'est conduite de façon malséante et l'Entrepreneur refuse l'accès à l'emplacement des travaux à une personne ainsi retirée.

## **CG22 Augmentation ou diminution des coûts**

- 22.1 Le montant établi dans les Articles de convention doit être ni augmenté, ni diminué en raison d'une augmentation ou d'une diminution du coût des travaux résultant d'une augmentation ou d'une diminution du coût du travail, de l'outillage, des matériaux ou des rajustements salariaux énoncés ou prescrits dans les Conditions de travail.
- 22.2 Nonobstant le paragraphe CG22.1 et l'article CG35, le montant énoncé dans les Articles de convention doit faire l'objet d'un redressement de la manière prévue au paragraphe CG22.3, en cas de modification à une taxe imposée en vertu de la Loi sur l'accise, de la Loi sur la taxe d'accise, de la Loi sur la sécurité de la vieillesse, de la Loi sur les douanes, du Tarif des douanes ou de toute loi provinciale sur la taxe de vente imposant une taxe de vente au détail sur l'achat de biens personnels corporels incorporés dans les biens immobiliers :
- 22.2.1 survenant après la date à laquelle l'Entrepreneur a présenté une soumission pour le Contrat,
- 22.2.2 s'appliquant aux matériaux; et
- 22.2.3 influant sur le coût de ces matériaux pour l'Entrepreneur.
- 22.3 En cas de changement fiscal suivant le paragraphe CG22.2, tout montant pertinent indiqué dans les Articles de convention sera augmenté ou diminué d'un montant égal qui, sur examen des registres mentionnés à l'article CG51, représente l'augmentation ou la diminution, selon le cas, des coûts directement attribuables à ce changement.
- 22.4 Aux fins du paragraphe CG22.2, lorsqu'une taxe fait l'objet d'un changement après la date à laquelle l'Entrepreneur a présenté une soumission mais alors que le ministre des Finances en avait donné avis public avant la date de présentation de la soumission, le changement fiscal est censé être survenu avant la date à laquelle la soumission a été présentée.

## **CG23 Main-d'œuvre et matériaux canadiens**

- 23.1 L'Entrepreneur emploie pour l'exécution des travaux, de la main-d'œuvre et des matériaux canadiens dans toute la mesure où ils sont disponibles, compte tenu des exigences économiques et de la nécessité de poursuivre une exécution diligente des travaux.
- 23.2 Sous réserve du paragraphe CG23.1, l'Entrepreneur emploie, dans la mesure où elle est disponible, la main-d'œuvre de la localité où les travaux sont exécutés, et il recourt aux bureaux des Centres d'emploi du Canada pour recruter les ouvriers, là où la chose est réalisable.
- 23.3 Sous réserve des paragraphes CG23.1 et CG23.2, l'Entrepreneur emploie une proportion raisonnable d'ouvriers qui ont été en service actif dans les Forces armées canadiennes et qui en

ont reçu une libération honorable.

#### **CG24 Protection des travaux et des documents**

- 24.1 L'Entrepreneur garde et protège les travaux, l'emplacement des travaux, le Contrat, les devis, les plans, les dessins, les renseignements, les matériaux, l'outillage et les biens immobiliers, fournis ou non par Sa Majesté à l'Entrepreneur, contre toute perte ou dommage de quelque nature et ne peut les utiliser, donner, démolir ou en disposer sans le consentement écrit du Ministre, sauf si cela est indispensable à l'exécution des travaux.
- 24.2 Si une cote de sécurité est attribuée aux documents ou renseignements donnés ou dévoilés à l'Entrepreneur, l'Entrepreneur prend toutes les mesures que lui enjoint le représentant ministériel pour assurer le degré de sécurité conforme à cette cote.
- 24.3 L'Entrepreneur fournit tous dispositifs de sécurité et aide toute personne à laquelle le Ministre a donné l'autorisation d'inspecter ou de prendre les mesures de sécurité qui s'imposent à l'égard des travaux et de l'emplacement des travaux.
- 24.4 Le représentant ministériel peut ordonner à l'Entrepreneur de faire telles choses et d'effectuer tels travaux additionnels qui, de l'avis du représentant ministériel, sont raisonnables et nécessaires pour assurer l'observation des paragraphes CG24.1 à CG24.3, ou pour rectifier une violation de ces paragraphes.

#### **CG25 Cérémonies publiques et enseignes**

- 25.1 L'Entrepreneur ne permet pas de cérémonie publique relativement aux travaux, sans la permission du Ministre.
- 25.2 L'Entrepreneur n'érige pas ou ne permet pas l'érection d'enseignes ou de panneaux publicitaires sur les travaux ou l'emplacement des travaux sans l'approbation du représentant ministériel.

#### **CG26 Précautions contre les dommages, la transgression des droits, les incendies, et les autres dangers**

- 26.1 L'Entrepreneur doit, à ses propres frais, faire le nécessaire pour s'assurer
- 26.1.1 que nulle personne n'est blessée, nul bien endommagé et nul droit, servitude ou privilège enfreint en raison de l'activité de l'Entrepreneur en vertu du Contrat;
  - 26.1.2 que la circulation à pied ou autrement sur les chemins ou cours d'eau publics ou privés n'est pas indûment entravée, interrompue ou rendue dangereuse par les travaux ou l'outillage;
  - 26.1.3 que les dangers d'incendie sur le chantier ou l'emplacement des travaux sont éliminés et que, sous réserve de tout ordre qui peut être donné par le représentant ministériel, tout incendie est promptement maîtrisé;

- 26.1.4 que la santé et sécurité des personnes occupées aux travaux ne sont pas menacées par les méthodes ou les moyens mis en œuvre;
- 26.1.5 que des services médicaux suffisants sont offerts en tout temps pendant les heures de travail, à toutes personnes occupées aux travaux;
- 26.1.6 que des mesures sanitaires suffisantes sont prises à l'égard des travaux et l'emplacement des travaux; et
- 26.1.7 que tous les jalons, bouées et repères placés sur les travaux ou l'emplacement des travaux par le représentant ministériel ou sur son ordre sont protégés et ne sont pas enlevés, abimés, changés ou détruits.

- 26.2 Le représentant ministériel peut ordonner à l'Entrepreneur de faire toute chose et de construire tout ouvrage additionnel qui, de l'avis du représentant ministériel, est raisonnable ou nécessaire pour assurer l'observation du paragraphe CG26.1 ou pour rectifier une infraction audit paragraphe.
- 26.3 L'Entrepreneur se conforme, à ses propres frais, à tout ordre que le représentant ministériel émet conformément au paragraphe CG26.2.

#### **CG27 Assurances**

- 27.1 L'Entrepreneur souscrit et maintient, à ses propres frais, des polices d'assurance relativement aux travaux et en fournit la preuve au représentant ministériel conformément aux exigences des Conditions d'assurance « E ».
- 27.2 Les polices d'assurance mentionnées au paragraphe CG27.1 doivent être :
  - 27.2.1 en la forme et nature, au montant, pour la durée et suivant les termes et conditions prévus aux Conditions d'assurance « E »; et
  - 27.2.2 prévoir le remboursement des demandes de règlement, conformément à l'article CG28.

#### **CG28 Indemnité d'assurance**

- 28.1 Dans le cas d'une demande de règlement en vertu d'une police d'assurance tous risques chantier (y compris les installations) que maintient l'Entrepreneur conformément à l'article CG27, les sommes dues à l'égard d'un sinistre seront remboursées directement à Sa Majesté, et :
  - 28.1.1 les sommes ainsi versées seront retenues par Sa Majesté aux fins du contrat; ou
  - 28.1.2 si Sa Majesté en décide ainsi, seront conservées par Sa Majesté, et le cas échéant, deviendront sa propriété de façon absolue.
- 28.2 Dans le cas d'une demande de règlement en vertu d'une police responsabilité civile générale que maintient l'Entrepreneur conformément à l'article CG27, l'assureur remboursera directement au

demandeur les sommes dues à l'égard d'un sinistre.

- 28.3 Si le Ministre choisit conformément au paragraphe CG28.1 de conserver l'indemnité d'assurance, il peut faire effectuer une vérification de la comptabilité de l'Entrepreneur et de Sa Majesté relativement à la partie des travaux perdue, endommagée ou détruite, afin d'établir la différence, s'il en est, entre
- 28.3.1 l'ensemble du montant des pertes ou dommages subis par Sa Majesté, incluant tous frais encourus pour le déblaiement et le nettoyage des travaux et l'emplacement des travaux et de toute autre somme payable par l'Entrepreneur à Sa Majesté en vertu du Contrat, moins toute somme retenue conformément à l'alinéa CG28.1.2; et
- 28.3.2 l'ensemble des sommes payables par Sa Majesté à l'Entrepreneur en vertu du Contrat à la date où la perte ou les dommages ont été subis.
- 28.4 Toute différence établie conformément au paragraphe CG28.3 doit être payée sans délai par la partie débitrice à la partie créancière.
- 28.5 Suite au paiement prévu au paragraphe CG28.4, Sa Majesté et l'Entrepreneur sont réputés libérés de tous droits et obligations en vertu du Contrat, à l'égard seulement de la partie des travaux qui a fait l'objet d'une vérification mentionnée au paragraphe CG28.3.
- 28.6 S'il n'est pas exercé de choix en vertu du paragraphe CG28.1.2, l'Entrepreneur, sous réserve du paragraphe CG28.7, déblaie et nettoie les travaux et l'emplacement des travaux et il restaure et remplace à ses frais la partie des travaux qui a été perdue ou endommagée, comme si ces travaux n'avaient pas encore été exécutés.
- 28.7 Lorsque l'Entrepreneur exécute les obligations prévues au paragraphe CG28.6, Sa Majesté lui rembourse, jusqu'à concurrence des sommes mentionnées au paragraphe CG28.1, les frais de déblaiement, nettoyage, restauration et remplacement en question.
- 28.8 Sous réserve du paragraphe CG28.7, tout paiement par Sa Majesté en exécution des obligations prévues au paragraphe CG28.7 est effectué conformément aux dispositions du Contrat, mais chaque paiement doit représenter 100% du montant réclamé, nonobstant les alinéas MP4.4.1 et MP4.4.2.

## **CG29 Garantie du contrat**

- 29.1 L'Entrepreneur obtient et dépose auprès du représentant ministériel une ou des garanties conformément aux conditions de garantie du contrat.
- 29.2 S'il est déposé une garantie auprès du représentant ministériel en vertu du paragraphe CG29.1 constituant en tout ou en partie en un dépôt de garantie, ce dépôt sera traité conformément aux articles CG43 et CG45 des Conditions générales.
- 29.3 Si la garantie en vertu du paragraphe CG29.1 consiste, en partie, en un cautionnement (bond) pour le paiement de la main-d'œuvre et des matériaux, l'Entrepreneur affiche une copie de ce cautionnement sur l'emplacement des travaux.

### **CG30 Modifications aux travaux**

- 30.1 Sous réserve de l'article CG5, le représentant ministériel peut, à tout moment avant de délivrer son Certificat définitif d'achèvement :
- 30.1.1 exiger des travaux ou des matériaux en sus de ceux qui ont été prévus dans les Plans et devis; et
  - 30.1.2 supprimer ou modifier les dimensions, le caractère, la quantité, la qualité, la description, la situation ou la position de la totalité ou d'une partie des travaux ou matériaux prévus dans les Plans et devis ou exigés en conformité de l'alinéa CG30.1.1.
- à condition que ces travaux ou matériaux supplémentaires, ou que ces suppressions ou modifications soient, selon lui compatibles avec l'intention du Contrat.
- 30.2 L'Entrepreneur exécute les travaux conformément aux ordres, suppressions et modifications émis de temps à autre par le représentant ministériel en vertu du paragraphe CG30.1, comme s'ils faisaient partie des Plans et devis.
- 30.3 Le représentant ministériel décide si ce que l'Entrepreneur a fait ou omis de faire conformément à un ordre, une suppression ou une modification en vertu du paragraphe CG30.1 a augmenté ou diminué le coût des travaux pour l'Entrepreneur.
- 30.4 Si le représentant ministériel décide, conformément au paragraphe CG30.3, qu'il y a eu augmentation du coût pour l'Entrepreneur, Sa Majesté paie à l'Entrepreneur le coût accru que l'Entrepreneur a nécessairement encouru pour les travaux supplémentaires, calculé conformément aux articles CG49 ou GB50.
- 30.5 Si le représentant ministériel décide, conformément au paragraphe CG30.3, qu'il y a eu réduction du coût pour l'Entrepreneur, Sa Majesté réduit le montant payable à l'Entrepreneur en vertu du Contrat d'un montant égal à la réduction du coût occasionné par toute suppression ou modification ordonnée conformément au paragraphe CG30.1.2, calculé conformément à l'article CG49.
- 30.6 Les paragraphes CG30.3 à CG30.5 s'appliquent seulement à un contrat ou partie d'un contrat comportant, suivant le Contrat, une Entente à prix fixe.
- 30.7 Tout ordre, suppression ou modification mentionné au paragraphe CG30.1 doit être par écrit, porter la signature du représentant ministériel et être communiqué à l'Entrepreneur conformément au paragraphe CG11.

### **CG31 Interprétation du Contrat par le représentant ministériel**

- 31.1 Avant la délivrance par le représentant ministériel du Certificat définitif d'achèvement mentionné au paragraphe CG44.1, le représentant ministériel tranche toute question concernant l'exécution des travaux ou les obligations de l'Entreteneur en vertu du Contrat et en particulier, mais sans limiter la portée générale de ce qui précède, concernant :

- 31.1.1 la signification de quoi que ce soit dans les Plans et devis;
  - 31.1.2 l'interprétation des Plans et devis au cas d'erreur, omission, obscurité ou divergence dans leur texte ou intention;
  - 31.1.3 le respect des exigences du Contrat quant à la quantité ou la qualité des matériaux ou du travail que l'Entrepreneur fournit ou se propose de fournir;
  - 31.1.4 la suffisance de la main-d'œuvre, de l'outillage ou des matériaux que l'Entrepreneur fournit pour la réalisation des travaux et du Contrat, pour assurer l'exécution des travaux suivant le Contrat et l'exécution du Contrat conformément à ses dispositions;
  - 31.1.5 la qualité de tout genre de travail effectué par l'Entrepreneur; ou
  - 31.1.6 l'échéancier et la programmation des diverses phases de l'exécution des travaux;
- et la décision du représentant ministériel est sans appel, pour ce qui est des travaux.
- 31.2 L'Entrepreneur exécute les travaux conformément aux décisions et directives du représentant ministériel en vertu du paragraphe CG31.1 et conformément à toute décision et directive du représentant ministériel que en découlent.

### **CG32 Garantie et rectification des défauts des travaux**

- 32.1 Sans restreindre les garanties implicites ou explicites de la loi ou du Contrat, l'Entrepreneur doit, à ses propres frais
- 32.1.1 rectifier toute défectuosité et corriger tout vice qui se manifeste dans les travaux ou qui est signalé au Ministre quant aux parties du travail acceptées relativement au Certificat provisoire d'achèvement mentionné au paragraphe CG44.2 dans les 12 mois qui suivront la date d'émission du Certificat provisoire d'achèvement.
  - 32.1.2 rectifier toute défectuosité et corriger tout vice qui se manifeste dans les travaux ou qui est signalé au Ministre relativement aux parties des travaux décrites dans le Certificat provisoire d'achèvement mentionné au paragraphe CG44.2 dans les 12 mois qui suivent la date d'émission du Certificat définitif d'achèvement mentionné au paragraphe CG44.1.
- 32.2 Le représentant ministériel peut ordonner à l'Entrepreneur de rectifier ou corriger toute défectuosité ou tout vice mentionné au paragraphe CG32.1 ou couvert par toute autre garantie implicite ou explicite.
- 32.3 L'ordre mentionné au paragraphe CG32.2.1 doit être par écrit; il peut préciser le délai dans lequel l'Entrepreneur doit rectifier ou corriger la défectuosité ou le vice et il doit être donné à l'Entrepreneur conformément à l'article CG11.
- 32.4 L'Entrepreneur doit rectifier la défectuosité ou corriger le vice mentionné dans l'ordre donné en conformité du paragraphe CG32.2 dans le délai qui y est stipulé.



### **CG33 Défaut de l'Entrepreneur**

- 33.1 Si l'Entrepreneur omet de se conformer à une décision ou directive rendue ou émise par le représentant ministériel en vertu des articles CG18, CG24, CG26, CG31 ou CG32, le représentant ministériel peut recourir aux méthodes qui lui semblent opportunes pour exécuter ce que l'Entrepreneur a omis d'exécuter.
- 33.2 L'Entrepreneur paie à Sa Majesté, sur demande, la totalité de tous les frais, dépenses et dommages encourus par Sa Majesté en raison du défaut de l'Entrepreneur de se conformer à toute décision ou directive stipulée au paragraphe CG31.1 et en raison de toute méthode utilisée en l'occurrence par le représentant ministériel conformément au paragraphe CG33.1.

### **CG34 Protestations des décisions du représentant ministériel**

- 34.1 L'Entrepreneur peut contester, dans les dix jours de sa réception, une décision ou directive mentionnée aux paragraphes CG30.3 ou CG33.1.
- 34.2 Toute contestation mentionnée au paragraphe CG34.1 doit être par écrit, indiquer tous les motifs de la contestation, être signée par l'Entrepreneur et communiquée à Sa Majesté par l'entremise du représentant ministériel.
- 34.3 Si l'Entrepreneur proteste conformément au paragraphe CG34.2, le fait pour lui de se conformer à la décision ou à la directive qu'il conteste ne sera pas interprété comme une reconnaissance du bienfondé de cette décision ou de cette directive et ne pourra constituer une fin de non-recevoir quant à toute poursuite qu'il estimera appropriée dans les circonstances.
- 34.4 Tout protêt de l'Entrepreneur en vertu du paragraphe CG34.2 ne le dispense de se conformer à la décision ou directive en question.
- 34.5 Sous réserve du paragraphe CG34.6, l'Entrepreneur doit, sous peine de déchéance, intenter toute poursuite judiciaire mentionnée au paragraphe CG34.3 dans les trois mois suivant la date d'émission du Certificat définitif d'achèvement mentionné au paragraphe CG44.1.
- 34.6 L'Entrepreneur doit, sous peine de déchéance, intenter dans les trois mois suivant la fin d'une période de garantie, toute poursuite judiciaire mentionnée au paragraphe CG34.3 et découlant d'un ordre donné en vertu de l'article CG32.
- 34.7 Sous réserve du paragraphe CG34.8, si Sa Majesté tient la contestation de l'Entrepreneur comme bien fondée, elle doit lui rembourser le coût des travaux, de l'outillage et des matériaux additionnels nécessaires à l'exécution de l'ordre ou de la directive ayant fait l'objet du protêt.
- 34.8 Les couts mentionnés au paragraphe CG34.7 doivent être calculés conformément aux dispositions des articles CG48 à CG50.

### **CG35 Changement des conditions du sol – Négligence ou retard de la part de Sa Majesté**

- 35.1 Sous réserve du paragraphe CG35.2, nul paiement autre qu'un paiement expressément stipulé au Contrat n'est fait par Sa Majesté à l'Entrepreneur en raison de quelque dépense supplémentaire

encourue ou pour quelque perte ou dommage subi par l'Entrepreneur.

35.2 Si l'Entrepreneur encourt des frais supplémentaires ou subit des pertes ou dommages directement attribuables :

35.2.1 à un écart substantiel entre les renseignements sur les conditions du sol à l'emplacement des travaux, dans les Plans et devis ou d'autre documents fournis à l'Entrepreneur pour l'établissement de sa soumission, ou à un écart substantiel entre une présomption raisonnable de l'Entrepreneur fondée sur lesdits renseignements et les conditions réelles rencontrées par l'Entrepreneur à l'emplacement des travaux lors de leur exécution; ou

35.2.2 à la négligence ou à un retard de la part de Sa Majesté après la date du Contrat, à fournir tout renseignement ou à tout acte auquel Sa Majesté est expressément obligée par le Contrat ou que les usages de l'industrie dicteraient ordinairement à tout propriétaire;

il doit dans les dix jours qui suivent la date de la constatation des conditions du sol décrites à l'alinéa CG35.2.1 ou la date de la négligence ou du retard décrit au paragraphe CG35.2.2, en donner avis par écrit au représentant ministériel et lui signifier son intention d'exiger le remboursement des frais supplémentaires encourus ou le coût de toutes pertes ou dommages subis.

35.3 Lorsque l'Entrepreneur a donné au représentant ministériel l'avis mentionné au paragraphe CG35.3, il doit sous peine de déchéance dans les 30 jours suivant la date de l'émission du Certificat définitif mentionné au paragraphe CG44.1, remettre au représentant ministériel une demande écrite de remboursement des frais supplémentaires ou du coût de toutes pertes ou dommages subis.

35.4 La demande de remboursement mentionnée au paragraphe CG35.3 devra contenir une description suffisante des faits et circonstances qui motivent la demande afin que le représentant ministériel puisse déterminer si cette demande est justifiée ou non, et l'Entrepreneur doit, à cette fin, fournir tout autre renseignement que le représentant ministériel peut exiger.

35.5 Si, de l'avis du représentant ministériel, la demande de remboursement mentionnée au paragraphe CG35.3 est bien fondée, Sa Majesté doit verser à l'Entrepreneur un supplément calculé en conformité des articles CG47 à CG49.

35.6 Si, de l'avis du représentant ministériel, le cas décrit à l'alinéa CG35.2.1 se traduit pour l'Entrepreneur par une économie dans l'exécution du Contrat, le montant établi dans les Articles de convention est, sous réserve du paragraphe CG35.7, réduit d'un montant égal à l'économie réalisée.

35.7 Le montant à être déduit en vertu du paragraphe CG35.6 doit être déterminé selon les dispositions des articles CG47 à CG49.

35.8 Si l'Entrepreneur néglige de donner l'avis mentionné au paragraphe CG35.2 et de présenter la demande de remboursement mentionnée au paragraphe CG35.3 dans le délai prescrit, aucun supplément ne doit lui être versé en l'occurrence.

### **CG36 Prolongation de délai**

- 36.1 Sous réserve du paragraphe CG36.2, le représentant ministériel peut, s'il estime que l'achèvement en retard des travaux est attribuable à des causes indépendantes de la volonté de l'Entrepreneur et sur demande présentée par l'Entrepreneur avant le jour fixe par les Articles de convention pour l'achèvement des travaux ou avant toute autre date fixée auparavant conformément au présent article, prolonger le délai d'achèvement des travaux.
- 36.2 Toute demande mentionnée au paragraphe CG36.1 doit être accompagnée du consentement écrit de la compagnie dont le cautionnement constitue une partie de la garantie du contrat.

### **CG37 Dédommagement pour retard d'exécution**

- 37.1 Aux fins du présent article :
- 37.1.1 les travaux sont censés être achetés le jour ou le représentant ministériel délivre le Certificat provisoire d'achèvement mentionné au paragraphe CG44.2; et
- 37.1.2 « période de retard » signifie la période commençant le jour fixé par les Articles de convention pour l'achèvement des travaux et se terminant le jour précédant immédiatement le jour de l'achèvement, à l'exclusion cependant de tout jour faisant partie d'une période de prolongation accordée en vertu du paragraphe CG36.1 et de tout autre jour où, de l'avis du représentant ministériel, l'achèvement des travaux a été retardé par des causes indépendantes de la volonté de l'Entrepreneur.
- 37.2 Si l'Entrepreneur n'achève pas les travaux au jour fixé par les Articles de convention mais achève ces travaux par la suite, l'Entrepreneur paie à Sa Majesté un montant égal à l'ensemble :
- 37.2.1 de tous les salaires, gages et frais de déplacement versés par Sa Majesté aux personnes surveillant les travaux pendant la période de retard;
- 37.2.2 des coûts encourus par Sa Majesté en conséquence de l'impossibilité pour Sa Majesté de faire usage des travaux achevés pendant la période de retard; et
- 37.2.3 de tous les autres frais et dommages encourus ou subis par Sa Majesté pendant la période de retard par suite de l'inachèvement des travaux à la date prévue.
- 37.3 S'il estime que l'intérêt public le commande, le Ministre peut renoncer au droit de Sa Majesté à la totalité ou partie d'un paiement exigible en conformité du paragraphe CG37.2.

### **CG38 Travaux retirés à l'Entrepreneur**

- 38.1 Le Ministre peut dans les cas suivants et à son entière discrétion, en donnant un avis par écrite à l'Entrepreneur conformément à l'article CG11, retirer à l'Entrepreneur la totalité ou une partie des travaux et recourir aux moyens qui lui semblent appropriés pour achever les travaux si l'Entrepreneur :
- 38.1.1 fait défaut ou retarde à commencer les travaux ou à exécuter les travaux avec diligence et à la satisfaction du représentant ministériel, dans les six jours suivant la réception par

l'Entrepreneur d'un avis par écrite du Ministre ou du représentant ministériel, conformément à l'article CG11 :

- 38.1.2 a néglige d'achever quelque partie des travaux dans le délai imparti par le Contrat;
  - 38.1.3 est devenu insolvable :
  - 31.1.4 a commis un acte de faillite;
  - 31.1.5 a abandonné les travaux;
  - 31.1.6 a fait cession du Contrat sans le consentement requis au paragraphe CG3.1; ou
  - 31.1.7 a de quelque autre façon fait défaut d'observer ou d'accomplir l'une quelconque des dispositions du Contrat.
- 38.2 Si la totalité ou une partie quelconque des travaux a été retirée à l'Entrepreneur en vertu de paragraphe CG38.1.
- 38.2.1 l'Entrepreneur n'a droit, sauf dispositions du paragraphe CG38.4, à aucun autre paiement dû et exigible.
  - 38.2.2 l'Entrepreneur est tenu de payer à Sa Majesté, sur demande, un montant égal à la totalité des pertes et dommages que Sa Majesté aura subis en raison de défaut de l'Entrepreneur d'achever les travaux.
- 38.3 Si la totalité ou partie des travaux retirés à l'Entrepreneur en vertu du paragraphe CG38.1 est achevée par Sa Majesté, le représentant ministériel établit le montant, s'il y en a, de toute retenue ou demande d'acompte de l'Entrepreneur existant au moment où les travaux lui ont été retirés et dont, selon le représentant ministériel, on n'a pas besoin pour assurer exécution des travaux ou pour rembourser à Sa Majesté les pertes ou dommages subis en raison du défaut de l'Entrepreneur.
- 38.4 Sa Majesté peut verser à l'Entrepreneur le montant qu'on jugera non requis suivant le paragraphe CG38.3.

### **CG39 Effet du retrait des travaux à l'Entrepreneur**

- 39.1 La retrait de la totalité ou d'une partie des travaux à l'Entrepreneur en conformité de l'article CG38, n'a pas pour effet de libérer l'Entrepreneur d'une obligation quelconque découlant pour lui du Contrat ou de la loi, sauf quant à l'obligation pour lui de continuer l'exécution de la partie des travaux qui lui fut ainsi retirée.
- 39.2 Si la totalité ou partie des travaux est retirée à l'Entrepreneur en conformité de l'article CG38, tous les matériaux et outillage, ainsi que l'intérêt de l'Entrepreneur dans tous les biens immobiliers, permis, pouvoirs et privilèges acquis, utilisés ou fournis par l'Entrepreneur pour les travaux, continuent d'être la propriété de Sa Majesté sans indemnisation de l'Entrepreneur.
- 39.3 Si le représentant ministériel certifie que tout matériau, outillage ou un intérêt quelconque

mentionné au paragraphe CG39.2 n'est plus requis pour les travaux et qu'il n'est plus dans l'intérêt de Sa Majesté de retenir lesdits matériaux, outillage ou intérêt, ils sont remis à l'Entrepreneur.

#### **CG40 Suspension des travaux par le Ministre**

- 40.1 Le Ministre peut, lorsqu'il estime que l'intérêt public le commande, sommer l'Entrepreneur de suspendre l'exécution des travaux pour une durée déterminée ou indéterminée, en lui communiquant par écrit un avis à cet effet, conformément à l'article CG11.
- 40.2 Sur réception suivant l'article CG11 de la sommation mentionnée au paragraphe CG40.1, l'Entrepreneur suspend toutes les opérations sauf celles qui, de l'avis du représentant ministériel, sont nécessaires à la garde et à la préservation des travaux, de l'outillage et des matériaux.
- 40.3 Pendant la période de suspension, l'Entrepreneur ne peut enlever de l'emplacement, sans le consentement du représentant ministériel, quelque partie des travaux, de l'outillage et des matériaux.
- 40.4 Si la période de suspension est de 30 jours ou moins, l'Entrepreneur reprend l'exécution des travaux dès l'expiration de la période de suspension et il a droit au paiement des frais, calculés en conformité des articles CG48 à CG50, du travail, de l'outillage et des matériaux nécessairement encourus en conséquence de la suspension des travaux.
- 40.5 Si, à l'expiration d'une période de suspension de plus de 30 jours, le Ministre et l'Entrepreneur conviennent que l'exécution des travaux sera continuée par l'Entrepreneur, ce dernier reprend les opérations sous réserve des termes et conditions convenus entre lui et le Ministre.
- 40.6 Si, à l'expiration d'une période de suspension de plus de 30 jours, le Ministre et l'Entrepreneur ne conviennent pas que les travaux seront continués par l'Entrepreneur ou ne s'entendent pas sur les termes et conditions suivant lesquels l'Entrepreneur poursuivra l'exécution des travaux, l'avis de suspension est censé être un avis de résiliation et conformément de l'article CG41.

#### **CG41 Résiliation du Contrat**

- 41.1 Le Ministre peut, à n'importe quel moment, résilier le Contrat en donnant avis par écrit à cet effet à l'Entrepreneur conformément à l'article CG11.
- 41.2 Sur réception suivant l'article CG11 de l'avis mentionné au paragraphe CG41.1, l'Entrepreneur cesse toutes opérations dans l'exécution du Contrat, sous réserve de toutes conditions énoncées dans l'avis.
- 41.3 Si le Contrat est résilié conformément au paragraphe CG41.1, Sa Majesté paie à l'Entrepreneur, sous réserve du paragraphe CG41.4, un montant égal :
  - 41.3.1 au coût de tout le travail, l'outillage et les matériaux qu'aura fournis l'Entrepreneur en vertu du Contrat à la date de résiliation, en exécution d'un contrat ou d'une partie de contrat relativement auquel une Entente à prix unitaire est précisée dans le Contrat; ou

41.3.2 au moins :

41.3.2.1 du montant, calculé conformément aux Modalités de paiement, qui aurait été payable à l'Entrepreneur s'il avait achevé les travaux; et

41.3.2.2 du montant que l'on reconnaît devoir à l'Entreteneur en vertu de l'article CG49, concernant un contrat ou une partie de contrat pour lequel le Contrat prévoit une Entente à prix fixe;

moins l'ensemble de tous les montants qui furent payés à l'Entrepreneur par Sa Majesté et de tous les montants dont l'Entrepreneur est redevable envers Sa Majesté en vertu du Contrat.

41.4 Si Sa Majesté et l'Entrepreneur ne peuvent convenir du montant mentionné au paragraphe CG41.3, ce montant sera déterminé suivant la méthode indiquée à l'article CG50.

#### **CG42 Réclamations contre et obligations de la part de l'Entrepreneur ou d'un sous-entrepreneur**

42.1 Afin d'acquitter toutes obligations légales de l'Entrepreneur ou d'un sous-entrepreneur ou de satisfaire à toutes réclamations légales contre eux résultant de l'exécution du Contrat, Sa Majesté peut payer tout montant qui est dû et payable à l'Entrepreneur en vertu du Contrat, directement aux créanciers de l'Entrepreneur ou du sous-entrepreneur, ou aux réclamants en l'occurrence. Toutefois, ce montant que paie Sa Majesté, le cas échéant, ne doit pas excéder le montant que l'Entrepreneur aurait été tenu de verser au réclamant si les dispositions des lois relatives aux privilèges dans les provinces et territoires ou, dans le cas de la province de Québec, de la loi à cet effet dans le Code civil, avaient été applicables aux travaux. Le réclamant n'a pas à respecter les dispositions des lois relatives aux privilèges qui établissent les démarches à suivre au moyen d'avis, d'enregistrements ou d'autre façon, comme il aurait pu être nécessaire de le faire pour conserver ou valider toute réclamation à l'égard de liens émanant du réclamant.

42.2 Sa Majesté n'effectue pas de paiement tel qu'il est décrit au paragraphe CG42.1 à moins que le réclamant lui remette :

42.2.1 un jugement ou une ordonnance exécutoire d'un tribunal compétent établissant le montant qu'aurait eu à verser l'Entrepreneur au réclamant en vertu des dispositions de la loi provinciale ou territoriale relative aux privilèges pertinente ou, dans le cas de la province de Québec, de la loi à cet effet dans le Code civil, si ces lois s'appliquaient aux travaux, ou

42.2.2 une sentence arbitrale définitive et exécutoire établissant le montant qu'aurait eu à verser l'Entrepreneur au réclamant en vertu des dispositions de la loi provinciale ou territoriale relative aux privilèges pertinente ou, dans le cas de la province de Québec, de la loi à cet effet dans le Code civil, si ces lois s'appliquaient aux travaux; ou

42.2.3 le consentement de l'Entrepreneur autorisant le paiement.

Pour déterminer les droits du réclamant en vertu des alinéas CG42.2.1 et CG42.2.2, l'avis exigé au paragraphe CG42.8 sera réputé remplacer l'enregistrement ou la prestation d'un avis après l'achèvement des travaux exigé par les lois applicables, et aucune réclamation ne sera réputée être

expirée, annulée ou non exécutoire parce que le réclamant n'a pas intenté de poursuites dans les délais prescrits par la loi applicable.

- 42.3 Lorsqu'il accepte d'exécuter un Contrat, l'Entrepreneur est réputée avoir consenti de soumettre à l'arbitrage obligatoire, à la demande d'un réclamant, toutes les questions auxquelles il faut répondre pour déterminer si le réclamant a droit au paiement conformément aux dispositions du paragraphe CG42.1. Les parties à l'arbitrage seront, entre autres, le sous-traitant à qui le réclamant a fourni des matériaux ou de l'équipement ou pour qui il a effectué du travail, si le sous-traitant le désire. L'État ne constitue pas une partie à l'arbitrage et, à moins d'une entente contraire entre l'Entrepreneur et le réclamant, l'arbitrage se déroulera conformément à la loi provinciale ou territoriale régissant l'arbitrage applicable dans la province ou le territoire où les travaux sont exécutés.
- 42.4 Une paiement effectuée en conformité du paragraphe CG42.1 comporte quittance de l'obligation de Sa Majesté envers l'Entrepreneur sous le contrat, jusqu'à concurrence du montant payé et peut être déduit d'un montant dû à l'Entrepreneur en vertu du Contrat.
- 42.5 Dans la mesure où les circonstances entourant l'exécution des travaux pour le compte de Sa Majesté le permettent, l'Entrepreneur se conforme à toutes les lois en vigueur dans la province ou le territoire où les travaux sont exécutés quant aux périodes de paiement, aux retenus obligatoires, à la création et à la mise en vigueur de lois concernant les privilèges des fournisseurs ou des constructeurs ou de lois semblables ou, s'il s'agit de la province de Québec, aux dispositions de la loi qui concerne les privilèges.
- 42.6 L'Entrepreneur acquitte toutes ses obligations légales et fait droit à toutes les réclamations légales qui lui sont adressées en conséquence de l'exécution des travaux, au moins aussi souvent que le Contrat oblige Sa Majesté à acquitter ses obligations envers l'Entrepreneur.
- 42.7 Sur demande du représentant ministériel, l'Entrepreneur fait une déclaration attestant de l'existence et de l'état de toutes les obligations et réclamations mentionnées au paragraphe CG42.6.
- 42.8 Le paragraphe CG42.1 ne s'applique qu'aux réclamations et aux obligations :
- 42.8.1 pour lesquelles le représentant ministériel a reçu un avis par écrit avant qu'un paiement n'ait été effectué à l'Entrepreneur conformément au paragraphe MP4.10 et dans les 120 jours suivant la date à laquelle le réclamant :
- 42.8.1.1 aurait dû être payé en totalité conformément au contrat qui le lie à l'Entrepreneur ou à un sous-traitant, s'il s'agit d'une réclamation pour des deniers dont il est légalement requis qu'ils soient retenus du réclamant; ou
- 42.8.1.2 s'est acquitté des derniers services ou travaux ou à fourni les derniers matériaux exigés par le contrat qui le lie à l'Entrepreneur ou à un sous-traitant, s'il ne s'agit pas d'une réclamation mentionnée au sous-alinéa CG42.8.1.1; et
- 42.8.2 pour lesquelles les procédures visant à établir les droits à un paiement, conformément au paragraphe CG42.2, ont commencé dans l'année suivant la date à laquelle l'avis mentionné à l'alinéa CG42.8.1 a été reçu par le représentant ministériel; et

l'avis exige à l'alinéa CG42.8.1 doit faire état du montant réclamé et du principal responsable selon le Contrat.

- 42.9 Sur réception d'un avis de réclamation en vertu de l'alinéa CG42.8.1, Sa Majesté peut retenir de tout montant dû et payable à l'Entrepreneur en vertu du Contrat un partie ou la totalité du montant de la réclamation.
- 42.10 Le représentant ministériel doit aviser l'Entrepreneur par écrit de la réception de toute réclamation mentionné à l'alinéa CG42.8.1 et de l'intention de Sa Majesté de retenir des fonds conformément au paragraphe CG42.9, et l'Entrepreneur peut, à tout moment par la suite et jusqu'à ce que le paiement soit effectué au réclamant, déposer, auprès de Sa Majesté, une garantie acceptable par Sa Majesté dont le montant est équivalent à la valeur de la réclamation. L'avis d'un tel dépôt doit être reçu par le représentant ministériel et, sur réception d'une telle garantie, Sa Majesté doit dégager à l'intention de l'Entrepreneur tous les fonds qui auraient été payables autrement à l'Entrepreneur et qui ont été retenus conformément aux dispositions du paragraphe CG42.9 à l'égard de la réclamation d'un réclamant pour laquelle la garantie a été déposée.

#### **CG43 Dépôt de garantie – Confiscation ou remise**

43.1 Si :

43.1.1 les travaux sont retirés à l'Entrepreneur conformément à l'article CG38;

43.1.2 le Contrat est résilié en vertu de l'article CG41; ou

43.1.3 l'Entrepreneur a violé ou n'a pas rempli ses engagements en vertu du Contrat;

Sa Majesté peut s'approprier le dépôt de garantie, s'il en est.

- 43.2 Si Sa Majesté s'approprie le dépôt de garantie conformément au paragraphe CG43.1, le montant obtenu en l'occurrence est censé être une dette payable à l'Entrepreneur par Sa Majesté en vertu du Contrat.
- 43.3 Tout solde du montant mentionné au paragraphe CG43.2, s'il en est, après paiement de toutes pertes dommages ou réclamations de Sa Majesté ou quelqu'un autre, sera payé par Sa Majesté à l'Entrepreneur si, dans l'opinion du représentant ministériel, il n'est pas requis pour les fins du Contrat.

#### **CG44 Certificats du représentant ministériel**

44.1 Le jour :

44.1.1 où les travaux sont achevés; et

44.1.2 où l'Entrepreneur s'est conformé au Contrat et à tous les ordres et directives donnés conformément au Contrat;



à la satisfaction du représentant ministériel, le représentant ministériel délivre à l'Entrepreneur un Certificat définitif d'achèvement.

- 44.2 Si le représentant ministériel est convaincu que les travaux sont suffisamment achevés, il peut, à tout moment avant la délivrance d'un Certificat définitif d'achèvement mentionné au paragraphe CG44.1 délivrer à l'Entrepreneur un Certificat provisoire d'achèvement, et :
- 44.2.1 aux fins du paragraphe CG44.2, les travaux seront jugés suffisamment achevés
- 44.2.1.1 lorsqu'une partie considérable ou la totalité des travaux visés par le Contrat sont, de l'avis du représentant ministériel, prêts à être utilisés par Sa Majesté ou sont utilisés aux fins prévues; et
- 44.2.1.2 lorsque les travaux qui restent à effectuer en vertu du Contrat peuvent, de l'avis du représentant ministériel, être achevés ou rectifiés à un coût n'excédant pas
- 44.2.1.2.1 -3 p. 100 des premiers 500 000 \$; et
- 44.2.1.2.2 -2 p 100 des prochains 500 000 \$; et
- 44.2.1.2.3 -1 p. 100 du reste
- de la valeur du Contrat au moment du calcul de ce coût.
- 44.3 Aux fins uniquement du sous-alinéa 44.2.1.2, lorsque les travaux ou une partie considérable des travaux sont prêts à être utilisés ou sont utilisés aux fins prévues et que le reste ou une partie des travaux ne peut être achevé pour des raisons indépendantes de la volonté de l'Entrepreneur ou, lorsque le représentant ministériel et l'Entrepreneur conviennent de ne pas achever les travaux dans les délais prescrits, le coût de la partie des travaux que l'Entrepreneur n'a pu terminer pour des raisons indépendantes de sa volonté ou que le représentant ministériel et l'Entrepreneur ont convenu de ne pas terminer dans les délais précisés sera déduit de la valeur du contrat mentionnée au sous-alinéa CG44.2.1.2 et ledit coût ne fera pas partie du coût des travaux qui restent à effectuer aux fins de la détermination de l'achèvement réel.
- 44.4 Le Certificat provisoire d'achèvement mentionné au paragraphe CG44.2 doit décrire les parties des travaux qui n'ont pas été achevées à la satisfaction du représentant ministériel et préciser tout ce que l'Entrepreneur doit faire :
- 44.4.1 avant que le Certificat définitif d'achèvement mentionné au paragraphe CG44.1 puisse être délivré; et
- 44.4.2 avant le début de la période de 12 mois mentionnée au paragraphe CG32.1.2 pour lesdites parties et toutes autres choses.
- 44.5 Le représentant ministériel peut, en plus des points indiqués dans le Certificat provisoire d'achèvement mentionné au paragraphe CG44.2, obliger l'Entrepreneur à rectifier toutes autres parties des travaux qui n'ont pas été achevées à sa satisfaction et faire effectuer toutes autres choses nécessaires pour l'achèvement satisfaisant des travaux.

- 44.6 Si le Contrat ou l'une de ses parties a fait l'objet d'une Entente à prix unitaire, le représentant ministériel mesure et consigne dans un registre les quantités de travail exécuté d'outillage fourni par l'Entrepreneur et de matériaux utilisés pour l'exécution des travaux, et informe, sur demande, l'Entrepreneur au sujet de ces mesurages.
- 44.7 L'Entrepreneur aide le représentant ministériel et coopère avec lui dans l'exécution des tâches précisées au paragraphe CG44.6 et a le droit de prendre connaissance de tout registre tenu par le représentant ministériel suivant le paragraphe CG44.6.
- 44.8 Une fois que le représentant ministériel a délivré le Certificat définitif d'achèvement mentionné au paragraphe CG44.1, il doit, si le paragraphe CG44.6 s'applique, délivrer un Certificat définitif de mesurage.
- 44.9 Le Certificat définitif de mesurage mentionné au paragraphe CG44.8 :
- 44.9.1 indique le total des mesurages des quantités mentionnées au paragraphe CG44.6, et
- 44.9.2 lie de façon péremptoire Sa Majesté et l'Entrepreneur quant aux mesurages des quantités qui y sont consignées.

#### **CG45 Remise du dépôt de garantie**

- 45.1 Après la délivrance du Certificat provisoire d'achèvement mentionné au paragraphe CG44.2 et à condition que l'Entrepreneur n'ait pas violé ses engagements en vertu du Contrat ou omis de les remplir, Sa Majesté retourne à l'Entrepreneur la totalité ou partie du dépôt de garantie, s'il en est, qui de l'avis du représentant ministériel, n'est pas requise aux fins du Contrat.
- 45.2 Au moment de la délivrance du Certificat définitif d'achèvement mentionné au paragraphe CG44.1, Sa Majesté retourne à l'Entrepreneur tout le solde du dépôt de sécurité, sauf stipulation contraire du Contrat.
- 45.3 Si le dépôt de garantie a été versé au Trésor, Sa Majesté doit payer à l'Entrepreneur l'intérêt sur ledit dépôt à un taux établi de temps à autre en vertu du paragraphe 21(2) de la Loi sur la gestion des finances publiques.

#### **CG46 Précision du sens des expressions figurant aux articles CG47 à CG50**

- 46.1 Dans les articles CG47 à CG50 :
- 46.1.1 l'expression « Tableau des prix unitaires » signifie le tableau figurant dans les Articles de convention, et
- 46.1.2 l'expression « outillage » ne comprend pas les outils habituellement fournis par les hommes de métier dans l'exercice de leurs fonctions.

#### **CG47 Additions ou modifications au Tableau des prix unitaires**

- 47.1 Le représentant ministériel et l'Entrepreneur peuvent convenir par écrit, lorsqu'une Entente à prix unitaire s'applique au Contrat ou à l'une de ses parties :
- 47.1.1 d'ajouter au Tableau des prix unitaires des catégories de travail, d'outillage ou de matériaux, des unités de mesurage, de prix par unité et des estimations de quantités lorsque certains travaux, outillage et matériaux devant apparaître dans le Certificat définitif de mesurage mentionné au paragraphe CG44.8 ne figurent dans aucune des catégories de travail, d'outillage ou de matériaux établies au Tableau des prix unitaires; ou
  - 47.1.2 sous réserve des paragraphes CG47.2 et CG47.3, de modifier le prix par unité établi au Tableau des prix unitaires à l'égard d'une quelconque catégorie de travail, d'outillage ou de matériaux y figurant, lorsqu'une quantité a été estimée à l'égard de cette catégorie de travail, d'outillage ou de matériaux, et que le Certificat définitif de mesurage mentionné au paragraphe CG44.8 indique ou est susceptible d'indiquer que la quantité totale de cette catégorie de travail exécuté, d'outillage fourni ou de matériaux utilisés par l'Entrepreneur, pour l'exécution des travaux, est :
    - 47.1.2.1 inférieur à 85% de la quantité estimée; ou
    - 47.1.2.2 supérieure à 115% de la quantité estimée.
- 47.2 Le coût total d'un article figurant au Tableau des prix unitaires qui a été modifié conformément au sous-alinéa 47.1.2.1 ne doit, en aucun cas, excéder le montant qui aurait été payable à l'Entrepreneur si la quantité totale estimative de travail avait été exécutée, la quantité totale estimative d'outillage avait été fournie ou la quantité totale estimative de matériaux, utilisée.
- 47.3 Toute modification rendue nécessaire par le sous-alinéa CG47.1.2.2 ne s'appliquera qu'aux quantités supérieures à 115%.
- 47.4 Si le représentant ministériel et l'Entrepreneur ne s'entendent pas suivant le paragraphe CG47.1, le représentant ministériel détermine la catégorie et l'unité de mesurage du travail, de l'outillage et des matériaux et, sous réserve des paragraphes CG47.2 et CG47.3, le prix par unité est déterminé conformément à l'article CG50.

#### **CG48 Établissement du coût – Tableau des prix unitaires**

- 48.1 Chaque fois qu'il est nécessaire, aux fins du Contrat, d'établir le coût du travail, de l'outillage et des matériaux, on multiplie la quantité de ce travail de cet outillage ou de ces matériaux, exprimée par l'unité énoncée à la colonne 3 du Tableau des prix unitaires, par le prix énoncé en regard de cette unité à la colonne 5 du Tableau des prix unitaires.

#### **CG49 Établissement du coût – Négociation**

- 49.1 Si le mode d'établissement du coût prévu à l'article CG48 ne peut être utilisé parce que le genre ou la catégorie de travail, d'outillage et de matériaux en cause ne figurent pas au Tableau des prix unitaires, le coût du travail, de l'outillage ou des matériaux, aux fins du Contrat est le montant

convenu de temps à autre entre l'Entrepreneur et le représentant ministériel.

- 49.2 Aux fins du paragraphe CG49.1, l'Entrepreneur remet au représentant ministériel lorsque ce dernier le requiert, tout renseignement nécessaire sur ce qu'il lui en coûte en travail, outillage et matériaux mentionnés au paragraphe CG49.1.

#### **CG50 Établissement du coût en cas d'échec des négociations**

- 50.1 Si l'on ne parvient pas à établir le coût du travail, de l'outillage et des matériaux conformément aux méthodes prévues aux articles CG47, CG48 ou CG49, pour les fins mentionnées dans ceux-ci, le coût sera égal à l'ensemble de :

- 50.1.1 tous les montants justes et raisonnables effectivement dépensés ou légalement payables par l'Entrepreneur pour le travail, l'outillage et les matériaux couverts par une des catégories de dépenses prévues au paragraphe CG50.2, qui sont directement attribuables à l'exécution du Contrat;
- 50.1.2 une somme égale à 10% du total des dépenses de l'Entrepreneur mentionnées à l'alinéa CG50.1.1, représentant une indemnité pour profit et pour tous les autres coûts et dépenses, incluant les frais de financement et les intérêts, les frais généraux, dépenses du siège social, et tous autres frais ou dépenses, mais non les coûts et dépenses mentionnés à l'alinéa CG50.1.1 ou CG50.1.3 ou pour une catégorie mentionnée au paragraphe CG50.2;
- 50.1.3 l'intérêt sur les coûts déterminés en vertu des alinéas CG50.1.1 et CG50.1.2, intérêt qui sera calculé conformément à l'article MP9,

pourvu que le coût total d'un article figurant au Tableau des prix unitaires, auquel s'appliquent les dispositions de l'alinéa CG47.1.2.1, n'est pas supérieur au montant qui aurait été payable à l'Entrepreneur si la quantité totale dudit article aurait été effectivement produite, utilisée ou fournie.

- 50.2 Aux fins de l'alinéa CG50.1.1, les catégories de dépenses admissibles dans l'établissement du coût du travail, de l'outillage et des matériaux, sont :
- 50.2.1 les paiements faits aux sous-entrepreneurs;
- 50.2.2 les traitements, salaires et frais de voyage versés aux employés de l'Entrepreneur affectés, proprement dit, à l'exécution des travaux, à l'exception des traitements, salaires, gratifications, frais de subsistance et de voyage des employés de l'Entrepreneur travaillant généralement au siège social ou à un bureau général de l'Entrepreneur, à moins que lesdits employés ne soient affectés à l'emplacement des travaux avec la approbation du représentant ministériel;
- 50.2.3 les cotisations exigibles en vertu d'un texte statutaire relativement aux indemnités des accidents du travail, à l'assurance-chômage, au régime de retraite et aux congés rémunérés;
- 50.2.4 les frais de location d'outillage ou un montant équivalent aux frais de location si l'outillage appartient à l'Entrepreneur qui était nécessaire et qui a été utilisé pour

l'exécution des travaux, à condition que lesdits frais ou la somme équivalente soient raisonnables et que l'utilisation dudit outillage ait été approuvée par le représentant ministériel;

- 50.2.5 les frais d'entretien et de fonctionnement de l'outillage nécessaire à l'exécution des travaux et des frais de réparation à tel outillage qui, de l'avis du représentant ministériel, sont nécessaires à la bonne exécution du Contrat, à l'exclusion de toutes réparations provenant de défauts existant avant l'affectation de l'outillage aux travaux;
- 50.2.6 les paiements relatifs aux matériaux nécessaires et incorporés aux travaux, ou nécessaires à l'exécution du Contrat et utilisés à cette fin; et
- 50.2.7 les paiements relatifs à la présentation, à la livraison, à l'utilisation, à l'érection, à l'installation, à l'inspection, à la protection et à l'enlèvement de l'outillage et des matériaux nécessaires à l'exécution du Contrat et utilisés à cette fin; et
- 50.2.8 tout autre paiement fait par l'Entrepreneur avec l'approbation du représentant ministériel et nécessaire à l'exécution du Contrat.

#### **CG51 Registres à tenir par l'Entrepreneur**

- 51.1 L'Entrepreneur :
  - 51.1.1 tient des registres complets du coût estimatif et réel des travaux, des appels d'offres, des prix cotés, des contrats, de la correspondance, des factures, des reçus et des pièces justificative s'y rapportant;
  - 51.1.2 met à la disposition du Ministre et du sous-receveur général du Canada ou des personnes qu'ils délèguent pour vérification et inspection tous les documents mentionnés à l'alinéa CG51.1.1;
  - 51.1.3 permet à toutes personnes mentionnées à l'alinéa 51.1.2 de faire des copies ou extraits de tous registres et documents mentionnés à l'alinéa CG51.1.1; et
  - 51.1.4 fournit aux personnes mentionnées à l'alinéa CG51.1.2 tous les renseignements qu'elles peuvent exiger de temps à autre au sujet de ces registres et documents.
- 51.2 Les registres tenus par l'Entrepreneur conformément à l'alinéa CG51.1.1, sont conservés intact pendant deux ans à compter de la date de la délivrance du Certificat définitif d'achèvement mentionné au paragraphe CG44.1, ou jusqu'à l'expiration de toute autre période que le Ministre peut fixer.
- 51.3 L'Entrepreneur oblige tous sous-entrepreneurs, et toutes autres personnes qu'il contrôle directement ou indirectement ou qui lui sont affiliés, de même que toutes personnes qui contrôlent l'Entrepreneur directement ou indirectement, à se conformer aux paragraphes CG51.1 et CG51.2 comme s'ils étaient l'Entrepreneur.

#### **CG52 Conflits d'intérêts**

- 52.1 Le présent Contrat stipule qu'aucun ancien titulaire de charge publique qui ne se conforme pas au Code régissant la conduite des titulaires de charge publique en ce qui concerne les conflits d'intérêts et l'après-mandat ne peut retirer des avantages directs du présent Contrat.

**CG53 Situation de l'Entrepreneur**

- 53.1 L'Entrepreneur sera retenu en vertu du Contrat à titre d'entrepreneur indépendant.
- 53.2 L'Entrepreneur et tout employé dudit entrepreneur n'est pas retenu en vertu du Contrat à titre d'employé, d'agent ou de mandataire de Sa Majesté.
- 53.3 Aux fins des paragraphes CG53.1 et CG53.2, l'Entrepreneur sera à lui seul responsable de tous les paiements et de toutes les retenues exigées par la loi, y compris ceux exigés par le Régime de pensions du Canada, le Régime des rentes du Québec, l'assurance-chômage, les accidents du travail ou l'impôt sur le revenu.



## **CONDITIONS GÉNÉRALES**

- CA 1 Preuve du contrat d'assurance**
- CA 2 Gestion des risques**
- CA 3 Paiement de franchise**
- CA 4 Assurance d'assurance**

## **EXIGENCES DE GARANTIES D'ASSURANCE**

- EGA 1 Assuré**
- EGA 2 Période d'assurance**
- EGA 3 Preuve du contrat d'assurance**
- EGA 4 Avis**

## **ASSURANCE DE LA RESPONSABILITÉ CIVILE DES ENTREPRISES**

- ARC 1 Portée de l'assurance**
- ARC 2 Garanties/Dispositions**
- ARC 3 Risques additionnels**
- ARC 4 Indemnité d'assurance**
- ARC 5 Franchise**

## **ASSURANCE DES CHANTIERS – RISQUES D'INSTALLATION – TOUS RISQUES**

- AC 1 Portée de l'assurance**
- AC 2 Biens assurés**
- AC 3 Indemnités d'assurance**
- AC 4 Montant d'assurance**
- AC 5 Franchise**
- AC 6 Subrogation**
- AC 7 Exclusion**

## **ATTESTATION D'ASSURANCE DE L'ASSUREUR**



## **CONDITIONS GÉNÉRALES**

### **CA 1 Preuve du contrat d'assurance (02/12/03)**

Dans un délai de trente (30) jours après l'acceptation de la soumission de l'entrepreneur, ce dernier, à moins d'avis contraire par écrit de l'agent d'approvisionnement, doit remettre à l'agent d'approvisionnement, l'Attestation d'assurance d'un assureur dans la forme apparaissant dans le présent document et, si demandé par l'agent d'approvisionnement, remettre à ce dernier les originaux ou les copies certifiées conformes de tous les contrats d'assurance auxquels l'entrepreneur a souscrit conformément aux Exigences des garanties d'assurance décrites ci-après.

### **CA 2 Gestion des risques (01/10/94)**

Les dispositions des Exigences des garanties d'assurance des présentes n'ont pas pour but de couvrir toutes les obligations de l'entrepreneur en vertu de l'article CG8 des Conditions générales « C » du marché. L'entrepreneur est libre, à condition d'en assumer le coût, de prendre des mesures additionnelles de gestion des risques ou des garanties d'assurance complémentaires qu'il juge nécessaire pour remplir ses obligations conformément à l'article CG8.

### **CA 3 Paiement de franchise (01/10/94)**

L'entrepreneur doit assumer le paiement de toutes sommes d'argent en règlement d'un sinistre, jusqu'à concurrence de la franchise.

### **CA 4 Assurance d'assurance (02/12/03)**

L'entrepreneur a déclaré qu'il détient une assurance de responsabilité civile appropriée et habituelle qui est en vigueur conformément aux présentes Conditions d'assurance et il a garanti qu'il obtiendra, en temps opportune et avant le commencement des travaux, l'assurance de biens appropriée et habituelle conformément aux présentes Conditions d'assurance et qu'en outre il maintiendra en vigueur toutes les polices d'assurance requises conformément aux présentes Conditions d'assurance.

## **EXIGENCES DE GARANTIES D'ASSURANCE**

### **PARTIE I**

## **EXIGENCES GÉNÉRALES D'ASSURANCE (EGA)**

### **EGA 1 Assuré (02/12/03)**

Chaque contrat d'assurance doit assurer l'entrepreneur et doit inclure à titre d'Assuré dénommé additionnel, Sa Majesté la Reine du chef du Canada, représentée par le Conseil national de recherches Canada.





**EGA 2 Période d'assurance  
(02/12/03)**

Moins d'avis contraire par écrit de l'agent d'approvisionnement ou d'indication contraire ailleurs dans les présentes Conditions d'assurance, les contrats d'assurance exigés dans les présentes doivent prendre effet le jour de l'attribution du marché et demeurer en vigueur jusqu'au jour de la délivrance du Certificat définitif d'achèvement du représentant ministériel.

**EGA 3 Preuve du contrat d'assurance  
(01/10/94)**

Dans un délai de vingt-cinq (25) jours après l'acceptation de la soumission de l'entrepreneur, l'assureur, à moins d'avis contraire écrit de l'entrepreneur, doit remettre à l'entrepreneur l'Attestation d'assurance d'un assureur dans la forme apparaissant dans le présent document et, si demandé, les originaux ou les copies certifiées conformes de tous les contrats d'assurance auxquels l'entrepreneur a souscrit conformément aux présentes Exigences de présentes garanties d'assurance.

**EGA 4 Avis  
(01/10/94)**

Chaque contrat d'assurance doit renfermer une disposition selon laquelle trente (30) jours avant de procéder à toute modification importante visant la garantie d'assurance, ou à l'annulation de ladite garantie d'assurance, un avis par écrit doit être envoyé par l'assureur à Sa Majesté. Tout avis de cette nature que reçoit l'entrepreneur doit être transmis sans délai à Sa Majesté.

**PARTIE II  
ASSURANCE DE LA RESPONSABILITÉ CIVILE DES ENTREPRISES**

**ARC 1 Portée de l'assurance  
(01/10/94)**

Le contrat d'assurance doit être établi sur un formulaire similaire à celui connu et désigné dans l'industrie de l'assurance sous l'appellation Assurance de la responsabilité civile des entreprises (base d'événement) – BAC 2100, et doit accorder un montant de garantie d'au moins 2 000 000 \$ (tous dommages confondus) pour des dommages corporels et matériels imputables au même événement ou à une série d'événements ayant la même origine. Les frais de justice ou autres déboursés de défense par suite de sinistre ou de réclamation ne viendront pas en déduction du montant de garantie.

**ARC 2 Garanties/Dispositions  
(01/10/94)**

Le contrat d'assurance doit inclure les garanties/dispositions suivantes sans toutefois nécessairement s'y limiter :

- 2.1 La responsabilité découlant de la propriété, de l'existence de l'entretien ou de l'utilisation de lieux par l'entrepreneur et les activités nécessaires ou connexes à l'exécution du présent contrat.
- 2.2 L'extension de la garantie « Dommages matériels et/ou privation de jouissance ».



- 2.3 L'enlèvement ou l'affaiblissement d'un support soutenant des bâtiments ou terrains, que ce support soit naturel ou non.
- 2.4 La responsabilité découlant des appareils de levage et des monte-charge (y compris les escaliers roulants).
- 2.5 La responsabilité civile indirecte des entrepreneurs.
- 2.6 Les responsabilités contractuelles et assumées en vertu du présent contrat.
- 2.7 La responsabilité civile découlant des risques après travaux. En regard de la présente garantie, ainsi que toutes les autres garanties de cette Partie II des présentes Conditions d'assurance, l'assurance doit demeurer en vigueur pendant au moins un (1) an à partir de la date de délivrance du Certificat d'achèvement du représentant ministériel.
- 2.8 Responsabilité réciproque – La clause doit être rédigée comme suit :

Responsabilité réciproque – L'assurance telle que garantie par le présent contrat s'applique à toute demande d'indemnité faite à ou à toute action intentée contre n'importe quel assuré par n'importe quel autre assuré. La garantie d'assurance s'applique de la même façon et dans la même mesure que si un contrat distinct avait été établi à chacun d'eux. L'inclusion de plus d'un assuré n'augmente pas le montant de garantie de l'assureur.

- 2.9 Individualité des intérêts – La clause doit être rédigée comme suit :

Individualité des intérêts – La présente assurance, sous réserve des montants de garantie, s'applique séparément à chaque assuré de la même façon et dans la même mesure que si un contrat distinct avait été établi à chacun d'eux. L'inclusion de plus d'un assuré n'augmente pas le montant de garantie de l'assureur.

### **ARC 3 Risques additionnels (02/12/03)**

Le contrat d'assurance doit couvrir ou être amendé pour couvrir les risques suivants, si l'entreprise y est soumise :

- 3.1 Dynamitage;
- 3.2 Battage de pieux et travail par caisson;
- 3.3 Reprise en sous-œuvre;
- 3.4 Risques associés aux activités de l'entrepreneur dans un aéroport en service;
- 3.5 Contamination par radioactivité par suite de l'utilisation d'isotopes commerciaux;
- 3.6 Endommagement à la partie d'un bâtiment existant hors de la portée directe d'un marché de rénovation, d'addition ou d'installation;
- 3.7 Risques maritimes reliés à la construction de jetés, quais et docks.



**ARC 4 Indemnités d'assurance**  
**(01/10/94)**

Toute indemnité en vertu de la présente assurance est habituellement versée à un tiers réclamant.

**ARC 5 Franchise**  
**(02/12/03)**

Le contrat d'assurance doit être établie avec une franchise d'au plus 10 000 \$ événement quant aux sinistres causés par dommages matériels.

**PART III**  
**ASSURANCE DES CHANTIERS – RISQUES D'INSTALLATION – TOUS RISQUES**

**AC 1 Portée de l'assurance**  
**(01/10/94)**

Le contrat d'assurance doit être établi pour assurer l'entreprise sur un base « Tous risques » donnant un couverture d'assurance identique à celle qui est fournie par les formulaires connues et désignées dans l'industrie des assurances sous les noms de l' « Assurances des Chantiers – Formule globale » ou « Risques d'installation – Tous Risques ».

**AC 2 Biens assurés**  
**(01/10/94)**

Les biens assurés doivent comprendre :

- 2.1 les travaux, ainsi que tous les biens, équipement et matériaux devant être incorporés à l'entreprise achevée à l'endroit du projet, avant, durant et après leur installation, érection ou construction, y compris les essais;
- 2.2 les frais de déblaiement du chantier occasionnés par un sinistre couvert y ayant laissé des débris provenant de biens couverts par la présente assurance, y compris la démolition des biens endommagés, l'enlèvement de la glace et l'assèchement.

**AC 3 Indemnité d'assurance**  
**(01/10/94)**

- 3.1 Toutes indemnités en vertu du contrat d'assurance doit être payées conformément à l'article CG28 des Conditions générales « C » du contrat.
- 3.2 Le contrat d'assurance doit stipuler que toute indemnité en vertu d'icelle doit être payé à Sa Majesté ou selon les directives du Ministre.
- 3.3 L'entrepreneur doit faire toutes choses et exécuter tous documents requis pour le paiement de l'indemnité d'assurance.

**AC 4 Montant d'assurance**



**(01/10/94)**

Le montant de l'assurance doit égalier au moins la somme de la valeur du contrat plus la valeur déclarée (s'il y a lieu) dans les documents du marché de tout le matériel et équipement fourni par Sa Majesté sur le chantier pour être incorporé à l'entreprise achevée et en faire partie.

**AC 5 Franchise**  
**(02/12/94)**

La police doit être établie avec une franchise d'au plus 10 000 \$.

**AC 6 Subrogation**  
**(01/10/94)**

La clause suivante doit être incluse dans le contrat d'assurance :

« Tous droits de subrogation ou transfert de droits sont par les présentes abandonnées contre toutes les personnes physiques ou morales ayant droit au bénéfice de la présente assurance. »

**AC 7 Exclusion**  
**(01/10/94)**

Le contrat d'assurance peut comporter les exclusions normales sous réserve des exceptions suivantes :

- 7.1 Peuvent être exclus les frais inhérents à la bonne exécution des travaux, et rendus nécessaires par des défauts dans les matériaux, la main d'œuvre ou la conception, l'assurance produisant néanmoins ses effets en ce qui concerne les sinistres entraînés par voie de conséquence.
- 7.2 La perte ou les dommages causés par la contamination de matériaux radioactifs, sauf la perte ou les dommages résultant de l'utilisation d'isotopes commerciaux pour la mesure, l'inspection, le contrôle de la qualité, la radiographie ou la photographie industriels.
- 7.3 La mise en service et l'occupation de l'entreprise, en totalité ou en partie, doivent être permis pour les fins auxquels l'entreprise est destiné à son achèvement.



**ATTESTATION D'ASSURANCE DE L'ASSUREUR**  
(À ÊTRE COMPLÈTE PAR L'ASSUREUR (NON PAR LE COURTIER) ET LIVRÉE AU CONSEIL NATIONAL DE RECHERCHES CANADA DANS LES TRENTE JOURS SUIVANT L'ACCEPTATION DE LA SOUMISSION)

**MARCHÉ**

DESCRIPTION DES TRAVAUX	NUMÉRO DE MARCHÉ	DATE D'ADJUDICATION
ENDROIT		

**ASSUREUR**

NOM
ADRESSE

**COURTIER**

NOM
ADRESSE

**ASSURÉ**

NOM DE L'ENTREPRENEUR
ADRESSE

**ASSURÉ ADDITIONNEL**

SA MAJESTÉ LA REINE DU CHEF DU CANADA REPRÉSENTÉE PAR LE CONSEIL NATIONAL DE RECHERCHES CANADA
--

LE PRÉSENT DOCUMENT ATTESTE QUE LES POLICES D'ASSURANCE SUIVANTES SONT PRÉSENTEMENT EN VIGUEUR ET COUVRENT TOUTES LES ACTIVITÉS DE L'ASSURÉ, EN FONCTION DU MARCHÉ DU CONSEIL NATIONAL DE RECHERCHES CANADA CONCLU ENTRE L'ASSURÉ DÉNOMMÉ ET LE CONSEIL NATIONAL DE RECHERCHES CANADA SELON LES CONDITIONS D'ASSURANCE « E ».

POLICE					
GENRE	NUMÉRO	DATE D'EFFET	DATE D'EXPIRATION	LIMITES DE GARANTIE	FRANCHISE
RESPONSABILITÉ CIVILE DES ENTREPRISES					
ASSURANCE DES CHANTIERS « TOUS RISQUES »					
RISQUES D'INSTALLATION « TOUS RISQUES »					

L'ASSUREUR CONVIENT DE DONNER UN PRÉAVIS DE TRENTE JOURS AU CONSEIL NATIONAL DE RECHERCHES CANADA EN CAS DE TOUTE MODIFICATION VISANT LA GARANTIE D'ASSURANCE OU LES CONDITIONS OU DE L'ANNULATION DE N'IMPORTE QUELLE POLICE OU GARANTIE QUI FONT PARTIE INTÉGRANTE DU CONTRAT.

NOM DU CADRE OU DE LA PERSONNE AUTORISÉE	SIGNATURE	DATE :
		NUMÉRO DE TÉLÉPHONE :



### **CGC1 Obligation de fournir une garantie de contrat**

- 1.1 L'Entrepreneur doit, à ses propres frais, fournir une ou plusieurs des garanties de contrat mentionnées à l'article CGC2.
- 1.2 L'Entrepreneur doit fournir au représentant ministériel la garantie de contrat mentionnée au paragraphe CGC1.1 dans les 14 jours suivant la date à laquelle l'Entrepreneur reçoit un avis lui signifiant l'acceptation de sa soumission par Sa Majesté.

### **CGC2 Types et montants acceptables de garanties de contrat**

- 2.1 L'Entrepreneur fournit au représentant ministériel conformément à l'article CGC1 :
  - 2.1.1 un cautionnement d'exécution et un cautionnement pour le paiement de la main-d'œuvre et des matériaux, représentant chacun au moins 50% du montant payable indiqué dans les Articles de convention; ou
  - 2.1.2 un cautionnement pour le paiement de la main-d'œuvre et des matériaux, représentant au moins 50% du montant payable indiqué dans les Articles de convention, et un dépôt de garantie représentant :
    - 2.1.2.1 au moins 10% du montant indiqué dans les Articles de convention, si ce montant n'excède pas 250 000 \$; ou
    - 2.1.2.2 25 000 \$, plus 5% de la partie du montant du Contrat indiqué dans les Articles de convention qui excède 250 000 \$; ou
  - 2.1.3 un dépôt de garantie représentant le montant prescrit à l'alinéa CGC2.1.2, majoré d'un supplément représentant 10% du montant du Contrat indiqué dans les Articles de convention.
- 2.2 Le cautionnement d'exécution et le cautionnement pour le paiement de la main-d'œuvre et des matériaux mentionnés au paragraphe CGC2.1 doivent être dans une forme approuvée et provenir d'une compagnie dont les cautionnements sont acceptés par Sa Majesté.
- 2.3 Le montant maximum du dépôt de garantie requis en vertu de l'alinéa CGC2.1.2 ne doit pas excéder 250 000 \$, quel que soit le montant du Contrat indiqué dans les Articles de convention.
- 2.4 Le dépôt de garantie mentionné aux alinéas CGC2.1.2 et CGC2.1.3 consiste en :
  - 2.4.1 une lettre de change payable à l'ordre du receveur général du Canada et certifiée par une institution financière approuvée ou tirée par une institution financière approuvée sur son propre compte; ou
  - 2.4.2 des obligations du gouvernement du Canada ou des obligations garanties inconditionnellement quant au capital et aux intérêts par le gouvernement du Canada.
- 2.5 Aux fins du paragraphe CGC2.4 :



- 2.5.1 une lettre de change est un ordre inconditionnel donné par écrit par l'Entrepreneur à une institution financière agréée et obligeant ladite institution à verser, sur demande et à une certaine date, une certaine somme au receveur général du Canada ou à l'ordre de ce dernier; et
- 2.5.2 si une lettre de change est certifiée par une institution financière autre qu'une banque à charte, elle doit être accompagnée d'une lettre ou d'une attestation estampillée confirmant que l'institution financière appartient à au moins l'une des catégories mentionnées à l'alinéa CGC2.5.3 ;
- 2.5.3 une institution financière agréée est :
  - 2.5.3.1 une société ou institution qui est membre de l'Association canadienne des paiements,
  - 2.5.3.2 une société qui accepte des dépôts qui sont garantis par la Société d'assurance-dépôts du Canada ou la Régie de l'assurance-dépôts du Québec jusqu'au maximum permis par la loi,
  - 2.5.3.3 une caisse de crédit au sens de l'alinéa 137(6)(b) de la *Loi de l'impôt sur le revenu*,
  - 2.5.3.4 une société qui accepte du public des dépôts dont le remboursement est garanti par Sa Majesté du chef d'une province, ou
  - 2.5.3.5 la Société canadienne des postes.
- 2.5.4 les obligations mentionnées à l'alinéa CGC2.4.2 doivent être :
  - 2.5.4.1 payables au porteur ;
  - 2.5.4.2 accompagnées d'un document de transfert dûment exécuté à l'ordre du receveur général du Canada, dûment exécuté et dans la forme prescrite par le Règlement concernant les obligations intérieures du Canada; ou
  - 2.5.4.3 enregistrées quant au capital ou quant au capital et aux intérêts au nom du receveur général du Canada, conformément au Règlement concernant les obligations intérieures du Canada; et
  - 2.5.4.4 fournies à leur valeur courante sur le marché à la date du Contrat.



Contract Number / Numéro du contrat <b>A1-011349-01</b>
Security Classification / Classification de sécurité <b>UNCLASSIFIED</b>

**SECURITY REQUIREMENTS CHECK LIST (SRCL)  
LISTE DE VÉRIFICATION DES EXIGENCES RELATIVES À LA SÉCURITÉ (LVERS)**

**PART A - CONTRACT INFORMATION / PARTIE A - INFORMATION CONTRACTUELLE**

1. Originating Government Department or Organization / Ministère ou organisme gouvernemental d'origine <b>National Research Council (NRC)</b>	2. Branch or Directorate / Direction générale ou Direction <b>Construction</b>
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3. a) Subcontract Number / Numéro du contrat de sous-traitance	3. b) Name and Address of Subcontractor / Nom et adresse du sous-traitant
--	---

4. Brief Description of Work / Brève description du travail  
Supply and install a renewable fuel boiler plant (biomass, wood chip fired) at the PSPC Confederation Heights CHCP located at 501 Heron Road, Ottawa.

5. a) Will the supplier require access to Controlled Goods? / Le fournisseur aura-t-il accès à des marchandises contrôlées?  
 No / Non  Yes / Oui

5. b) Will the supplier require access to unclassified military technical data subject to the provisions of the Technical Data Control Regulations? / Le fournisseur aura-t-il accès à des données techniques militaires non classifiées qui sont assujetties aux dispositions du Règlement sur le contrôle des données techniques?  
 No / Non  Yes / Oui

6. Indicate the type of access required / Indiquer le type d'accès requis

6. a) Will the supplier and its employees require access to PROTECTED and/or CLASSIFIED information or assets? / Le fournisseur ainsi que les employés auront-ils accès à des renseignements ou à des biens PROTÉGÉS et/ou CLASSIFIÉS?  
(Specify the level of access using the chart in Question 7. c) / (Préciser le niveau d'accès en utilisant le tableau qui se trouve à la question 7. c)  
 No / Non  Yes / Oui

6. b) Will the supplier and its employees (e.g. cleaners, maintenance personnel) require access to restricted access areas? No access to PROTECTED and/or CLASSIFIED information or assets is permitted. / Le fournisseur et ses employés (p. ex. nettoyeurs, personnel d'entretien) auront-ils accès à des zones d'accès restreintes? L'accès à des renseignements ou à des biens PROTÉGÉS et/ou CLASSIFIÉS n'est pas autorisé.  
 No / Non  Yes / Oui

6. c) Is this a commercial courier or delivery requirement with no overnight storage? / S'agit-il d'un contrat de messagerie ou de livraison commerciale sans entreposage de nuit?  
 No / Non  Yes / Oui

7. a) Indicate the type of information that the supplier will be required to access / Indiquer le type d'information auquel le fournisseur devra avoir accès

Canada <input checked="" type="checkbox"/>	NATO / OTAN <input type="checkbox"/>	Foreign / Étranger <input type="checkbox"/>
--	--------------------------------------	---

7. b) Release restrictions / Restrictions relatives à la diffusion

No release restrictions / Aucune restriction relative à la diffusion <input checked="" type="checkbox"/>	All NATO countries / Tous les pays de l'OTAN <input type="checkbox"/>	No release restrictions / Aucune restriction relative à la diffusion <input type="checkbox"/>
Not releasable / À ne pas diffuser <input type="checkbox"/>		
Restricted to: / Limité à: <input type="checkbox"/>	Restricted to: / Limité à: <input type="checkbox"/>	Restricted to: / Limité à: <input type="checkbox"/>
Specify country(ies): / Préciser le(s) pays:	Specify country(ies): / Préciser le(s) pays:	Specify country(ies): / Préciser le(s) pays:

7. c) Level of information / Niveau d'information

PROTECTED A / PROTÉGÉ A <input type="checkbox"/>	NATO UNCLASSIFIED <input type="checkbox"/>	PROTECTED A / PROTÉGÉ A <input type="checkbox"/>
PROTECTED B / PROTÉGÉ B <input type="checkbox"/>	NATO NON CLASSIFIÉ <input type="checkbox"/>	PROTECTED B / PROTÉGÉ B <input type="checkbox"/>
PROTECTED C / PROTÉGÉ C <input type="checkbox"/>	NATO RESTRICTED / NATO DIFFUSION RESTREINTE <input type="checkbox"/>	PROTECTED C / PROTÉGÉ C <input type="checkbox"/>
CONFIDENTIAL / CONFIDENTIEL <input type="checkbox"/>	NATO CONFIDENTIAL / NATO CONFIDENTIEL <input type="checkbox"/>	CONFIDENTIAL / CONFIDENTIEL <input type="checkbox"/>
SECRET / SECRET <input type="checkbox"/>	NATO SECRET <input type="checkbox"/>	SECRET / SECRET <input type="checkbox"/>
TOP SECRET / TRÈS SECRET <input type="checkbox"/>	COSMIC TOP SECRET / COSMIC TRÈS SECRET <input type="checkbox"/>	TOP SECRET / TRÈS SECRET <input type="checkbox"/>
TOP SECRET (SIGINT) / TRÈS SECRET (SIGINT) <input type="checkbox"/>		TOP SECRET (SIGINT) / TRÈS SECRET (SIGINT) <input type="checkbox"/>





**PART A (continued) / PARTIE A (suite)**

8. Will the supplier require access to PROTECTED and/or CLASSIFIED COMSEC information or assets?  
 Le fournisseur aura-t-il accès à des renseignements ou à des biens COMSEC désignés PROTÉGÉS et/ou CLASSIFIÉS?  
 If Yes, indicate the level of sensitivity:  
 Dans l'affirmative, indiquer le niveau de sensibilité :  No / Non  Yes / Oui
9. Will the supplier require access to extremely sensitive INFOSEC information or assets?  
 Le fournisseur aura-t-il accès à des renseignements ou à des biens INFOSEC de nature extrêmement délicate?  No / Non  Yes / Oui
- Short Title(s) of material / Titre(s) abrégé(s) du matériel :  
 Document Number / Numéro du document :

**PART B - PERSONNEL (SUPPLIER) / PARTIE B - PERSONNEL (FOURNISSEUR)**

10. a) Personnel security screening level required / Niveau de contrôle de la sécurité du personnel requis
- |   |   |   |  |
|---|---|---|--|
| <input checked="" type="checkbox"/> RELIABILITY STATUS<br>COTE DE FIABILITÉ | <input type="checkbox"/> CONFIDENTIAL<br>CONFIDENTIEL           | <input type="checkbox"/> SECRET<br>SECRET           | <input type="checkbox"/> TOP SECRET<br>TRÈS SECRET               |
| <input type="checkbox"/> TOP SECRET- SIGINT<br>TRÈS SECRET - SIGINT         | <input type="checkbox"/> NATO CONFIDENTIAL<br>NATO CONFIDENTIEL | <input type="checkbox"/> NATO SECRET<br>NATO SECRET | <input type="checkbox"/> COSMIC TOP SECRET<br>COSMIC TRÈS SECRET |
| <input type="checkbox"/> SITE ACCESS<br>ACCÈS AUX EMPLACEMENTS              |   |   |  |
- Special comments:  
 Commentaires spéciaux : \_\_\_\_\_
- NOTE: If multiple levels of screening are identified, a Security Classification Guide must be provided.  
 REMARQUE : Si plusieurs niveaux de contrôle de sécurité sont requis, un guide de classification de la sécurité doit être fourni.

10. b) May unscreened personnel be used for portions of the work?  
 Du personnel sans autorisation sécuritaire peut-il se voir confier des parties du travail?  No / Non  Yes / Oui
- If Yes, will unscreened personnel be escorted?  
 Dans l'affirmative, le personnel en question sera-t-il escorté?  No / Non  Yes / Oui

**PART C - SAFEGUARDS (SUPPLIER) / PARTIE C - MESURES DE PROTECTION (FOURNISSEUR)**

**INFORMATION / ASSETS / RENSEIGNEMENTS / BIENS**

11. a) Will the supplier be required to receive and store PROTECTED and/or CLASSIFIED information or assets on its site or premises?  
 Le fournisseur sera-t-il tenu de recevoir et d'entreposer sur place des renseignements ou des biens PROTÉGÉS et/ou CLASSIFIÉS?  No / Non  Yes / Oui
11. b) Will the supplier be required to safeguard COMSEC information or assets?  
 Le fournisseur sera-t-il tenu de protéger des renseignements ou des biens COMSEC?  No / Non  Yes / Oui

**PRODUCTION**

11. c) Will the production (manufacture, and/or repair and/or modification) of PROTECTED and/or CLASSIFIED material or equipment occur at the supplier's site or premises?  
 Les installations du fournisseur serviront-elles à la production (fabrication et/ou réparation et/ou modification) de matériel PROTÉGÉ et/ou CLASSIFIÉ?  No / Non  Yes / Oui

**INFORMATION TECHNOLOGY (IT) MEDIA / SUPPORT RELATIF À LA TECHNOLOGIE DE L'INFORMATION (TI)**

11. d) Will the supplier be required to use its IT systems to electronically process, produce or store PROTECTED and/or CLASSIFIED information or data?  
 Le fournisseur sera-t-il tenu d'utiliser ses propres systèmes informatiques pour traiter, produire ou stocker électroniquement des renseignements ou des données PROTÉGÉS et/ou CLASSIFIÉS?  No / Non  Yes / Oui
11. e) Will there be an electronic link between the supplier's IT systems and the government department or agency?  
 Disposera-t-on d'un lien électronique entre le système informatique du fournisseur et celui du ministère ou de l'agence gouvernementale?  No / Non  Yes / Oui



Contract Number / Numéro du contrat <b>A1 - 011349-01</b>
Security Classification / Classification de sécurité <b>UNCLASSIFIED</b>

**PART C - (continued) / PARTIE C - (suite)**

For users completing the form manually use the summary chart below to indicate the category(ies) and level(s) of safeguarding required at the supplier's site(s) or premises.  
Les utilisateurs qui remplissent le formulaire manuellement doivent utiliser le tableau récapitulatif ci-dessous pour indiquer, pour chaque catégorie, les niveaux de sauvegarde requis aux installations du fournisseur.

For users completing the form online (via the Internet), the summary chart is automatically populated by your responses to previous questions.  
Dans le cas des utilisateurs qui remplissent le formulaire en ligne (par Internet), les réponses aux questions précédentes sont automatiquement saisies dans le tableau récapitulatif.

SUMMARY CHART / TABLEAU RÉCAPITULATIF

Category / Catégorie	PROTECTED / PROTÉGÉ			CLASSIFIED / CLASSIFIÉ			NATO				COMSEC					
	A	B	C	CONFIDENTIAL / CONFIDENTIEL	SECRET	TOP SECRET / TRÈS SECRET	NATO RESTRICTED / NATO DIFFUSION RESTREINTE	NATO CONFIDENTIAL / NATO CONFIDENTIEL	NATO SECRET	COSMIC TOP SECRET / COSMIC TRÈS SECRET	PROTECTED / PROTÉGÉ			CONFIDENTIAL / CONFIDENTIEL	SECRET	TOP SECRET / TRÈS SECRET
											A	B	C			
Information / Assets / Renseignements / Biens																
Production																
IT Media / Support TI																
IT Link / Lien électronique																

12. a) Is the description of the work contained within this SRCL PROTECTED and/or CLASSIFIED?  
La description du travail visé par la présente LVERS est-elle de nature PROTÉGÉE et/ou CLASSIFIÉE?  No / Non  Yes / Oui
- If Yes, classify this form by annotating the top and bottom in the area entitled "Security Classification".  
Dans l'affirmative, classifiez le présent formulaire en indiquant le niveau de sécurité dans la case intitulée « Classification de sécurité » au haut et au bas du formulaire.
12. b) Will the documentation attached to this SRCL be PROTECTED and/or CLASSIFIED?  
La documentation associée à la présente LVERS sera-t-elle PROTÉGÉE et/ou CLASSIFIÉE?  No / Non  Yes / Oui
- If Yes, classify this form by annotating the top and bottom in the area entitled "Security Classification" and indicate with attachments (e.g. SECRET with Attachments).  
Dans l'affirmative, classifiez le présent formulaire en indiquant le niveau de sécurité dans la case intitulée « Classification de sécurité » au haut et au bas du formulaire et indiquez qu'il y a des pièces jointes (p. ex. SECRET avec des pièces jointes).



Contract Number / Numéro du contrat <b>A1-011349-01</b>
Security Classification / Classification de sécurité <b>UNCLASSIFIED</b>

**PART D - AUTHORIZATION / PARTIE D - AUTORISATION**

**13. Organization Project Authority / Chargé de projet de l'organisme**

Name (print) - Nom (en lettres moulées) <b>Lisa Paterick</b>	Title - Titre <b>Research Council Officer</b>	Signature 
Telephone No. - N° de téléphone <b>613-990-0460</b>	Facsimile No. - N° de télécopieur	E-mail address - Adresse courriel <b>Lisa.Paterick@nrc-cnrc.gc.ca</b>
		Date <b>6 June 17</b>

**14. Organization Security Authority / Responsable de la sécurité de l'organisme**

Name (print) - Nom (en lettres moulées) <b>Richard Bramucci</b>	Title - Titre <b>Analyst, Security in Contracting / Analyste, sécurité dans les marchés</b>	Signature 
Telephone No. - N° de téléphone <b>613-991-1093</b>	Facsimile No. - N° de télécopieur	E-mail address - Adresse courriel <b>RBRAMUCCI@NRC.CA</b>
		Date <b>JUN 06 2017</b>

15. Are there additional instructions (e.g. Security Guide, Security Classification Guide) attached? / Des instructions supplémentaires (p. ex. Guide de sécurité, Guide de classification de la sécurité) sont-elles jointes?  No / Non  Yes / Oui

**16. Procurement Officer / Agent d'approvisionnement**

Name (print) - Nom (en lettres moulées) <b>Collin Long</b>	Title - Titre <b>Procurement officer</b>	Signature 
Telephone No. - N° de téléphone <b>613-993-0431</b>	Facsimile No. - N° de télécopieur <b>613-991-3297</b>	E-mail address - Adresse courriel <b>collin.long@nrc-cnrc.gc.ca</b>
		Date <b>June 15, 2017</b>

**17. Contracting Security Authority / Autorité contractante en matière de sécurité**

Name (print) - Nom (en lettres moulées)	Title - Titre	Signature
Telephone No. - N° de téléphone	Facsimile No. - N° de télécopieur	E-mail address - Adresse courriel
		Date