

RETURN BIDS TO:
RETOURNER LES SOUMISSIONS À:
Travaux publics et Services gouvernementaux
Canada
Place Bonaventure, portail Sud-Est
800, rue de La Gauchetière Ouest
7^{ème} étage
Montréal
Québec
H5A 1L6
FAX pour soumissions: (514) 496-3822

INVITATION TO TENDER
APPEL D'OFFRES

**Tender To: Public Works and Government Services
Canada**

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.

**Soumission aux: Travaux Publics et Services
Gouvernementaux Canada**

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 et sur toute feuille ci-annexée, au(x) prix indiqué(s).

Comments - Commentaires

Vendor/Firm Name and Address
**Raison sociale et adresse du
fournisseur/de l'entrepreneur**

Issuing Office - Bureau de distribution

Travaux publics et Services gouvernementaux Canada
Place Bonaventure, portail Sud-Est
800, rue de La Gauchetière Ouest
7^{ème} étage
Montréal
Québec
H5A 1L6

Title - Sujet Chillers Replacement, Drummond Inst	
Solicitation No. - N° de l'invitation 21301-146028/A	Date 2014-03-26
Client Reference No. - N° de référence du client 21301-14-6028	GETS Ref. No. - N° de réf. de SEAG PW-\$MTC-480-12668
File No. - N° de dossier MTC-3-36432 (480)	CCC No./N° CCC - FMS No./N° VME
Solicitation Closes - L'invitation prend fin at - à 02:00 PM on - le 2014-04-28	
Time Zone Fuseau horaire Heure Avancée de l'Est HAE	
F.O.B. - F.A.B. Plant-Usine: <input type="checkbox"/> Destination: <input checked="" type="checkbox"/> Other-Autre: <input type="checkbox"/>	
Address Enquiries to: - Adresser toutes questions à: Belisle, France	Buyer Id - Id de l'acheteur mtc480
Telephone No. - N° de téléphone (514) 496-3881 ()	FAX No. - N° de FAX (514) 496-3822
Destination - of Goods, Services, and Construction: Destination - des biens, services et construction: SERVICE CORRECTIONNEL DU CANADA Etablissement Drummond 2025, boul. Jean de Breboeuf Drummond Québec J2B 7Z6 Canada	

Instructions: See Herein

Instructions: Voir aux présentes

Delivery Required - Livraison exigée	Delivery Offered - Livraison proposée
.	
Vendor/Firm Name and Address Raison sociale et adresse du fournisseur/de l'entrepreneur	
Telephone No. - N° de téléphone Facsimile No. - N° de télécopieur	
Name and title of person authorized to sign on behalf of Vendor/Firm (type or print) Nom et titre de la personne autorisée à signer au nom du fournisseur/ de l'entrepreneur (taper ou écrire en caractères d'imprimerie)	
Signature	Date

Solicitation No. - N° de l'invitation

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Amd. No. - N° de la modif.

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MTC-3-36432

Buyer ID - Id de l'acheteur

mtc480

CCC No./N° CCC - FMS No/ N° VME

21301-14-6028

INVITATION TO TENDER

IMPORTANT NOTICE TO BIDDERS

LIMITATION OF LIABILITY

PWGSC is limiting the Contractor's first party liability for work in Low Rise, High Rise and Heritage Buildings. See changes to GC1.6 "Indemnification by the Contractor" of R2810D in the Supplementary Conditions.

R2940D CLAUSE IS CANCELLED AND SECTION 3.8 OF R2830D IS MODIFIED

Following the repeal of the Fair Wages and Hours of Labour Act, R2940D clause will be non applicable for contracts awarded after January 1st 2014. For contracts awarded prior to that date the clause remains applicable.

As a result section 3.8 of R2830D has been modified as indicated in Supplementary Conditions SC03

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SI01	Code of Conduct and certifications, related documentations
SI02	Bid Documents
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SI08	Construction Documents
SI09	Web Sites

R2710T GENERAL INSTRUCTIONS TO BIDDERS (GI) (2014-03-01)

The following GI's are included by reference and are available at the following Web Site
<https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual/5/R>

GI01	Code of Conduct and Certification - Bid
GI02	Completion of Bid
GI03	Identity or Legal Capacity of the Bidder
GI04	Applicable Taxes
GI05	Capital Development and Redevelopment Charges
GI06	Registry and Pre-qualification of Floating Plant
GI07	Listing of Subcontractors and Suppliers
GI08	Bid Security Requirements
GI09	Submission of Bid
GI10	Revision of Bid
GI11	Rejection of Bid
GI12	Bid Costs
GI13	Procurement Business Number
GI14	Compliance With Applicable Laws
GI15	Approval of Alternative Materials
GI16	Performance Evaluation
GI17	Conflict of Interest-Unfair Advantage

SUPPLEMENTARY CONDITIONS (SC)

SC01	Security related requirements
SC02	Limitation of Liability
SC03	Labour

CONTRACT DOCUMENTS (CD)

BID AND ACCEPTANCE FORM (BA)

BA01	Identification
BA02	Business Name and Address of Bidder
BA03	The Offer
BA04	Bid Validity Period
BA05	Acceptance and Contract
BA06	Construction Time
BA07	Bid Security
BA08	Signature

APPENDIX 1 - COMPLETE LIST OF EACH INDIVIDUAL WHO ARE CURRENTLY DIRECTORS OF THE BIDDER

SPECIAL INSTRUCTIONS TO BIDDERS (SI)

SI01 CODE OF CONDUCT AND CERTIFICATIONS - RELATED DOCUMENTATION

By submitting a bid, the Bidder certifies that the Bidder and its affiliates are in compliance with the provisions as stated in Section 01 Code of Conduct and Certifications - Bid of Standard Instructions to Bidders R2710T (2014-03-01). The related documentation therein required will assist Canada in confirming that the certifications are true.

SI02 BID DOCUMENTS

1. The following are the bid documents:
 - a. Invitation to Tender - Page 1;
 - b. Special Instructions to Bidders;
 - c. General Instructions to Bidders, R2710T (2014-03-01)
 - d. Clauses & Conditions identified in "Contract Documents";
 - e. Drawings and Specifications;
 - f. Bid and Acceptance Form and related Appendix(s); and
 - g. Any amendment issued prior to solicitation closing.

Submission of a bid constitutes acknowledgement that the Bidder has read and agrees to be bound by these documents.

2. General Instructions to Bidders is incorporated by reference and is set out in the Standard Acquisition Clauses and Conditions (SACC) Manual, issued by Public Works and Government Services Canada (PWGSC). The SACC Manual is available on the PWGSC Web site:

<https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual/5/R>

SI03 ENQUIRIES DURING THE SOLICITATION PERIOD

1. Enquiries regarding this bid must be submitted in writing to the Contracting Officer named on the Invitation to Tender - Page 1 as early as possible within the solicitation period. Except for the approval of alternative materials as described in G15 of R2710T, enquiries should be received no later than seven (7) calendar days prior to the date set for solicitation closing to allow sufficient time to provide a response. Enquiries received after that time may not result in an answer being provided.
2. To ensure consistency and quality of the information provided to Bidders, the Contracting Officer shall examine the content of the enquiry and shall decide whether or not to issue an amendment.
3. All enquiries and other communications related to this bid sent throughout the solicitation period are to be directed ONLY to the Contracting Officer named on the Invitation to Tender - Page 1. Failure to comply with this requirement may result in the bid being declared non-responsive.

SI04 MANDATORY SITE VISIT

There will be a site visit on **April 15th at 10:00**. Interested bidders are to meet at Drummond Institution, 2025 Jean-de-Brébeuf, Drummondville, Québec, J2B 7Z6.

The site visit for this project is MANDATORY. The representative of the bidder will be required to sign the Site Visit Attendance Sheet at the site visit. Bids submitted by Bidders who have not signed the attendance sheet will not be accepted.

Security Requirement

Contractor personnel shall submit to a local verification of identity or information by Correctional Service Canada (CSC) prior to admittance to the facility/site. Correctional Service Canada reserves the right to deny access to any facility/site part thereof of any Contractor personnel, at any time.

All Contractor personnel or sub-contractors that must have access to CSC facilities must complete the form CSC-SCC 1279. CSC reserves the right to deny access to any employees that doesn't meet CSC security minimum standards. Canada will not pay any compensation to the Contractor for employees that have been denied access. (see the attached form).

Send form by email: louis.o.nadeau@csc-scc.gc.ca at least three (5) working days before the Bidders' site visit.

Contractor personnel will be escorted in specific areas of the facility / site as and where required by Correctional Service Canada personnel or those authorized by CSC to do so on its behalf.

SI05 REVISION OF BID

A bid may be revised by letter or facsimile in accordance with GI10 of R2710T. The facsimile number for receipt of revisions is (514) 496-3822.

SI06 BID RESULTS

1. A public bid opening will be held in the office designated on the Front Page "Invitation to Tender" for the receipt of bids shortly after the time set for solicitation closing.
2. Following solicitation closing, bid results may be obtained by calling at No. (514) 496-3388.

SI07 BID VALIDITY PERIOD

1. Canada reserves the right to seek an extension to the bid validity period prescribed in BA04 of the Bid and Acceptance Form. Upon notification in writing from Canada, Bidders shall have the option to either accept or reject the proposed extension.
2. If the extension referred to in paragraph 1. of SI07 is accepted, in writing, by all those who submitted bids, then Canada shall continue immediately with the evaluation of the bids and its approvals processes.
3. If the extension referred to in paragraph 1. of SI07 is not accepted in writing by all those who submitted bids then Canada shall, at its sole discretion, either

- a. continue to evaluate the bids of those who have accepted the proposed extension and seek the necessary approvals; or
- b. cancel the invitation to tender.

4. The provisions expressed herein do not in any manner limit Canada's rights in law or under GI11 of R2710T

SI08 CONSTRUCTION DOCUMENTS

The successful Contractor will be provided with one paper copy of the sealed and signed drawings, the specifications and the amendments upon acceptance of the offer. Additional copies, up to a maximum of five (5), will be provided free of charge upon request by the Contractor. Obtaining more copies shall be the responsibility of the Contractor including costs.

SI09 WEB SITES

The connection to some of the Web sites in the solicitation documents is established by the use of hyperlinks. The following is a list of the addresses of the Web sites:

Treasury Board Appendix L, Acceptable Bonding Companies

<http://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=14494§ion=text#appL>

Buy and Sell <https://www.achatsetventes-buyandsell.gc.ca>

Canadian economic sanctions <http://www.international.gc.ca/sanctions/index.aspx?lang=eng>

Contractor Performance Evaluation Report (Form PWGSC-TPSGC 2913)

<http://www.tpsgc-pwgsc.gc.ca/app-acq/forms/documents/2913.pdf>

Bid Bond (form PWGSC-TPSGC 504) <http://www.tpsgc-pwgsc.gc.ca/app-acq/forms/documents/504.pdf>

Performance Bond (form PWGSC-TPSGC 505)

<http://www.tpsgc-pwgsc.gc.ca/app-acq/forms/documents/505.pdf>

Labour and Material Payment Bond (form PWGWSC-TPSGC 506)

<http://www.tpsgc-pwgsc.gc.ca/app-acq/forms/documents/506.pdf>

Standard Acquisition Clauses and Conditions (SACC) Manual

<https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual>

PWGSC, Industrial Security Services <http://ssi-iss.tpsgc-pwgsc.gc.ca/index-eng.html>

PWGSC, Code of Conduct and Certifications

<http://www.tpsgc-pwgsc.gc.ca/app-acq/cndt-cndct/index-eng.html>

PWGSC Consent to a Criminal Record Verification (PWGSC-TPSGC 229)

<http://www.tpsgc-pwgsc.gc.ca/app-acq/forms/documents/229.pdf>

Construction and Consultant Services Contract Administration Forms Real Property Contracting

<http://www.tpsgc-pwgsc.gc.ca/app-acq/forms/formulaires-forms-eng.html>

SUPPLEMENTARY CONDITIONS (SC)**SC01 SECURITY REQUIREMENTS, DOCUMENT SAFEGUARDING LOCATION**

There is no security requirement applicable to this Contract.

SC02 LIMITATION OF LIABILITY

GC1.6 of R2810D is deleted and replaced with the following:

GC1.6 Indemnification by the Contractor

1. The Contractor shall indemnify and save Canada harmless from and against all claims, demands, losses, costs, damages, actions, suits, or proceedings whether in respect to losses suffered by Canada or in respect of claims by any third party, brought or prosecuted and in any manner based upon, arising out of, related to, occasioned by, or attributable to the activities of the Contractor in performing the Work, provided such claims are caused by the negligent or deliberate acts or omissions of the Contractor, or those for whom it is responsible at law.

2. The Contractor's obligation to indemnify Canada for losses related to first party liability shall be limited to:

a. In respect to each loss for which insurance is to be provided pursuant to the insurance requirements of the Contract, the Commercial General Liability insurance limit for one occurrence as referred to in the insurance requirements of the Contract

b. In respect to losses for which insurance is not required to be provided in accordance with the insurance requirements of the Contract, the greater of the Contract Amount or \$5,000,000, but in no event shall the sum be greater than \$20,000,000.

The limitation of this obligation shall be exclusive of interest and all legal costs and shall not apply to any infringement of intellectual property rights or any breach of warranty obligations.

3. The Contractor's obligation to indemnify Canada for losses related to third party liability shall have no limitation and shall include the complete costs of defending any legal action by a third party. If requested by Canada, the Contractor shall defend Canada against any third party claims.

4. The Contractor shall pay all royalties and patent fees required for the performance of the Contract and, at the Contractor's expense, shall defend all claims, actions or proceedings against Canada charging or claiming that the Work or any part thereof provided or furnished by the Contractor to Canada infringes any patent, industrial design, copyright trademark, trade secret or other proprietary right enforceable in Canada.

5. Notice in writing of a claim shall be given within a reasonable time after the facts, upon which such claim is based, became known.

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File No. - N° du dossier

MTC-3-36432

CCC No./N° CCC - FMS No/ N° VME

SC03 LABOUR

Clause R2830D subsection GC3.8 has been modified as follows;

1. Title has been changed from "Labour and Fair Wages" to "Labour".
2. Delete subsection 1.
3. Following subsections must be renumbered accordingly.

CONTRACT DOCUMENTS (CD)

1. The following are the contract documents:

- a. Contract Page when signed by Canada;
- b. Duly completed Bid and Acceptance Form and any Appendices attached thereto;
- c. Drawings and Specifications;
- d. General Conditions and clauses

GC1	General Provisions	R2810D	(2014-03-01);
GC2	Administration of the Contract	R2820D	(2012-07-16);
GC3	Execution and Control of the Work	R2830D	(2010-01-11);
GC4	Protective Measures	R2840D	(2008-05-12);
GC5	Terms of Payment	R2850D	(2010-01-11);
GC6	Delays and Changes in the Work	R2860D	(2013-04-25);
GC7	Default, Suspension or Termination of Contract	R2870D	(2008-05-12);
GC8	Dispute Resolution	R2882D	(2008-12-12);
GC9	Contract Security	R2890D	(2012-07-16);
GC10	Insurance	R2900D	(2008-05-12);
	Supplementary Conditions		
	Allowable Costs for Contract Changes Under GC6.4.1	R2950D	(2007-05-25);
- e. Any amendment issued or any allowable bid revision received before the date and time set for solicitation closing;
- f. Any amendment incorporated by mutual agreement between Canada and the Contractor before acceptance of the bid; and
- g. Any amendment or variation of the contract documents that is made in accordance with the General Conditions.

2. The documents identified by title, number and date above are incorporated by reference and are set out in the Standard Acquisition Clauses and Conditions (SACC) Manual, issued by Public Works and Government Services Canada (PWGSC). The SACC Manual is available on the PWGSC Web site:

<https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual>

3. The language of the contract documents is the language of the Bid and Acceptance Form submitted.

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mtc480

Client Ref. No. - N° de réf. du client

21301-14-6028

CCC No./N° CCC - FMS No/ N° VME

BID AND ACCEPTANCE FORM (BA)

BA01 IDENTIFICATION

Chillers replacement, Drummond Institution.

BA02 BUSINESS NAME AND ADDRESS OF BIDDER

Name: _____

Address: _____

Telephone: _____ Fax: _____ PBN: _____

Email: _____

BA03 THE OFFER

The Bidder offers to Canada to perform and complete the Work for the above named project in accordance with the Bid Documents for the Total Bid Amount of

\$ _____ excluding applicable tax(es).
(amount in numbers)

BA04 BID VALIDITY PERIOD

The bid shall not be withdrawn for a period of sixty [60] days following the date of solicitation closing.

BA05 ACCEPTANCE AND CONTRACT

Upon acceptance of the Contractor's offer by Canada, a binding Contract shall be formed between Canada and the Contractor. The documents forming the Contract shall be the contract documents identified in Contract Documents (CD).

BA06 CONSTRUCTION TIME

The Contractor shall perform and complete the Work within **12 weeks** from the date of notification of acceptance of the offer.

BA07 BID SECURITY

The Bidder is enclosing bid security with its bid in accordance with GI08 - Bid Security Requirements of R2710T - General Instructions to Bidders.

BA08 SIGNATURE

Name and title of person authorized to sign on behalf of Bidder (Type or print)

Signature

Date

PROJECT

Chillers replacement
Drummond Institution

CLIENT

Correctionnal Service Canada
2025, boul, Jean-de-Bréboeuf
Drummondville (Québec)
J2B 7Z6

ARCHITECT

Bourassa Maillé Architecte inc.
23, Route 116
Saint-Christophe d'Arthabaska (Québec)
G6R 0S2
Tél : 819 357-1225
Fax : 819 357-1226

MECHANICAL
AND ELECTRICAL

GENIVAR Inc.
5355, boul. des Gradins
Québec (Québec)
G2J 1C8
Tél : 418-623-2254
Fax : 418-622-1137

STRUCTURE

GENIVAR Inc.
5355, boul. des Gradins
Québec (Québec)
G2J 1C8
Tél : 418-623-2254
Fax : 418-622-1137

END OF SECTION 00 01 01

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Division 00-01 - GENERAL REQUIREMENTS

00 01 07	PAGE DES SCEAUX ET DES SIGNATURES	1
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01 35 29.14	HEALTH AND SAFETY FOR CONTAMINATED SITES	3
01 74 11	CLEANING	2
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23 07 13	DUCT INSULATION	5
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23 09 33	CONTROL : GENERAL REQUIREMENTS	7
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FOR TENDER
March 25, 2014

GENIVAR Inc.

Mechanical Engineer:



Jérôme Thibault, ing.

Electrical Engineer:



Isabelle Simard, ing.

Structural Engineer:



Marie-Ève Hinse Ouellet

Bourassa Maillé Architectes:



Marc-André Maillé, arch.

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

- .1 Consult detail of tender and other contractual documents.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

- .1 Work of this Contract comprises replacement of the existing chiller at Drummond establishment situated on 2025, Jean-de-Bréboeuf Boulevard, Drummondville, QC, J2B 7Z6 and identified as Correctional Service Canada.

1.3 WORK SEQUENCE

- .1 Construct Work in stages to accommodate Owner's continued use of premises during construction.
- .2 Co-ordinate Progress Schedule and co-ordinate with Owner Occupancy during construction.

1.4 CONTRACTOR USE OF PREMISES

- .1 Limit use of premises for Work and for access, to allow:
- .1 Owner occupancy.
- .2 Co-ordinate use of premises under direction of Owner.
- .3 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.
- .4 Remove or alter existing work to prevent injury or damage to portions of existing work which remain.
- .5 Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work.
- .6 At completion of operations condition of existing work: equal to or better than that which existed before new work started.

1.5 OWNER OCCUPANCY

- .1 Owner will occupy premises during entire construction period for execution of normal operations.

1.6 ALTERATIONS,
ADDITIONS OR
REPAIRS TO EXISTING
BUILDING

- .1 Execute work with least possible interference or disturbance to building operations and normal use of premises. Arrange with Owner to facilitate execution of work.
- .2 Use only access confirmed by Owner existing in building for moving workers and material.
 - .1 Accept liability for damage, safety of equipment and overloading of existing equipment.

1.7 EXISTING
SERVICES

- .1 Notify Owner and utility companies of intended interruption of services and obtain required permission.
- .2 Where Work involves breaking into or connecting to existing services, give Owner 48 hours notice for necessary interruption of mechanical or electrical service throughout course of work. Minimize duration of interruptions. Carry out work at times as directed by governing authorities with minimum disturbance to tenant operations.
- .3 Provide alternative routes for personnel, pedestrian and vehicular traffic.
- .4 Submit schedule to and obtain approval from Owner for any shut-down or closure of active service or facility including power and communications services. Adhere to approved schedule and provide notice to affected parties.
- .5 Provide temporary services to maintain critical building and tenant systems.
- .6 Construct barriers in accordance with construction security regulation .

1.8 DOCUMENTS
REQUIRED

- .1 Maintain at job site, one copy each document as follows:
 - .1 Contract Drawings.
 - .2 Specifications.
 - .3 Addenda.
 - .4 Reviewed Shop Drawings.
 - .5 List of Outstanding Shop Drawings.
 - .6 Change Orders.
 - .7 Other Modifications to Contract.
 - .8 Field Test Reports.
 - .9 Copy of Approved Work Schedule.
 - .10 Health and Safety Plan and Other Safety Related Documents.
 - .11 Other documents as specified.

1.9 WORK DESCRIPTION

- .1 This contract includes, but is no limited, the work for replacement of two 40 ton water chillers. This works is:
- .1 Dismantling the refrigeration piping system including the fan/compressors unit and related equipment and accessories.
 - .2 Dismantling the condenser coil and fan unit including the air duct and insulation duct.
 - .3 Blank louvers and dismantling condenser system.
 - .4 New 110 ton air cooled chillers and connect to existing cool water piping.
 - .5 New pipe and water circulation pump and existing pump replacement.
 - .6 Insulation pumping and duct located in mechanical cooling water pump.
 - .7 New ladder and small bridges with exterior door for access to new chiller on existing roof.
 - .8 Electrical dismantling and new electrical connections.
 - .9 Existing sprinkler modification.
 - .10 Commissioning.
 - .11 Testing and balancing.
 - .12 Roof work for chiller installation.
 - .13 Structural and architectural work.
 - .14 Regulation work for chiller and A9A and A9R ventilation systems.

1.10 ARCHITECTURAL GENERAL CONDITIONS .1

- The contractor is responsible for dimensions to be confirmed and correlated at job site, to ensure that they do not conflict with the architect's specifications. In case of disparity, immediately notify the architect. In this situation, do not start any work without the architect's written approval.
- .2 Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been coordinated.
- .3 Submit to the architect an electronic copy of product data sheets or shop drawings for the following elements :
- .1 Roofing components;
 - .2 Door, frame and hardware;
 - .3 Insulation, including sprayed insulation;
 - .4 Gypsum;
 - .5 Steel studs;
 - .6 Metal cladding;
 - .7 Fixing system;
 - .8 Handrails and other metal works.
- .4 Do not proceed with work affected by submittal until review is complete.

- .5 Only proceed with work if the weather conditions so allow. Once the patching work has begun, all the sealing work has to be finished by the end of the day.
- .6 All wooden elements will be treated for outdoor use.
- .7 The gauge of the steel studs must be adapted to their use, but must never be lower than 20.
- .8 Throughout the construction project, submit pictures of the work progress. Upon completion of the work, provide the architect two (2) USB memory devices with all the photos.
- .9 Submit two (2) USB memory devices with verified shop drawings, product data, product warranties and « as built » drawings.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not used.

PART 1 - GENERAL

1.1 RELATED
REQUIREMENTS

.1 Division 01 sections.

1.2 ACTION AND
INFORMATIONAL
SUBMITTALS

.1 Shop drawings to show:

- .1 Mounting arrangements.
- .2 Operating and maintenance clearances.

.2 Shop drawings and product data accompanied by:

- .1 Detailed drawings of bases, supports, and anchor bolts.
- .2 Acoustical sound power data, where applicable.
- .3 Points of operation on performance curves.
- .4 Manufacturer to certify current model production.
- .5 Certification of compliance to applicable codes.

.3 Use MCAC "Shop Drawing Submittal Title Sheet". Identify section and paragraph number.

.4 Closeout Submittals:

- .1 Provide operation and maintenance data for incorporation into manual.
- .2 Operation and maintenance manual approved by, and final copies.
- .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 2 copies of draft Operation and Maintenance Manual 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 Site records:
 - .1 Departmental Representative will provide 1 set of reproducible mechanical drawings. Provide sets prints as required for each phase of work. Mark changes as work progresses and as changes occur. Include changes to existing mechanical systems, control systems and low voltage control wiring.
 - .2 Transfer information weekly to reproducibles, revising reproducibles to show work as actually installed.
 - .3 Use different colour waterproof ink for each service.
 - .4 Make available for reference purposes and inspection.

1.3 QUALITY ASSURANCE

- .1 Health and Safety Requirements: do construction occupational health and safety.

1.4 MAINTENANCE

- .1 Provide one set of special tools required to service equipment as recommended by manufacturers.

PART 2 - PRODUCTS

2.1 NOT USED .1 NOT USED.

PART 3 - EXECUTION

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

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

- | | | | |
|---|-------------|----|--|
| 1 | Purpose | .1 | To ensure that both the construction project and the institutional operations may proceed without undue disruption or hindrance and that the security of the Institution is maintained at all times. |
| 2 | Definitions | .1 | <p>"Contraband" means:</p> <ul style="list-style-type: none"> a) an intoxicant, including alcoholic beverages, drugs and narcotics, energy beverages, (b) a weapon or a component thereof, ammunition for a weapon, and anything that is designed to kill, injure or disable a person or that is altered so as to be capable of killing, injuring or disabling a person, when possessed without prior authorization, (c) an explosive or a bomb or a component thereof, (d) currency over any applicable prescribed limit [25.00\$], and (e) any item not described in paragraphs (a) to (d) that could jeopardize the security of a Penitentiary or the safety of persons, when that item is possessed without prior authorization |
| | | .2 | "Unauthorized Smoking Items" means all smoking items including, but not limited to, cigarettes, cigars, tobacco, chewing or snuffing tobacco, cigarette making machines, matches and lighters. |
| | | .3 | "Commercial Vehicle" means any motor vehicle used for the shipment of material, equipment and tools required for the construction project. |
| | | .4 | "CSC" means Correctional Service Canada. |
| | | .5 | "Director" means Director or Warden of the Institution as applicable or their representative. |
| | | .6 | "Construction employees" means persons working for the general contractor, the sub-contractors, equipment operators, material suppliers, testing and inspection companies and regulatory agencies. |
| | | .7 | "Departmental Representative" means the Public Works and Government Services Canada (PWGSC) or the Correctional Service Canada (CSC) project manager depending on project. |
| | | .8 | "Perimeter" means the fenced or walled area of the institution that restrains the movement of the inmates. |
| | | .9 | "Construction zone" means the area as shown on the contract drawings where the contractor will be allowed to work. This area may or may not be isolated from the security area of the institution. In this project the construction area will be delimited by CSC security fences and by contractor's job site fences. Only |

one breach will be used as entrance and exit for the construction zone.

- | | | | |
|---|-------------------------|----|--|
| 3 | Preliminary Proceedings | .1 | <p>Prior to the commencement of work, the contractor shall meet with the Director to:</p> <ul style="list-style-type: none"> .1 Discuss the nature and extent of all activities involved in the Project. .2 Establish mutually acceptable security procedures in accordance with this instruction and the institution's particular requirements. <p>.2 The contractor will:</p> <ul style="list-style-type: none"> .a Ensure that all construction employees are aware of the CSC security requirements. .b Ensure that a copy of the CSC security requirements is always prominently on display at the job site. .c Co-operate with institutional personnel in ensuring that security requirements are observed by all construction employees. |
| 4 | Construction Employees | .1 | <p>Submit to the Director a list of the names with date of birth of all construction employees to be employed on the construction site and a security clearance form for each employee.</p> <p>.2 Allow two (2) weeks for processing of security clearances. Employees will not be admitted to the Institution without a valid security clearance in place and a recent picture identification such as a provincial driver's license. Security clearances obtained from other CSC institutions are not valid at the institution where the project is taking place.</p> <p>.3 The Director may require that facial photographs may be taken of construction employees and these photographs may be displayed at appropriate locations in the institution or in an electronic database for identification purposes. The Director may require that Photo ID cards be provided for all construction workers. ID cards will then be left at the designated entrance to be picked upon arrival at the institution and shall be displayed prominently on the construction employees clothing at all time while employees are at the institution.</p> <p>.4 Entry to Institutional Property will be refused to any person there may be reason to believe may be a security risk.</p> <p>.5 Any person employed on the construction site will be subject to immediate removal from Institutional Property if they:</p> <ul style="list-style-type: none"> .1 appear to be under the influence of alcohol, drugs or narcotics. .2 behave in an unusual or disorderly manner. |

- .3 are in possession of contraband.
- 5 Vehicles
- .1 All unattended vehicles on CSC property shall have windows closed; doors and trunks shall be locked and keys removed. The keys shall be securely in the possession of the owner or an employee of the company that owns the vehicle.
- .2. The director may limit at any time the number and type of vehicles allowed within the Institution.
- .3. Drivers of delivery vehicles for material required by the project shall not require security clearances but must remain with their vehicle the entire time that the vehicle is in the Institution. The director may require that these vehicles be escorted by Institutional staff or Commissionaires while in the Institution.
- .4. If the Director permits trailers to be left inside the secure perimeter of the Institution, these trailer doors will be locked at all times. All windows will be securely locked when left unoccupied. All trailer windows shall be covered with expanded metal mesh. All storage trailers inside and outside the perimeter must be locked when not in use.
- 6 Parking
- .1 The parking area(s) to be used by construction employees will be designated by the Director. Parking in other locations will be prohibited and vehicles may be subject to removal.
- 7 Shipments
- .1 All shipments of project material, equipment and tools shall be addressed in the Contractor's name to avoid confusion with the institution's own shipments. The contractor must have his own employees on site to receive any deliveries or shipments. CSC staff will **NOT** accept receipt of deliveries or shipments of any material equipment or tools for the contractor.
- 8 Telephones
- .1 There will be no installation of telephones, Facsimile machines and computers with Internet connections permitted within the perimeter of the institution unless prior approval of the Director is received.
- .2 The Director will ensure that approved telephones, Facsimile machine and computers with Internet connections are located where they are not accessible to inmates. All computers will have an approved password protection that will stop an Internet connection to unauthorized personnel.
- .3 Wireless cellular and digital telephones, including but not limited to devices for telephone messaging, pagers, BlackBerries, telephone used as 2-way radios, are not permitted within the

- perimeter of the Institution unless approved by the Director. If wireless cellular telephones are permitted, the user will not permit their use by any inmate.
- .4. The Director may approve but limit the use of two way radios.
- 9 Work Hours
- .1 Work hours within the Institution are: Monday to Friday [07:00 hrs] to [16:30 hrs]
- .2 Work will not be permitted during weekends and statutory holidays without the permission of the Director. A minimum of seven days advance notice will be required to obtain the required permission. In case of emergencies or other special circumstances, this advance notice may be waived by the Director.
- 10 Overtime Work
- .1 No overtime work will be allowed without permission of the Director. Give a minimum forty-eight (48) hours advance notice when overtime work on the construction project is necessary and approved. If overtime work is required because of an emergency such the completion of a concrete pour or work to make the construction safe and secure, the contractor shall advise the Director as soon as this condition is known and follow the directions given by the Director. Costs to Canada for such events may be attributed to the contractor.
- .3 When overtime work, weekend statutory holiday work is required and approved by the Director, extra staff members may be posted by the Director or his designate, to maintain the security surveillance. The actual cost of this extra staff may be attributed to the contractor.
- 11 Tools and Equipment
- .1 Maintain on site a complete list of all tools and equipment to be used during the construction project. Make this inventory available for inspection when required.
- .2 Throughout the construction project maintain an up-to-date list of tools and equipment specified above.
- .3 Keep all tools and equipment under constant supervision, particularly power-driven and cartridge-driven tools, cartridges, files, saw blades, rod saws, wire, rope, ladders and any sort of jacking device.
- .4 Store all tools and equipment in approved secure locations.
- .5 Lock all tool boxes when not in use. Keys to remain in the possession of the employees of the contractor.
- .6 Scaffolding shall be secured and locked when not erected and when erected, shall be secured in a manner agreed upon with the director.

- .7 All missing or lost tools or equipment shall be reported immediately to the Director.
- .8 The Director will ensure that the security staff members carry out checks of the Contractor's tools and equipment against the list provided by the Contractor. These checks may be carried out at the following intervals:
 - .1 At the beginning and conclusion of every construction project.
 - .2 Weekly, when the construction project extends longer than a one week period.
- .9 Certain tools/equipment such as cartridges and hacksaw blades are highly controlled items. The contractor will be given at the beginning of the day, a quantity that will permit one day's work. Used blades/cartridges will be returned to the Ministerial Director's representative at the end of each day.
- .10 If propane or natural gas is used for heating the construction, the institution will require that an employee of the contractor supervise the construction site during non-working hours.

12 Keys

1. Security Hardware Keys

- .1 The Contractor shall arrange with the security hardware supplier/installer to have the keys for the security hardware to be delivered directly to Institution, specifically the Security Maintenance Officer (SMO).
- .2 The SMO will provide a receipt to the Contractor for security hardware keys.
- .3 The contractor will provide a copy of the above-mentioned receipt to the Departmental Representative.

2. Other Keys

- .1 The contractor will use standard construction cylinders for locks for his use during the construction period.
- .2 The contractor will issue instructions to his employees and sub-trades, as necessary, to ensure safe custody of the construction set of keys.
- .3 Upon completion of each phase of the construction, the CSC representative will, in conjunction with the lock manufacturer:
 - .a Prepare an operational keying schedule;
 - .b accept the operational keys and cylinders directly from the lock manufacturer;
 - .c Arrange for removal and return of the construction cores and install the operational core in all locks.
- .4 Upon putting operational security keys into use, the CSC construction escort shall obtain these keys as they are required from the SMO and open doors as required by the Contractor. The Contractor shall issue instructions to his employees advising them that all security keys shall always remain with the CSC construction escort.

- 13 Security Hardware .1 Turn over all removed security hardware to the Director of the Institution for disposal or for safekeeping until required for re-installation.
- 14 Prescription Drugs .1 Employees of the contractor who are required to take prescription drugs during the workday shall obtain approval of the Director to bring a one day supply only into the Institution.
- 15 Smoking Restrictions .1 Contractors and construction employees are not permitted to smoke inside correctional facilities or outdoors within the perimeter of a correctional facility and must not possess unauthorized smoking items within the perimeter of a correctional facility.
- .2 Contractors and construction employees who are in violation of this policy will be requested to immediately cease smoking or dispose of any unauthorized smoking items and, if they persist, will be directed to leave the institution.
3. Smoking is only permitted outside the perimeter of a correctional facility in an area to be designated by the Director.
- 16 Contraband .1 Weapons, ammunition, explosives, alcoholic beverages, drugs and narcotics are prohibited on institutional property.
- .2 The discovery of contraband on the construction site and the identification of the person(s) responsible for the contraband shall be reported immediately to the Director.
- .3 Contractors should be vigilant with both their staff and the staff of their sub-contractors and suppliers that the discovery of contraband may result in cancellation of the security clearance of the affected employee. Serious infractions may result in the removal of the company from the Institution for the duration of the construction.
- .4. Presence of arms and ammunition in vehicles of contractors, sub-contractors and suppliers or employees of these will result in the immediate cancellation of security clearances for the driver of the vehicle.
- 17 Searches .1 All vehicles and persons entering institutional property may be subject to search.
- .2 When the Director suspects, on reasonable grounds, that an employee of the Contractor is in possession of contraband or unauthorized items, he may order that person to be searched.
- .3 All employees entering the Institution may be subject to screening of personal effects for traces of contraband drug residue.
- 18 Access to and Removal from .1 Construction personnel and commercial vehicles will not be admitted to the institution after normal working hours, unless approved by the Director.

Institutional Property

- 19 Movement of Vehicles .1 Escorted commercial vehicles will be allowed to enter or leave the institution through the vehicle access gate during the following hours:
- .1 [08:30 a.m.] to [11:00 a.m.]
 - .2 [13:00 p.m.] to [15:30 p.m.]
- Construction vehicles shall not leave the Institution until an inmate count is completed.
- .2. The contractor shall advise the Director Forty eight (48) hours in advance to the arrival on the site of heavy equipment such as concrete trucks, cranes, etc.
 - .3. Vehicles being loaded with soil or other debris, or any vehicle considered impossible to search, must be under continuous supervision by CSC staff or Commissionaires working under the authority of the Director.
 - .4. Commercial vehicles will only be allowed access to institutional property when their contents are certified by the Contractor or his representative as being strictly necessary to the execution of the construction project.
 - .5. Vehicles shall be refused access to institutional property if, in the opinion of the Director, they contain any article which may jeopardize the security of the institution.
 - .6. Private vehicles of construction employees will not be allowed within the security perimeter of medium or maximum security institutions without the authorization of the Director.
 - .7. With prior approval of the Director, a vehicle may be used in the morning and evening to transport a group of employees to the work site. This vehicle will not remain within the Institution the remainder of the day.
 - .8. With the approval of the Director, certain equipment may be permitted to remain on the construction site overnight or over the weekend. This equipment must be securely locked, with the battery removed. The Director may require that the equipment be secured with a chain and padlock to another fixed object.
- 20 Movement of construction employees on Institutional Property .1 Subject to the requirements of good security, the Director will permit the Contractor and his employees as much freedom of action and movement as is possible.
- .2. However, notwithstanding paragraph above, the Director may:
 - .1 Prohibit or restrict access to any part of the institution.
 - .2 Require that in certain areas of the institution, either during the entire construction project or at certain intervals, construction

employees only be allowed access when escorted by a member of the CSC security staff or a commissionaire.

- | | | | |
|----|------------------------------------|-----|---|
| | | .3 | During the lunch and coffee/health breaks, construction employees will be allowed to leave the construction site. The specific time of those breaks will be set by the contractor with the approval of the warden. The Construction employees are not permitted to eat in the officer's lounge or the dining room of the institution. |
| 21 | Surveillance and Inspection | .1 | Construction activities and all related movement of personnel and vehicles will be subject to surveillance and inspection by CSC security staff members to ensure that established security requirements are met. |
| | | .2 | CSC staff members will ensure that an understanding of the need to carry out surveillance and inspections, as specified above, is established among construction employees and maintained throughout the construction project. |
| 22 | Stoppage of Work | .1. | The director may order at any time that the contractor, his employees, sub-contractors and their employees to not enter or to leave the work site immediately due to a security situation occurring within the Institution. The contractor's site supervisor shall note the name of the CSC staff member giving this instruction, the time of the request and obey the order as quickly as possible.

The contractor shall advise the Departmental Representative of this interruption of the work within 24 hours. |
| 23 | Contact with Inmates | .1. | Unless specifically authorized, it is forbidden to come into contact with inmates, to talk with them, to receive objects from them or to give them objects. Any construction employee doing any of the above will be removed from the site and his security clearance revoked. If some inmates try to contact you, another worker will inform the Director at once. |
| | | .2 | It is to be noted that cameras are not allowed on CSC property. |
| | | .3 | Notwithstanding the above paragraph, if the director approves of the usage of cameras, it is strictly forbidden to take pictures of inmates, of CSC staff members or of any part of the Institution other than those required as part of this contract. |
| 24 | Completion of Construction Project | .1 | Upon completion of the construction project or, when applicable, the takeover of a facility, the Contractor shall remove all remaining construction material, tools and equipment that are not specified to remain in the Institution as part of the construction contract. |

PART 1 - GENERAL

1.1 REFERENCES

- .1 Province of Quebec
 - .1 Act Respecting Occupational Health and Safety, R.S.Q. last edition.

1.2 ACTION AND
INFORMATIONAL
SUBMITTALS

- .1 Submit site-specific Health and Safety Plan, within 7 days after date of Notice to Proceed and prior to mobilization to site. Address following items:
 - .2 Safety and health risk or hazard analysis for each site task and operation.
 - .3 Develop checklist for items to be inspected on a daily basis. Document actions taken.
 - .4 Personnel training requirements including:
 - .1 Names of personnel and alternates responsible for site safety and health, hazards present on site, and use of personal protective equipment.
 - .2 Work practices by which personnel can minimize risks from hazards, safe use of engineering controls and equipment on site, medical surveillance requirements, including recognition of symptoms and signs which might indicate overexposure to hazards, and elements of site-specific Health and Safety Plan.
 - .5 Personal protective equipment (PPE) program addressing:
 - .1 Donning and doffing procedures.
 - .2 PPE selection based upon site hazards.
 - .3 PPE use and limitations of equipment.
 - .4 Work mission duration, PPE maintenance and storage.
 - .5 PPE decontamination and disposal.
 - .6 PPE inspection procedures prior to, during, and after use.
 - .7 Evaluation of effectiveness of PPE program, and limitations during temperature extremes, and other appropriate medical considerations.
 - .8 Medical surveillance requirements for personnel assigned to work at site.
 - .9 Frequency and types of air monitoring, personnel monitoring, and environmental sampling techniques and instrumentation to be used, including methods of maintenance and calibration of monitoring and sampling equipment.
 - .10 Site control measures employed at site including site map, site work zones, use of 'buddy system', site communications including site security, alerting means for emergencies, standard operating procedures or safe work practices, and

- identification of nearest medical assistance.
- . 11 Decontamination procedures for both personnel and equipment.
 - . 12 Emergency response requirements addressing: pre-emergency planning, personnel roles, lines of authority and communication, emergency recognition and prevention, safe distances and places of refuge, site security and control, evacuation routes and procedures, decontamination procedures not covered under decontamination section, emergency medical treatment and first aid, emergency alerting and response procedures, critique of response and follow-up, PPE and emergency equipment, site topography, layout, prevailing weather conditions, and procedures for reporting incidents to local, provincial, or federal agencies.
 - . 13 Written respiratory protection program for project activities.
 - . 14 Procedures dealing with heat and/or cold stress.
 - . 15 Confined space entry procedures.
 - . 16 Spill containment program if drummed waste material is generated, excavated, stored, or managed on site.
- . 6 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 5 days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within 5 days after receipt of comments from Departmental Representative.
- 1.3 WORK STOPPAGE
- . 1 Assign responsibility and obligation to Health and Safety Officer where required to stop or start Work when, at Health and Safety Officer's discretion, it is necessary or advisable for reasons of health or safety. Departmental Representative may also stop Work for health and safety considerations.
- 1.4 UNFORESEEN HAZARDS
- . 1 Should unforeseen or peculiar safety-related factor, hazard, or condition become evident during performance of Work, stop work and immediately advise Departmental Representative verbally and in writing.
- PART 2 - PRODUCTS
- 2.1 NOT USED
- . 1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

PART 1 - GENERAL

1.1 REFERENCES

- .1 Refer to contractual document to be signed.

1.2 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 or dispose. Do not burn waste materials on site.
- .3 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .4 Provide on-site containers for collection of waste materials and debris.
- .5 Provide and use marked separate bins for recycling.
- .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 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
- .9 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- .10 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

1.3 FINAL CLEANING

- .1 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.
- .2 Prior to final review remove surplus products, tools, construction machinery and equipment.
- .3 Remove waste products and debris other than including that caused

- by Owner or other Contractors.
- . 4 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site.
 - . 5 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
 - . 6 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, walls, and floors.
 - . 7 Clean lighting reflectors, lenses, and other lighting surfaces.
 - . 8 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.
 - . 9 Remove dirt and other disfiguration from exterior surfaces.
 - . 10 Clean and sweep roofs, gutters, areaways, and sunken wells.
 - . 11 Clean equipment and fixtures to sanitary condition; clean or replace filters of mechanical equipment.
 - . 12 Clean roofs, downspouts, and drainage systems.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

PART 1 - GENERAL1.1 WASTE
MANAGEMENT GOALS

- .1 Prior to start of Work conduct meeting with Departmental Representative to review and discuss Waste Management Plan and Goals.
- .2 Accomplish maximum control of solid construction waste.
- .3 Preserve environment and prevent pollution and environment damage.

1.2 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.

1.3 STORAGE,
HANDLING AND
PROTECTION

- .1 Store, materials to be reused, recycled and salvaged in locations.
- .2 Unless specified otherwise, materials for removal become Contractor's property.
- .3 Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.
- .4 Protect structural components not removed for demolition from movement or damage.
- .5 Support affected structures. If safety of building is endangered, cease operations and immediately notify

Departmental Representative.

- .6 Protect surface drainage, mechanical and electrical from damage and blockage.
- .7 Separate and store materials produced during dismantling of structures in designated areas.
- .8 Prevent contamination of materials to be salvaged and recycled and handle materials.

1.4 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.
- .3 Remove materials from deconstruction as deconstruction/disassembly Work progresses.

1.5 USE OF SITE AND FACILITIES

- .1 Execute work with least possible interference or disturbance to normal use of premises.
- .2 Maintain security measures established by existing facility.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

3.1 CLEANING

- .1 Remove tools and waste materials on completion of Work, and leave work area in clean and orderly condition.
- .2 Clean-up work area as work progresses.
- .3 Source separate materials to be reused/recycled into

specified sort areas.

3.2 CANADIAN
GOVERNMENTAL
DEPARTMENTS CHIEF
RESPONSIBILITY FOR
THE ENVIRONMENT

.1 Schedule E - Government Chief Responsibility for the Environment:

Province of Quebec

Ministère de l'Environnement et de la Faune

Siège social

150, boul. René-Lévesque Est

Québec (Québec) G1R 4Y1

418 643-3127

800 561-1616

418 646-5974

Conseil de la conservation et de l'environnement

800, place d'Youville, 19^e étage

Québec (Québec) G1R 3P4

418 643-3818

PART 1 - GENERAL

1.1 ADMINISTRATIVE
REQUIREMENTS

- .1 Demonstrate operation and maintenance of equipment and systems to Owner's personnel two weeks prior to date of substantial performance.
- .2 Owner: provide list of personnel to receive instructions, and co-ordinate 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 equipment 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: ensure amount of time required for instruction of each item of equipment.

1.2 ACTION AND
INFORMATIONAL
SUBMITTALS

- .1 Submit 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 Owner's personnel.
 - . 2 Provide written report that demonstration and instructions have been completed.

1.4 TIME ALLOCATED FOR INSTRUCTIONS

- . 1 Ensure amount of time required for instruction of each item of equipment or system as follows:
 - . 1 Chiller: Four (4) hours
 - . 2 Pumps: Two (2) hours
 - . 3 Regulation: Four (4) hours
 - . 4 Electrical system: Two (2) hours

PART 2 - PRODUCTS

2.1 NOT USED

- . 1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

- . 1 Not Used.

PART 1 - GENERAL1.1 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 Contractor's 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 is responsible of 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: as per client's requirements or determined by designer. To meet Project functional and operational requirements.

1.3 COMMISSIONING OVERVIEW

- . 1 Cx to be a line item of Contractor's cost breakdown.
- . 2 Cx activities supplement field quality and testing procedures described in relevant technical sections.
- . 3 Cx is conducted in concert with activities performed during 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 include transfer of critical knowledge to facility operational personnel.
- . 4 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 unfunctional 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 and approval.
 - .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 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit no later than 4 weeks after award of Contract:
 - .1 Name of Contractor's Cx agent.
 - .2 Draft Cx documentation.
 - .3 Preliminary Cx schedule.
- .2 Request in writing to Departmental Representative for changes to submittals and obtain written approval at least 8 weeks prior to start of Cx.
- .3 Submit proposed Cx procedures to Departmental Representative where not specified and obtain written approval at least 8 weeks prior to start of Cx.
- .4 Provide additional documentation relating to Cx process

required by Departmental Representative.

1.8 COMMISSIONING DOCUMENTATION

.1 Provide completed and approved Cx documentation to Departmental Representative.

1.9 COMMISSIONING SCHEDULE

.1 Provide detailed Cx schedule as part of construction schedule.

.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.

1.10 COMMISSIONING MEETINGS

.1 Purpose: to resolve issues, monitor progress, identify deficiencies, relating to Cx.

.2 Continue Cx meetings on regular basis until commissioning deliverables have been addressed.

.3 Thereafter Cx meetings to be held until project completion and as required during equipment start-up and functional testing period.

.4 Meeting will be chaired by Departmental Representative, who will record and distribute minutes.

1.11 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.

1.12 WITNESSING OF STARTING AND TESTING

.1 Provide 7 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.

1.13 MANUFACTURER'S INVOLVEMENT

- .1 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.
- .2 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.
- .3 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.

1.14 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.

1.15 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.

1.16 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 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.

1.17 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.

1.18 START OF
COMMISSIONING

.1 Start Cx after elements of building affecting start-up and performance verification of systems have been completed.

1.19 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.

1.20 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.

1.21 MAINTENANCE
MATERIALS, SPARE
PARTS, SPECIAL
TOOLS

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

1.22 OWNER'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.

PARTIE 1 - GÉNÉRALITÉS

1.1 GENERAL

- .1 Before work commences, verify elevations and dimensions of existing building, access conditions, overall floor space, owner's requirements, etc., and notify the engineer of any discrepancy.

1.2 STRUCTURAL STEEL

- .1 General:
 - .1 Reference standard: CAN/CSA-S16-09.
 - .2 Refer to the architectural, mechanical, and structural plans and specifications for all work that may interfere with or affect structural steel elements.
 - .3 Verify on site all the dimensions and elevations that relate to the anchor points of the steel structure.
 - .4 Assembly is to be carried out at the plant or on site following the details shown on the structural drawings. In the absence of precise information, design and execute the assembly to the requirements of standard S16-09.
 - .5 Provide one copy of the shop drawings for control. These shop drawings must bear the seal of a qualified engineer.
- .2 Materials:
 - .1 Structural steel:
 - .1 H & I sections: to CAN/CSA-G40.21 grade 350 W;
 - .2 Tubular sections: TO CAN/CSA-G40.21 grade 350 W, class H;
 - .3 C sections, steel angle, plates and rebars: to CAN/CSA-G40.21 grade 300 w.
 - .2 Bolts, nuts and washer in assemblies: to ASTM, A-325.
 - .3 Welding materials: to CSA-W59.
 - .4 Primer applied in-plant on all structural steel elements: to CPMA 1-73A.
- .3 Gratings: fasten the units as per manufacturer's details and recommendations.

1.3 HEAVY WOOD FRAMING

- .1 Reference standard for timber dimensions: CSA 0141. the wood used shall comply with can/csa-086-09, with the N.L.G.A. classification rules and bear the N.L.G.A. stamp.
- .2 Materials
 - .1 Non punctured treated wood no 2 quality spruce to N.L.G.A. standards lumber shall be dressed four sides ((D4S). The elements that are subject to lesser loads may be no 2 quality. Water content of lumber shall be lower than to 19% at time of assembly.

Part 1 General**1.1 SECTION SUMMARY**

- .1 This section covers material and installation of metal doors and frames in concrete block assemblies.

1.2 RELATED SECTIONS

- .1 Section 08 71 00 - Door hardware, for adequate hardware complying with a correctional facility's standards

1.3 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM A653/A653M-06a, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - .2 ASTM B29-03, Standard Specification for Refined Lead.
 - .3 ASTM B749-03, Standard Specification for Lead and Lead Alloy Strip, Sheet and Plate Products.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.
- .3 Canadian Steel Door Manufacturers' Association (CSDMA)
 - .1 CSDMA, Recommended Specifications for Commercial Steel Doors and Frames, 2000.
 - .2 CSDMA, Selection and Usage Guide for Commercial Steel Doors, 1990.
- .4 National Fire Protection Association (NFPA)
 - .1 NFPA 80-99, Standard for Fire Doors and Fire Windows.
 - .2 NFPA 252-03, Standard Methods of Fire Tests of Door Assemblies.
- .5 Underwriters' Laboratories of Canada (ULC)
 - .1 CAN4-S104-M80, Standard Method for Fire Tests of Door Assemblies.
 - .2 CAN4-S105-M85, Standard Specification for Fire Door Frames Meeting the Performance Required by CAN4-S104.

1.4 SYSTEM DESCRIPTION

- .1 Design Requirements:
 - .1 Design exterior frame assembly to accommodate to expansion and contraction when subjected to minimum and maximum surface temperature of -35 degrees C to 35 degrees C.
 - .2 Maximum deflection for exterior steel entrance screens under wind load of 1.2 kPa not to exceed 1/175th of span.

- .3 Steel fire rated doors and frames: labelled and listed by an organization accredited by Standards Council of Canada in conformance with CAN4-S104 et NFPA 252 for ratings specified or indicated.
- .4 Provide fire labelled frames for openings requiring fire protection ratings. Test products in conformance with CAN4-S104, or NFPA 252 and listed by nationally recognized agency having factory inspection services.

1.5 SUBMITTALS

- .1 Provide required product data for approval.
- .2 Provide required shop drawings.
 - .1 Indicate each type of door, material, steel core thicknesses, mortises, reinforcements, location of exposed fasteners, openings, arrangement of hardware and fire rating and finishes.
 - .2 Indicate each type frame material, core thickness, reinforcements, glazing stops, location of anchors and exposed fastenings and reinforcing fire rating finishes.
 - .3 Submit test and engineering data, and installation instructions.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with the manufacturer and the Ministerial representative's directions.

Part 2 Products

2.1 MATERIALS

- .1 All material for doors and frames must originate from the same manufacturer.
- .2 Hot dipped galvanized steel sheet: to ASTM A653M, ZF75, minimum base steel thickness in accordance with CSDMA Table 1 - Thickness for Component Parts.
- .3 Reinforcement channel to CSA G40.20/G40.21, Type 44W, coating designation to ASTM A653M, ZF75.
- .4 Doors:
 - .1 Minimum thickness of bare metal for interior doors' face: 1,5mm
 - .2 Minimum thickness of bare metal for exterior doors' face: 1,5mm
 - .3 Thickness of bare metal for faces of doors receiving to hinges and locks reinforcement pieces: gauge 10
 - .4 Thickness of bare metal for faces opposite to hinges: gauge 14
 - .5 Install gauge 14 reinforcement for door closers

2.2 DOOR CORE MATERIALS

- .1 Polyurethane: to CSGB 51-GP-21M rigid, modified polyurethane, closed cell board, density 54 kg/m with RSI 0.35 (R 2.0)³.

2.3 ADHESIVES

- .1 Polyurethane core: heat resistant, polyurethane based, low viscosity contact cement.

2.4 PRIMER

- .1 Touch-up prime CAN/CGSB-1.181.
- .2 Application:
- .1 Apply two (2) primary 5 mils (dry film) coats of a two-component, high solids with the following characteristics:
- | | | | |
|--------------|---|-------------------------|-------------------------|
| Aspect : | High brilliance | | |
| Dry E: | 75 % of volume | | |
| Viscosity : | >110-135 units KU/Krebs Stormer at 20°C (Mixed product) | | |
| Drying time: | 20°C/50% HR | 10°C/60% HR | 30°C/50% HR |
| To touch: | 6 hours | 12 hours | 4 hours |
| Workable : | 12 hours | 36 hours | 6 hours |
| Re-coatable: | After 16h
Before 72h | After 36h
Before 96h | After 12h
Before 72h |

2.5 PAINT

- .1 Field paint steel doors and frames. Protect weather-strips from paint. Provide final finish free of scratches or other blemishes.
- .2 Application:
1. Apply two (2) 5 mils (dry film) coats of a two-component, polyurethane acrylic with the following characteristics:
- | | | | |
|--------------|--|-------------|-------------|
| Aspect : | brilliant | | |
| Density : | 1,08 kg/litre ± 0,06 depending on tint | | |
| Dry E.: | 28,7 % en volume ± 1,9 depending on tint | | |
| Viscosity : | 88-92 units KU/Krebs Stormer at 20°C | | |
| Drying time: | 20°C/50% HR | 10°C/60% HR | 30°C/50% HR |
| To touch: | 20 minutes | 2 hours | 20 minutes |
| Workable: | 2 hours | 6 hours | 2 hours |
| Re-coatable: | After 2h | After 8h | After 2h |
2. Color by the Ministerial representative based on Manufacturer's standard range.

2.6 ACCESSORIES

- .1 Fabricate glazing stops as formed channel, minimum 16 mm height, accurately fitted, butted at corners and fastened to frame sections with counter-sunk oval head sheet metal screws.
- .2 Door bottom seal: as per section 08 71 00.
- .3 Metallic paste filler: to manufacturer's standard.
- .4 Exterior sealant: silicone or polyurethane-based, depending on the compatibility constraints.
- .5 Interior sealant: paintable latex sealant.

2.7 FRAMES FABRICATION GENERAL

- .1 Fabricate frames in accordance with CSDMA specifications.
- .2 Fabricate frames to profiles and maximum face sizes as indicated.
- .3 Exterior frames: 1.8 mm (gauge 14) with PVC thermal break
 - .1 Made of two parts assembled with “Z” reinforcement steel clip, separating exterior part from interior part.
 - .2 Welded frame
 - .3 Frame depth: to fit with wall thickness
- .4 Manufacturer's nameplates on frames and screens are not permitted.
- .5 Conceal fastenings except where exposed fastenings are indicated.
- .6 Provide factory-applied touch up primer at areas where zinc coating has been removed during fabrication.
- .7 Insulate exterior frame components with polyurethane insulation.

2.8 FRAME ANCHORAGE

- .1 Provide appropriate anchorage to floor and wall construction.
- .2 Locate each wall anchor immediately above or below each hinge reinforcement on hinge jamb and directly opposite on strike jamb.
- .3 Provide 2 anchors for rebate opening heights up to 1520 mm and 1 additional anchor for each additional 760 mm of height or fraction thereof.
- .4 Locate anchors for frames in existing openings not more than 150 mm from top and bottom of each jambs and intermediate at 660 mm on centre maximum.

2.9 FRAMES: WELDED TYPE

- .1 Welding in accordance with CSA W59.
- .2 Accurately mitre or mechanically joint frame product and securely weld on inside of profile.
- .3 Cope accurately and securely weld butt joints of mullions, transom bars, centre rails and sills.
- .4 Grind welded joints and corners to a flat plane, fill with metallic paste and sand to uniform smooth finish.
- .5 Securely attach floor anchors to inside of each jamb profile.
- .6 Weld in 2 temporary jamb spreaders per frame to maintain proper alignment during shipment.

2.10 DOOR FABRICATION GENERAL

- .1 Fabricate doors with longitudinal edges welded, grind welded joints to a flat plane, fill with metallic paste filler and sand to a uniform smooth finish.
- .2 Doors: manufacturers' proprietary construction, tested and/or engineered as part of a fully operable assembly, including door, frame, gasketing and hardware in accordance with ASTM E330.
- .3 Blank, reinforce, drill doors and tap for mortised, templated hardware and electronic hardware.
- .4 Factory prepare holes 12.7 mm diameter and larger except mounting and through-bolt holes, on site, at time of hardware installation.
- .5 Reinforce doors where required, for surface mounted hardware. Provide flush PVC top caps to exterior doors. Provide inverted, recessed, spot welded channels to top and bottom of interior doors.

2.11 THERMALLY BROKEN DOORS AND FRAMES

- .1 Fabricate thermally broken doors by using insulated core and separating exterior parts from interior parts with continuous interlocking thermal break.
- .2 Thermal break: rigid polyvinylchloride extrusion conforming to CGSB 41-GP-19Ma.
- .3 Fabricate thermally broken frames separating exterior parts from interior parts with continuous interlocking thermal break.
- .4 Apply insulation.

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 INSTALLATION GENERAL

- .1 Install labelled steel fire rated doors and frames to NFPA 80 except where specified otherwise.
- .2 Install doors and frames to CSDMA Installation Guide.

3.3 FRAME INSTALLATION

- .1 Set frames plumb, square, level and at correct elevation.
- .2 Secure anchorages and connections to adjacent construction.

- .3 Brace frames rigidly in position while building-in. Install temporary horizontal wood spreader at third points of door opening to maintain frame width. Provide vertical support at centre of head for openings over 1200 mm wide. Remove temporary spreaders after frames are built-in.
- .4 Make allowances for deflection of structure to ensure structural loads are not transmitted to frames.
- .5 Caulk perimeter of frames.
- .6 Maintain continuity of air barrier and vapour retarder.

3.4 DOOR INSTALLATION

- .1 Install doors and hardware in accordance with hardware templates, manufacturer's instructions and Section 08 71 00 - Door Hardware.
- .2 Provide even margins between doors and jambs and doors and finished floor and thresholds as follows.
 - .1 Hinge side: 1.0 mm.
 - .2 Latch side and head: 1.5 mm.
 - .3 Finished floor, sill: 13 mm.
- .3 Adjust operable parts for correct function.

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Part 4 Annexe

Excerpt from CSDMA charts: Appendix I

APPENDIX 1: STEEL THICKNESSES AND GAUGES

The Tables below provide equivalent thickness information for coated (galvannealed and galvanized) sheet steel complying with ASTM A653/A653M, and stainless steel complying with ASTM A666, as they relate to traditionally specified steel gauges, based on standards published by the American Iron and Steel Institute (A.I.S.I.).

Coated (Galvannealed and Galvanized) Steel Sheet - CS, Type B						
Gauge	Nominal Equivalent Thickness		A.I.S.I. Tolerances (+/-)		Minimum Thickness ^(*)	
	Imperial	SI	Imperial	SI	Imperial	SI
	10	0.138"	3.51 mm	0.009"	0.23 mm	0.129"
12	0.108"	2.74 mm	0.009"	0.23 mm	0.099"	2.51 mm
14	0.078"	1.98 mm	0.008"	0.20 mm	0.070"	1.78 mm
16	0.063"	1.60 mm	0.006"	0.15 mm	0.057"	1.45 mm
18	0.051"	1.30 mm	0.005"	0.13 mm	0.046"	1.17 mm
20	0.039"	1.00 mm	0.004"	0.10 mm	0.035"	0.90 mm
22	0.033"	0.84 mm	0.004"	0.10 mm	0.029"	0.74 mm

*1: Minimum = Nominal Thickness - Tolerance

Stainless Steel Sheet - Cold Worked						
Gauge	Nominal Equivalent Thickness		A.I.S.I. Tolerances (+/-)		Minimum Thickness ^(*)	
	Imperial	SI	Imperial	SI	Imperial	SI
	10	0.134"	3.40 mm	0.006"	0.15 mm	0.128"
12	0.103"	2.62 mm	0.005"	0.13 mm	0.098"	2.49 mm
14	0.074"	1.88 mm	0.004"	0.10 mm	0.070"	1.78 mm
16	0.059"	1.50 mm	0.003"	0.08 mm	0.056"	1.42 mm
18	0.047"	1.19 mm	0.003"	0.08 mm	0.044"	1.11 mm
20	0.035"	0.89 mm	0.002"	0.05 mm	0.033"	0.84 mm
22	0.029"	0.74 mm	0.002"	0.05 mm	0.027"	0.69 mm

*1: Minimum = Nominal Thickness - Tolerance

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 08 11 00 - METAL DOORS AND FRAMES

1.2 REFERENCES

- .1 American National Standards Institute (ANSI) / Builders Hardware Manufacturers Association (BHMA)
 - .1 CAN/CGSB-69.18-M90/ANSI/BHMA A156.1-2000, American National Standard for Butts and Hinges.
 - .2 CAN/CGSB-69.17-M86/ANSI/BHMA A156.2-2003, Bored and Preamsembled Locks and Latches.
 - .3 CAN/CGSB-69.19-93/ANSI/BHMA A156.3-2001, Exit Devices.
 - .4 CAN/CGSB-69.20-M90/ANSI/BHMA A156.4-2000, Door Controls - Closers.
 - .5 CAN/CGSB-69.21-M90/ANSI/BHMA A156.5-2001, Auxiliary Locks and Associated Products.
 - .6 CAN/CGSB-69.22-M90/ANSI/BHMA A156.6-2005, Architectural Hardware.
 - .7 CAN/CGSB-69.23-M90/ANSI/BHMA A156.7-2009, Hinges template dimensions.
 - .8 CAN/CGSB-69.28-M90/ANSI/BHMA A156.12-2005, Interconnected Locks and Latches.
 - .9 CAN/CGSB-69.29-M93/ANSI/BHMA A156.13-2002, Mortise Locks and Latches Series 1000.
- .2 Canadian Steel Door and Frame Manufacturers' Association (CSDMA)
 - .1 CSDMA Recommended Dimensional Standards for Commercial Steel Doors and Frames - 2009.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit required documents and samples.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for door hardware and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Samples:
 - .1 Submit one sample for review and acceptance of each unit.
 - .2 Samples will be returned for inclusion into work.
 - .3 Identify each sample by label indicating applicable specification paragraph number, brand name and number, finish and hardware package number.
 - .4 After approval, samples will be returned for incorporation in Work.
- .4 Hardware List:

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- .1 Submit contract hardware list.
- .2 Indicate specified hardware, including make, model, material, function, size, finish and other pertinent information.
- .5 Manufacturer's Instructions: submit manufacturer's installation instructions.

1.4 DOCUMENTS SUBMITTALS-END OF WORK

- .1 Supply maintenance and exploitation data sheets for door hardware and accessories when delivering building.

1.5 QUALITY ASSURANCE

- .1 Regulatory Requirements:
 - .1 Hardware for doors in fire separations and exit doors certified by a Canadian Certification Organization accredited by Standards Council of Canada.
 - .2 Test reports: submit test reports certifying that products/material comply with specified performance characteristics and criteria and physical requirements.
 - .3 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .2 Package items of hardware including fastenings, separately or in like groups of hardware, label each package as to item definition and location.
- .3 Storage and Handling Requirements:
 - .1 Store materials in dry location and in accordance with manufacturer's recommendations.
 - .2 Store and protect door hardware from nicks, scratches, and blemishes.
 - .3 Protect prefinished surfaces with strippable coating.
 - .4 Replace defective or damaged materials with new.

Part 2 Products

2.1 GENERAL REQUIREMENTS

- .1 Use one manufacturer's products only for similar items.
- .2 Verify pressure differentials between rooms and make sure that the door closers have enough power to close door firmly.
- .3 Unless indicate otherwise, only hardware as per ANSI/BHMA A156 and CAN/CGSB-69 (series) is acceptable. Hardware is as specified.

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2.2 DOOR HARDWARE

- .1 Refer to door hardware list at the end of present section.

2.3 FASTENING

- .1 Supply screws, bolts, expansion shields and other fastening devices required for satisfactory installation and operation of hardware.
- .2 Exposed fastening devices to match finish of hardware.
- .3 Where a pull handle is scheduled on one side of door and a push plate on other side, supply fastening devices, and install so the pull handle can be secured through door from reverse side. Install the push plate to cover fasteners.
- .4 Use fasteners compatible with material through which they pass.
- .5 All exposed fastening components must be high security and anti-theft type, as prescribed.

2.4 KEYING

- .1 All keys and master keys must be supplied by Manufacturer and directly transmitted to the Ministerial representative in sealed, clearly identified envelopes.
- .2 New cylinders and keys for cabinet and doors must be on the same existing master key system, to be coordinated by the Ministerial representative.
- .3 Schedule necessary meetings for key system set-up and prepare a detailed keys list with the Ministerial representative.
- .4 Supply three (3) keys for every lock in this Contract.
- .5 Supply three (3) master keys for each master key or grand master key group.
- .6 Supply three (3) additional key blanks to the Ministerial representative.
- .7 Stamp keying code numbers on keys and cylinders.
- .8 Supply construction cores.
- .9 Hand over permanent cores and keys to the Ministerial representative.

Part 3 Execution

3.1 INSTALLATION

- .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.
- .2 Supply metal door and frame manufacturers with complete instructions and templates for preparation of their work to receive hardware.
- .3 Supply manufacturers' instructions for proper installation of each hardware component.
- .4 Install hardware to standard hardware location dimensions in accordance with CSDFMA Canadian Metric Guide for Steel Doors and Frames (Modular Construction).
- .5 Where door stop contacts door handle, mount stop to strike bottom of handle.

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- .6 Use only manufacturer's supplied fasteners.
 - .1 Use of "quick" type fasteners, unless specifically supplied by manufacturer, is unacceptable.
- .7 Remove construction cores when directed by the Ministerial representative.
 - .1 Install permanent cores and ensure locks operate correctly.

3.2 ADJUSTING

- .1 Adjust door hardware, operators, closures and controls for optimum, smooth operating condition, safety and for weather tight closure.
- .2 Lubricate hardware, operating equipment and other moving parts.
- .3 Adjust door hardware to ensure tight fit at contact points with frames.

3.3 CLEANING

- .1 Progress Cleaning: clean in accordance with the following.
 - .1 Leave Work area clean at end of each day.
 - .2 Clean hardware with damp rag and approved non-abrasive cleaner, and polish hardware in accordance with manufacturer's instructions.
 - .3 Remove protective material from hardware items where present.
 - .4 Final Cleaning: upon completion: take out of site debris, tools, material and equipment.

3.4 DEMONSTRATION

- .1 Maintenance Staff Briefing:
 - .1 Brief maintenance staff regarding:
 - .1 Proper care, cleaning, and general maintenance of projects complete hardware.
 - .2 Description, use, handling and storage of keys.
 - .3 Use, application and storage of wrenches for door closers, locksets, and fire exit hardware.
 - .2 Demonstrate operation, operating components, adjustment features, and lubrication requirements.

3.5 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by door hardware installation.

3.6 HARDWARE LIST

PRODUCTS MANUFACTURERS

MANUFACTURERS	ABBREVIATIONS
Architectural Unique	UNI

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Southern Folger	SF
Folger Adam	FA
Gallery Specialty Hardware	GSH
LCN (division OF Ingersoll Rand)	LCN

Key types: existing master key system to be matched and coordinated by Contractor and Ministerial representative.

MATERIAL AND FINISHES CHART

Code description	Base Material	Canadian equivalent
600 - Primed For Painting	Steel	CP
603 - Zinc Plated	Steel	C2G
626 - Satin Chromium Plate	Brass, bronze	C26D
628 - Satin Aluminum, Clear Anodized	Aluminum	C28
629 - Satin stainless steel	Stainless steel series 300	C32
630 - Bright stainless steel	Stainless steel series 300	C32D
689 - Aluminum painted	Any	C28

LEGEND

Description	Abreviation
Door width	D.W.
Door height	D.H.
Opening perimeter	O.P.

HARDWARE GROUP

Quantity	Description	Model No.	Finish	Manufacturer
GROUP 01 – Exterior Door				
3.0	Heavy-Duty full surfaceHinge Factory drilled (6 holes), dropped forged steel+Security Screws	205FS 127mm x 146mm x 12.7 mm + Torx Security Screws w pins.	CP	SF
1.0	Heavy-Duty door closers+ security cover+ Security Screws	4211+ Torx Security Screws w pins.	689	LCN
1.0	Mortise deadlock w springs, Knobs on each side+ mortise strike+ security screws	66K-SK-SK + 60-4DB + Torx Security Screws	C26D	FA
1.0	Lock mountings, 178 mm x 254 mm x 5 mm + security screws	HM + Torx Security Screws+pin	C32	FA
1.0	Cylinder shield+ Security screws	No. 2CS + Torx Security Screws+pin	C32D	FA
1.0	Foot plate+ security screw	GSH 80A 8" x D.W. + Torx Security Screws+pin	C32D	GSH
1.0	Aluminum threshold + security screw	AB2 + ABBT + AB7 + Torx Security Screws+pin	C32D	UNI

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2.0	lateral weatherstrip+ security screws	17V x D.H. + Torx Security Screws+pin	C28	UNI
1.0	Top weatherstrip+security screws	17V x D.W. + Torx Security Screws+pin	C28	UNI
1.0	Sweeps+ security screws	R-380 + Torx Security Screws+pin		UNI
1.0	Key system			

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

- .1 National Fire Prevention Association (NFPA)
 - .1 NFPA 13 last edition, Standard for the Installation of Sprinkler Systems.
 - .2 NFPA 20 last edition, Standard for the Installation of Stationary Pumps for Fire Protection.
 - .3 NFPA 24 last edition, Standard for the Installation of Private Fire Service Mains and Their Appurtenances.
 - .4 NFPA 25 last edition, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems.
- .2 Underwriter's Laboratories of Canada (ULC)
 - .1 CAN4 S543 last edition, Standard for Internal Lug Quick Connect Couplings for Fire Hose.

1.2 DRAWING AND
HYDROLOGIC CALCULATION

- .1 This project includes a minor modification to an existing sprinkler system. Before beginning work, contractor should make a drawing and calculator approved by an engineer. This engineer should be member of "Ordre des ingénieurs du Québec". The drawing and calculation should be conformed to NFPA 13 last edition.
- .2 The drawing and calculation should be offered to building Insurance company.
- .3 After approbation by engineer and assurance, provide before works three copies of these documents for approbation and verification.

1.3 HYDROLOGIC
CALCULATION

- .1 The pipe sizing make by contractor should be conformed to insurance, NFPA 13 and regulation.
- .2 When pipe size indicates to tender document the contractor respect this size.
- .3 The information concerning flow test provide by Department representative.
- .4 The contractor provides complete information concerning

restrictive hydrolic calculation.

1.4 DESIGN
REQUIREMENTS

- .1 Locate heads in relation to ceiling and spacing of sprinkler heads not to exceed that permitted by NFPA 13 for ordinary 6.1 l for 140 m² surface application.
- .2 Uniformly space sprinklers on branch.
- .2 Added 3.16 l/min to sprinkler design with fire hose.
- .3 Added domestic water flow when necessary.
- .4 The "P-101" insurance group should be used for flow calculation.

1.5 TENDER DRAWING

- .1 The piping localization on the drawing is for demonstration only. The contractor must adapt the piping installation to existing condition.
- .2 The complete piping details are not indicated to drawing. The contractor must include the complete piping and accessories required for the project.

1.6 WORKS DRAWING

- .1 Coordinate the sprinkler system work with other mechanical work and structural works.
- .2 Write on work drawing with red pen the modifications relative to drawing.

PART 2 - PRODUCTS

2.1 SPRINKLER

- .1 Sprinkle should be approved ULC.
- .2 Sprinkler should include a colored approved bulb.
- .3 Sprinkler head with possibility of impact or collision should be protected with a protection guard.

2.2 ABOVE GROUND

- .1 Provide fittings for changes in direction of piping and for

PIPING SYSTEMS

connections.

- .1 Make changes in piping sizes through tapered reducing pipe fittings, bushings will not be permitted.
- .2 Perform welding in shop; field welding will not be permitted.
- .3 Conceal piping in areas with suspended ceiling.

2.3 PIPE, FITTINGS
AND VALVES

- .1 Pipe:
 - .1 Ferrous: to NFPA 13.
 - .2 Copper tube: to NFPA 13.
- .2 Fittings and joints to NFPA 13:
 - .1 Ferrous: screwed, welded, flanged or roll grooved.
 - .1 Grooved joints designed with two ductile iron housing segments, pressure responsive gasket, and zinc-electroplated steel bolts and nuts. Cast with offsetting angle-pattern bolt pads for rigidity and visual pad-to-pad offset contact.
 - .2 Copper tube: screwed, soldered, brazed, grooved.
 - .3 Provide fittings into which sprinkler heads, sprinkler head riser nipples, or drop nipples are threaded.
 - .4 Plain-end fittings with mechanical couplings and fittings which use steel gripping devices to bite into pipe when pressure is applied will [not] be permitted.
 - .5 Rubber gasketed grooved-end pipe and fittings with mechanical couplings are permitted in pipe sizes 32 mm and larger.
 - .6 Fittings: ULC approved for use in wet pipe sprinkler systems.
 - .7 Ensure fittings, mechanical couplings, and rubber gaskets are supplied by same manufacturer.
 - .8 Side outlet tees using rubber gasketed fittings are not permitted.
 - .9 Sprinkler pipe and fittings: metal.
- .3 Pipe hangers:
 - .1 ULC listed for fire protection services in accordance with NFPA.

2.4 SPRINKLER HEADS

- .1 General: to NFPA 13 and ULC listed for fire services.
- .2 Sprinkler Head Type:
 - .1 Type A: upright bronze.
 - .2 Type B: pendant chrome link and lever type.

- .3 Type C: pendant chrome glass bulb type.
- .4 Type F: side wall polished link and lever type.
- .3 Provide nominal 1.2 cm orifice sprinkler heads.
 - .1 Release element of each head to be of intermediate temperature rating or higher as suitable for specific application.
 - .2 Provide corrosion-resistant sprinkler heads and sprinkler head guards in accordance with NFPA 13 to mechanical rooms and other non-accessible room.
 - .3 Ceiling cups: not permitted.

2.5 PIPE SLEEVES

- .1 Provide pipe sleeves where piping passes through walls.
- .2 Secure sleeves in position and location during construction.
- .3 Provide sleeves of sufficient length to pass through entire thickness of walls.
- .4 Provide 2.5 cm minimum clearance between exterior of piping and interior of sleeve or core-drilled hole.
 - .1 Firmly pack space with mineral wool insulation.
 - .2 Seal space at both ends of sleeve or core-drilled hole with plastic waterproof cement which will dry to firm but pliable mass, provide mechanically adjustable segmented elastomeric seal.
 - .3 In fire walls and fire floors, seal both ends of pipe sleeves or core-drilled holes with ULC listed fill, void, or cavity material.
- .5 Sleeves in Masonry and Concrete Walls, Floors, and Roofs:
 - .1 Provide hot-dip galvanized steel.
 - .2 Core drilling of masonry and concrete may be provided in lieu of pipe sleeves when cavities in core-drilled hole are completely grouted smooth.
- .6 Sleeves in Other Than Masonry and Concrete Walls, Floors, and Roofs:
 - .1 Provide 0.61 mm thick galvanized steel sheet.

PART 3 - EXECUTION

- 3.1 MANUFACTURER'S
 - .1 Compliance: comply with manufacturer's written

INSTRUCTIONS

recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 INSTALLATION

- .1 Install, inspect and test to acceptance in accordance with NFPA 13 and NFPA 25.

3.3 PIPE
INSTALLATION

- .1 Install piping straight and true to bear evenly on hangers and supports. Do not hang piping from plaster ceilings.
- .2 Keep interior and ends of new piping and existing piping thoroughly cleaned of water and foreign matter.
- .3 Keep piping systems clean during installation by means of plugs or other approved methods. When work is not in progress, securely close open ends of piping to prevent entry of water and foreign matter.
- .4 Inspect piping before placing into position.

3.4 DISINFECTION

- .1 Disinfect new piping and existing piping.
- .2 Fill piping systems with solution containing minimum of 50 parts per million of chlorine and allow solution to stand for minimum of 24 hours.
- .3 Flush solution from systems with clean water until maximum residual chlorine content is not greater than 0.2 part per million or residual chlorine content of domestic water supply.
- .4 Obtain at least two consecutive satisfactory bacteriological samples from piping, analyzed by certified laboratory, and submit results prior to piping being placed into service.

PART 1 - GENERAL

- 1.1 REFERENCES
- .1 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.181 last edition, Ready-Mixed Organic Zinc-Rich Coating.
 - .2 Canadian Standards Association (CSA International)
 - .1 CSA B139 last edition, Installation Code for Oil Burning Equipment.
 - .3 Green Seal Environmental Standards (GSES)

PART 2 - PRODUCTS

- 2.1 NOT USED
- .1 Not used

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 and National Fire Code of Canada.
- .2 Provide space for disassembly, removal of equipment and components as recommended by manufacturer as indicated without interrupting operation of other system, equipment, components.

3.4 DRAINS

- .1 Install piping with grade in direction of flow except as indicated.
- .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 unless indicated otherwise, with hose end male thread, cap and chain.

3.5 AIR VENTS

- .1 Install automatic air vents to CSA B139 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 PIPEWORK
INSTALLATION

- .1 Install pipework to CSA B139.
- .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 pipework to minimize furring space, maximize headroom, conserve space.
- .9 Slope piping, except where indicated, in direction of flow for positive drainage and venting.
- .10 Install, except where indicated, to permit separate thermal insulation of each pipe.
- .11 Group piping wherever possible and as indicated.
- .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 as indicated.
- .15 Valves:
 - .1 Install in accessible locations.
 - .2 Remove interior parts before soldering.
 - .3 Install with stems above horizontal position unless indicated.
 - .4 Valves accessible for maintenance without removing adjacent piping.
 - .5 Install globe valves in bypass around control valves.
 - .6 Use ball valves at branch take-offs for isolating purposes except where specified.
 - .7 Install butterfly valves on chilled water and related condenser water systems only.

- .8 Install butterfly valves between weld neck flanges to ensure full compression of liner.
- .9 Install plug cocks or ball valves for glycol service.
- .10 Use chain operators on valves NPS 2 1/2 and larger where installed more than 3000 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 and as indicated.
- .2 Install swing check valves in horizontal lines on discharge of pumps and as indicated.

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: 6 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.
 - .3 Before installation, paint exposed exterior surfaces with heavy application of zinc-rich paint to CAN/CGSB-1.181.
- .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 ESCUTCHEONS

- .1 Install on pipes passing through walls, partitions, floors, and ceilings in finished areas.

- .2 Construction: one piece type with set screws.
 - .1 Chrome or nickel plated brass or type 302 stainless steel.
- .3 Sizes: outside diameter to cover opening or sleeve.
 - .1 Inside diameter to fit around pipe or outside of insulation if so provided.

3.10 PREPARATION
FOR FIRE STOPPING

- .1 Install firestopping within annular space between pipes, ducts, insulation and adjacent fire separation.
- .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 fire stopping material or installation.
- .4 Insulated pipes and ducts: ensure integrity of insulation and vapor barriers.

3.11 FLUSHING OUT
OF PIPING SYSTEMS

- .1 Before start-up, clean interior of piping systems in accordance with requirements as specified in relevant mechanical sections.
- .2 Preparatory to acceptance, clean and refurbish equipment and leave in operating condition, including replacement of filters in piping systems.

3.12 PRESSURE
TESTING OF
EQUIPMENT AND
PIPEWORK

- .1 Advise Departmental Representative 48 hours minimum prior to performance of pressure tests.
- .2 Pipework: test as specified in relevant sections of heating, ventilating and air conditioning work.
- .3 Maintain specified test pressure without loss for 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.

- . 6 Pay costs for repairs or replacement, retesting, and making good. Departmental Representative to determine whether repair or replacement is appropriate.
- . 7 Insulate or conceal work only after approval and certification of tests by Departmental Representative.

3.13 EXISTING
SYSTEMS

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

3.14 CLEANING

- . 1 Remove surplus materials, excess materials, rubbish, tools and equipment.
- . 2 Waste Management: separate waste materials for reuse and recycling.

PART 1 - GENERAL

- 1.1 REFERENCES
- .1 American Society of Mechanical Engineers (ASME)
 - .1 ASME B40.100 last edition, Pressure Gauges and Gauge Attachments.
 - .2 ASME B40.200 last edition, Thermometers, Direct Reading and Remote Reading.
 - .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-14.4 last edition, Thermometers, Liquid-in-Glass, Self Indicating, Commercial/Industrial Type.
 - .2 CAN/CGSB-14.5 last edition, Thermometers, Bimetallic, Self-Indicating, Commercial/Industrial Type.

PART 2 - PRODUCTS

- 2.1 GENERAL
- .1 Design point to be at mid-point of scale or range.
 - .2 Ranges: as indicated.
- 2.2 DIRECT READING THERMOMETERS
- .1 Industrial, variable angle type, liquid filled, 125 mm scale length: to CAN/CGSB-14.4 and ASME B40.200.
- 2.3 THERMOMETER WELLS
- .1 Copper pipe: copper or bronze.
 - .2 Steel pipe: stainless steel.
- 2.4 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 Siphon for steam service.
 - .2 Snubber for pulsating operation.
 - .3 Diaphragm assembly for corrosive service.
 - .4 Gasketed pressure relief back with solid front.
 - .5 Bronze stop cock.
 - .6 Oil filled for high vibration applications.

PART 3 - EXECUTION

3.1 GENERAL

- .1 Install thermometers and gauges so they can be easily read from floor or platform.
 - .1 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. Include heat conductive material inside well.
- .2 Install in locations as indicated and on inlet and outlet of:
 - .1 Heat exchangers.
 - .2 Water heating and cooling coils.
 - .3 Water boilers.
 - .4 Chillers.
- .3 Use extensions where thermometers are installed through insulation.

3.3 PRESSURE GAUGES

- .1 Install in locations as follows:
 - .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 coils.
 - .5 Inlet and outlet of liquid side of heat exchangers.
 - .6 Outlet of boilers.
 - .7 In other locations as indicated.
- .2 Install gauge cocks for balancing purposes, elsewhere as indicated.

.3 Use extensions where pressure gauges are installed through insulation.

3.4 NAMEPLATES .1 Install engraved lamicoid nameplates in accordance with Section 23 05 53.01 - Mechanical Identification, identifying medium.

PART 1 - GENERAL

1.1 SUMMARY

- .1 Section Includes:
- .1 Seismic restraint systems for statically supported and vibration isolated equipment and systems; including laboratory fume hoods, BSC's, incinerators, kitchen equipment, electrical light fixtures, transformers, MCC's, UPS, diesel generators, standby power, fire protection, communications, equipment and systems, both vibration isolated and statically supported.

1.2 REFERENCES

- .1 Canadian Standards Association (CSA International)
- .1 CSA G40.20/G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .2 National Building Code of Canada (NBC) - 1995.

1.3 DEFINITIONS

- .1 Priority Two (P2) Buildings: buildings in which life safety is of paramount concern. It is not necessary that P2 buildings remain operative during or after earthquake activity.
- .2 SRS: acronym for Seismic Restraint System.

1.4 DESCRIPTION

- .1 SRS fully integrated into, and compatible with:
- .1 Noise and vibration controls specified elsewhere.
- .2 Structural, mechanical, electrical design of project.
- .2 Systems, equipment not required to be operational during and after seismic event.
- .3 During seismic event, SRS to prevent systems and equipment from causing personal injury and from moving from normal position.
- .4 Designed by Professional Engineer specializing in design of SRS and registered in Province of Quebec.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Shop drawings: submit drawings stamped and signed by Professional Engineer registered or licensed in Province of Alberta, Canada.

- .2 Submit design data including:
- .1 Full details of design criteria.
 - .2 Design calculations (including restraint loads resulting from seismic forces in accordance with National Building Code, detailed work sheets, tables).
 - .3 Separate shop drawings for each SRS and devices for each system, equipment.
 - .4 Identification of location of devices.
 - .5 Schedules of types of SRS equipment and devices.
 - .6 Details of fasteners and attachments to structure, anchorage loadings and attachment methods.
 - .7 Installation procedures and instructions.
- .3 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.
- 1.6 DELIVERY, STORAGE, AND HANDLING
- .1 Packing, shipping, handling and unloading:
- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

PART 2 - PRODUCTS

- 2.1 SRS MANUFACTURER
- .1 SRS from one manufacturer regularly engaged in SRS production.
- 2.2 GENERAL
- .1 SRS to provide gentle and steady cushioning action and avoid high impact loads.
- .2 SRS to restrain seismic forces in every direction.
- .3 Fasteners and attachment points to resist same load as seismic restraints.
- .4 SRS of Piping systems compatible with:
- .1 Expansion, anchoring and guiding requirements.
 - .2 Equipment vibration isolation and equipment SRS.

- .5 SRS utilizing cast iron, threaded pipe, other brittle materials not permitted.
- .6 Attachments to RC structure:
- .1 Use high strength mechanical expansion anchors.
- .2 Drilled or power driven anchors not permitted.
- .7 Wet pipe sprinkler systems: refer to Section 21 13 13 - Wet Pipe Sprinkler Systems.
- .8 Seismic control measures not to interfere with integrity of firestopping.
- 2.3 SRS FOR STATIC EQUIPMENT, SYSTEMS
- .1 Floor-mounted equipment, systems:
- .1 Anchor equipment to equipment supports.
- .2 Anchor equipment supports to structure.
- .3 Use size of bolts scheduled in approved shop drawings.
- .2 Suspended equipment, systems:
- .1 Use one or combination of following methods:
- .1 Install tight to structure.
- .2 Cross-brace in every direction.
- .3 Brace back to structure.
- .4 Slack cable restraint system.
- .2 SCS to prevent sway in horizontal plane, "rocking" in vertical plane, sliding and buckling in axial direction.
- .3 Hanger rods to withstand compressive loading and buckling.
- 2.4 SRS FOR VIBRATION ISOLATED EQUIPMENT
- .1 Floor mounted equipment, systems:
- .1 Use one or combination of following methods:
- .1 Vibration isolators with built-in snubbers.
- .2 Vibration isolators and separate snubbers.
- .3 Built-up snubber system approved by Consultant, consisting of structural elements and elastomeric layer.
- .2 SRS to resist complete isolator unloading.
- .3 SRS not to jeopardize noise and vibration isolation systems. Provide 4-8 mm clearance between seismic restraint snubbers and equipment during normal operation of equipment and systems.
- .4 Cushioning action: gentle and steady by utilizing elastomeric material or other means in order to avoid high impact loads.
- .2 Suspended equipment, systems:
- .1 Use one or combination of following methods:

- .1 Slack cable restraint system.
 - .2 Brace back to structure via vibration isolators and snubbers.
- 2.5 SLACK CABLE RESTRAINT SYSTEM (SCS)
- .1 Use elastomer materials or similar to avoid high impact loads and provide gentle and steady cushioning action.
 - .2 SCS to prevent sway in horizontal plane, "rocking" in vertical plane, sliding and buckling in axial direction.
 - .3 Hanger rods to withstand compressive loading and buckling.
- 2.6 SERVICE UTILITIES ENTRANCE INTO BUILDING
- .1 Provide flexibility to prevent breakage in the event of earthquake activity.

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 Attachment points and fasteners:
 - .1 To withstand same maximum load that seismic restraint is to resist and in every direction.
 - .2 Slack Cable Systems (SCS):
 - .1 Connect to suspended equipment so that axial projection of wire passes through centre of gravity of equipment.
 - .2 Use appropriate grommets, shackles and other hardware to ensure alignment of restraints and to avoid bending of cables at connection points.
 - .3 Piping systems: provide transverse SCS at 10 m spacing maximum, longitudinal SCS at 20 m maximum or as limited by anchor/slack cable performance.
 - .4 Small pipes may be rigidly secured to larger pipes for restraint purposes, but not reverse.
 - .5 Orient restraint wires on ceiling hung equipment at

approximately 90 degrees to each other (in plan), tie back to structure at maximum of 45 degrees to structure.

.6 Adjust restraint cables so that they are not visibly slack but permit vibration isolation system to function normally.

.7 Tighten cable to reduce slack to 40 mm under thumb pressure. Cable not to support weight during normal operation.

.3 Install SRS at least 25 mm from equipment, systems, services.

.4 Miscellaneous equipment not vibration-isolated:

.1 Bolt through house-keeping pad to structure.

.5 Co-ordinate connections with other disciplines.

.6 Vertical tanks:

.1 Anchor through house-keeping pad to structure.

.2 Provide steel bands above centre of gravity.

.7 Horizontal tanks:

.1 Provide at least two straps with anchor bolts fastened to structure.

3.3 FIELD QUALITY CONTROL

.1 Inspection and Certification:

.1 SRS: inspected and certified by Seismic Engineer upon completion of installation.

.2 Provide written report to Consultant with certificate of compliance.

.3 Commissioning Documentation:

.1 Upon completion and acceptance of certification, hand over to Consultant complete set of construction documents, revised to show "as-built" conditions.

3.4 CLEANING

.1 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

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 Sustainable requirements for construction and verification.

1.2 REFERENCES

- .1 Canadian Gas Association (CGA)
 - .1 CSA/CGA B149.1 last edition, Natural Gas and Propane Installation Code.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.60 last edition, Interior Alkyd Gloss Enamel.
 - .2 CAN/CGSB-24.3 last edition, Identification of Piping Systems.
- .3 National Fire Protection Association (NFPA)
 - .1 NFPA 13 last edition, Standard for the Installation of Sprinkler Systems.
 - .2 NFPA 14 last edition, 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 Propane gas: to CSA/CGA B149.1.
 - .3 Sprinklers: to NFPA 13.
 - .4 Standpipe and hose systems: to NFPA 14.

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
City water	Green	CITY WATER
Chilled water supply	Green	CH. WTR. SUPPLY
Chilled water return	Green	CH. WTR. RETURN
Hot water heating supply	Yellow	HEATING SUPPLY
Hot water heating return	Yellow	HEATING RETURN
High temp HW Htg. supply	Yellow	HTHW HTG. SUPPLY++
High temp HW Htg. return	Yellow	HTHW HTG. RETURN++
Make-up water	Yellow	MAKE-UP WTR
Safety valve vent	Yellow	STEAM VENT
Domestic hot water supply	Green	DOM. HW SUPPLY
Dom. HWS recirculation	Green	DOM. HW CIRC
Domestic cold water supply	Green	DOM. CWS
Waste water	Green	WASTE WATER
Storm water	Green	STORM
Sanitary	Green	SAN
Plumbing vent	Green	SAN. VENT
Refrigeration suction	Yellow	REF. SUCTION
Refrigeration liquid	Yellow	REF. LIQUID
Refrigeration hot gas	Yellow	REF. HOT GAS
Gas regulator vents	to Codes	
Fire protection water	Red	FIRE PROT. WTR
Sprinklers	Red	SPRINKLERS
Instrument air	Green	INSTRUMENT AIR

2.6 IDENTIFICATION
DUCTWORK SYSTEMS

- .1 50 mm high stencilled letters and directional arrows 150 mm long x 50 mm high.
- .2 Colours: back, or co-ordinated with base colour to ensure strong contrast.

2.7 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.

2.8 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.

2.9 LANGUAGE

- .1 Identification in English and French.
- .2 Use one nameplate and label for each language.

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 TIMING

- .1 Provide identification only after painting specified Section 09 91 23 - Interior Painting has been completed.

3.3 INSTALLATION

- .1 Perform work in accordance with CAN/CGSB-24.3 except as specified otherwise.
- .2 Provide ULC registration plates as required by respective agency.
- .3 Identify systems, equipment to conform to PWGSC PMSS.

3.4 NAMEPLATES

- .1 Locations:
 - .1 In conspicuous location to facilitate easy reading and identification from operating floor.
- .2 Standoffs:

3.5 LOCATION OF IDENTIFICATION ON PIPING AND DUCTWORK SYSTEMS

- .1 Provide for nameplates on hot and/or insulated surfaces.
- .3 Protection:
 - .1 Do not paint, insulate or cover.
- .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.

3.6 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.

3.7 FIELD QUALITY CONTROL

- .1 Verification requirements include:
 - .1 Materials and resources.
 - .2 Storage and collection of recyclables.
 - .3 Construction waste management.
 - .4 Resource reuse.
 - .5 Recycled content.
 - .6 Local/regional materials.
 - .7 Certified wood.
 - .8 Low-emitting materials.

3.8 CLEANING

- .1 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

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 Submit names of personnel to perform TAB to Departmental Representative within 7 days of award of contract.
- .2 Provide documentation confirming qualifications, successful experience.
- .3 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.
- .4 Recommendations and suggested practices contained in the TAB Standard: mandatory.
- .5 Use TAB Standard provisions, including checklists, and report forms to satisfy Contract requirements.
- .6 Use TAB Standard for TAB, including qualifications for TAB Firm and Specialist and calibration of TAB instruments.
- .7 Where instrument manufacturer calibration recommendations are more stringent than those listed in TAB Standard, use manufacturer's recommendations.
- .8 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 REVIEW
- .1 Review contract documents before project construction is started and confirm in writing to Departmental Representative adequacy of provisions for TAB and other aspects of design and installation pertinent to success of TAB.
- .2 Review specified standards and report to Departmental

- Representative in writing proposed procedures which vary from standard.
- . 3 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.
- . 2 Follow special start-up procedures specified elsewhere in Division 23.
- 1.8 OPERATION OF SYSTEMS DURING TAB
- . 1 Operate systems for length of time required for TAB and as required by Departmental Representative for verification of TAB reports.
- 1.9 START OF TAB
- . 1 Notify Departmental Representative 7 days prior to start of TAB.
- . 2 Start TAB when building is essentially completed, including:
- . 3 Installation of ceilings, doors, windows, other construction affecting TAB.
- . 4 Application of weatherstripping, sealing, and caulking.
- . 5 Pressure, leakage, other tests specified elsewhere Division 23.
- . 6 Provisions for TAB installed and operational.
- . 7 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 Air systems:
- . 1 Filters in place, clean.
- . 2 Duct systems clean.
- . 3 Ducts, air shafts, ceiling plenums are airtight to within specified tolerances.
- . 4 Correct fan rotation.
- . 5 Fire, smoke, volume control dampers

		installed and open.
	. 6	Coil fins combed, clean.
	. 7	Access doors, installed, closed.
	. 8	Outlets installed, volume control dampers open.
	. 3	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.
<u>1.10 APPLICATION TOLERANCES</u>	. 1	Do TAB to following tolerances of 5 % plus and 5 % minus according specification.
<u>1.11 ACCURACY TOLERANCES</u>	. 1	Measured values accurate to within plus or minus 2 % of actual values.
<u>1.12 INSTRUMENTS</u>	. 1	Prior to TAB, submit to Departmental Representative list of instruments used together with serial numbers.
	. 2	Calibrate in accordance with requirements of most stringent of referenced standard for either applicable system or HVAC system.
<u>1.13 PRELIMINARY TAB REPORT</u>	. 1	Submit for checking and approval of 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.
<u>1.14 TAB REPORT</u>	. 1	Format in accordance with referenced standard.

- .2 TAB report to show results in SI units and to include:
 - .1 Project record drawings.
 - .2 System schematics.
 - .3 Submit 6 copies of TAB Report to Departmental Representative for verification and approval, in both official languages, in D-ring binders, complete with index tabs.
- 1.15 VERIFICATION
- .1 Reported results subject to verification by Departmental Representative.
 - .2 Provide personnel and instrumentation to verify up to 30 % of reported results.
 - .3 Number and location of verified results as directed by Departmental Representative.
 - .4 Pay costs to repeat TAB as required to satisfaction of Departmental Representative.
- 1.16 SETTINGS
- .1 After TAB is completed to satisfaction of Departmental Representative, replace drive guards, close access doors, lock devices in set positions, 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 Departmental Representative.
- 1.18 AIR AND HYDROLIC SYSTEMS
- .1 Standard: TAB to most stringent of TAB standards of AABC, NEBB, SMACNA and ASHRAE.
 - .2 Do TAB of systems, equipment, components, controls specified Division 23 following systems, equipment, components, controls:
 - .1 Chiller water system.
 - .2 Ventilation system (supply and exhaust) located in chiller water pump room.

- .3 Qualifications: personnel performing TAB current member in good standing of AABC or NEBB.
- .4 Quality assurance: perform TAB under direction of supervisor qualified to standards of AABC or NEBB.
- .5 Measurements: to include as appropriate for systems, equipment, components, controls: air velocity, static pressure, flow rate, pressure drop (or loss), temperatures (dry bulb, wet bulb, dewpoint), duct cross-sectional area, RPM, electrical power, voltage, noise, vibration.
- .6 Locations of equipment measurements: to include as appropriate:
 - .1 Inlet and outlet of dampers, filter, coil, humidifier, fan, other equipment causing changes in conditions.
 - .2 At controllers, controlled device.
- .7 Locations of systems measurements to include as appropriate: main ducts, main branch, sub-branch, run-out (or grille, register or diffuser).

PART 2 - PRODUCTS

2.1 NOT USED .1 Not used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not used.

PART 1 - GENERAL

1.1 REFERENCES

- .1 Definitions:
 - .1 For purposes of this section:
 - .1 "CONCEALED" - insulated mechanical services and equipment in suspended ceilings and non-accessible chases and furred-in spaces.
 - .2 "EXPOSED" - means "not concealed" as previously defined.
 - .3 Insulation systems - insulation material, fasteners, jackets, and other accessories.
 - .2 TIAC Codes:
 - .1 CRD: Code Round Ductwork,
 - .2 CRF: Code Rectangular Finish.
- .2 Reference Standards:
 - .1 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)
 - .1 ANSI/ASHRAE/IESNA 90.1 last edition, SI; Energy Standard for Buildings Except Low-Rise Residential Buildings.
 - .2 ASTM International Inc.
 - .1 ASTM B 209M last edition, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric).
 - .2 ASTM C 335 last edition, Standard Test Method for Steady State Heat Transfer Properties of Pipe Insulation.
 - .3 ASTM C 411 last edition, Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.
 - .4 ASTM C 449/C 449M last edition, Standard Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement.
 - .5 ASTM C 547 last edition, Standard Specification for Mineral Fiber Pipe Insulation.
 - .6 ASTM C 553 last edition, Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
 - .7 ASTM C 612 last edition, Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
 - .8 ASTM C 795 last edition, Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.

- .9 ASTM C 921 last edition, Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.
- .3 Canadian General Standards Board (CGSB)
 - .1 CGSB 51-GP-52Ma last edition, Vapour Barrier, Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.
- .4 Thermal Insulation Association of Canada (TIAC): National Insulation Standards (2005).
- .5 Underwriters Laboratories of Canada (ULC)
 - .1 CAN/ULC-S102 last edition, Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
 - .2 CAN/ULC-S701 last edition, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.

PART 2 - PRODUCTS

2.1 FIRE AND SMOKE RATING

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

2.2 INSULATION

- .1 Mineral fibre: as 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 C 335.
- .3 TIAC Code C-1: Rigid mineral fibre board to ASTM C 612, with factory applied vapour retarder jacket to CGSB 51-GP-52Ma (as scheduled in PART 3 of this Section).
- .4 TIAC Code C-2: Mineral fibre blanket to ASTM C 553 faced with factory applied vapour retarder jacket to CGSB 51-GP-52Ma (as scheduled in PART 3 of this section).
 - .1 Mineral fibre: to ASTM C 553.
 - .2 Jacket: to CGSB 51-GP-52Ma.
 - .3 Maximum "k" factor: to ASTM C 553.

2.3 JACKETS

- .1 Canvas:
 - .1 220 gm/m² cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C 921.
- .2 Lagging adhesive: compatible with insulation.
- .3 Aluminum:
 - .1 To ASTM B 209 without moisture barrier as scheduled in PART 3 of this section.
 - .2 Thickness: [0.50] mm sheet.
 - .3 Finish: Stucco embossed.
 - .4 Jacket banding and mechanical seals: 12 mm wide, 0.5 mm thick stainless steel.
 - .5 Stainless steel:
 - .6 Type: 304.
 - .7 Thickness: 0.50 mm sheet.
 - .8 Finish: Corrugated.
 - .9 Jacket banding and mechanical seals: 12 mm wide, 0.5 mm thick stainless steel.

2.4 ACCESSORIES

- .1 Vapor retarder lap adhesive:
 - .1 Water based, fire retardant type, compatible with insulation.
- .2 Indoor Vapor Retarder Finish:
 - .1 Vinyl emulsion type acrylic, compatible with insulation.
- .3 Insulating Cement: hydraulic setting on mineral wool, to ASTM C 449.
- .4 ULC Listed Canvas Jacket:
 - .1 220 gm/m² cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C 921 untreated.
- .5 Outdoor Vapour Retarder Mastic:
 - .1 Vinyl emulsion type acrylic, compatible with insulation.
 - .2 Reinforcing fabric: Fibrous glass, untreated 305 g/m².
- .6 Tape: self-adhesive, aluminum reinforced, 75 mm wide minimum.
- .7 Contact adhesive: quick-setting
- .8 Tie wire: 1.5 mm stainless steel.

- . 9 Banding: 12 mm wide, 0.5 mm thick stainless steel.
- . 10 Facing: 25 mm stainless steel hexagonal wire mesh stitched on both faces of insulation.
- . 11 Fasteners: 2 mm diameter pins with 35 mm diameter square clips, length to suit thickness of insulation.

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 test ductwork systems complete, witness and certify.
- . 2 Ensure surfaces are 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 as indicated.
- . 3 Use 2 layers with staggered joints when required nominal thickness exceeds 75 mm.
- . 4 Maintain uninterrupted continuity and integrity of vapor retarder jacket and finishes.
 - . 1 Ensure hangers, and supports are outside vapor retarder jacket.
- . 5 Hangers and supports in accordance with Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment.
 - . 1 Apply high compressive strength insulation where insulation may be compressed by weight of ductwork.
- . 6 Fasteners: install at 300 mm on centre in horizontal and vertical directions, minimum 2 rows each side.

3.4 DUCTWORK
INSULATION SCHEDULE

- .1 Insulation 50 mm on existing duct suite to dismantling.

PART 1 - GENERAL

1.1 REFERENCES

- .1 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)
 - .1 ASHRAE Standard 90.1 last edition, 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 B 209M last edition, Standard Specification for Aluminum and Aluminum Alloy Sheet and Plate[Metric.
 - .2 ASTM C 335 last edition, Standard Test Method for Steady State Heat Transfer Properties of Horizontal Pipe Insulation.
 - .3 ASTM C 411 last edition, Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.
 - .4 ASTM C 449/C 449M last edition, Standard Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement.
 - .5 ASTM C 533 last edition, Calcium Silicate Block and Pipe Thermal Insulation.
 - .6 ASTM C 547 last edition, Mineral Fiber Pipe Insulation.
 - .7 ASTM C 795 last edition, Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.
 - .8 ASTM C 921 last edition, Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.

- .3 Canadian General Standards Board (CGSB)
 - .1 CGSB 51-GP-52Ma last edition, Vapour Barrier, Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.
 - .2 CAN/CGSB-51.53 last edition, Poly (Vinyl Chloride) Jacketing Sheet, for Insulated Pipes, Vessels and Round Ducts

- .4 Underwriters' Laboratories of Canada (ULC)
 - .1 CAN/ULC-S102 last edition, Surface Burning Characteristics of Building Materials and Assemblies.
 - .2 CAN/ULC-S701 last edition, Thermal Insulation, Polystyrene, Boards and Pipe Covering.

- . 3 CAN/ULC-S702 last edition, Thermal Insulation, Mineral Fibre, for Buildings
- . 4 CAN/ULC-S702.2 last edition, Thermal Insulation, Mineral Fibre, for Buildings, Part 2: Application Guidelines.

1.2 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.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- . 1 Submittals: in accordance with prescription.

PART 2 - PRODUCTS

2.1 SUSTAINABLE REQUIREMENTS

- . 1 Materials and products in accordance with Section 01 47 15 - Sustainable Requirements: Construction.

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 Insulation use on these elements:
 - . 1 Refrigeration piping, hot gas and suction;
 - . 2 Chiller water piping;
 - . 3 Exterior piping;
 - . 4 Valve and accessories.
- . 2 Closed-cell non-wicking insulation with antimicrobial protection
 - . 1 IAQ approval insulation
 - . 2 FM approved insulation

- .3 Conform to CAN/UL S102, UL723, ASTM E84.
- .3 Insulation protected with two coats of white approved coating insulation fixed by an approved adhesive.
 - .1 Piping DM 1 : 12 mm
 - .2 Piping DM 1 ¼ - 2 : 10 mm
 - .3 Piping DM 2 ½ and over : 25 mm

- 2.4 JACKETS
 - .1 Aluminum for extension piping:
 - .1 To ASTM B 209.
 - .2 Thickness: 0.50 mm sheet.
 - .3 Finish: corrugated.
 - .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.

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 INSTALLATION OF
ELASTOMERIC
INSULATION

- . 1 Insulation to remain dry. Overlaps to manufacturers instructions. Ensure tight joints.
- . 2 Provide vapour retarder as recommended by manufacturer.

PART 1 - GENERAL

- 1.1 SUMMARY .1 Section Includes:
.1 General requirements for electric/electronic Control System for chillers system and other systems.
- 1.2 SYSTEM DESCRIPTION .1 Refer to control schematics and system control drawings. Refer also to all drawings and technical specifications so as to have a complete understanding of the description of the system in its entirety. The new control should be compatible with the existing Dinax EMCS control system.
- .2 The system control works for complete installation and operation of chiller replacement include:
.1 furnish, install and connect (FIC) command device
.2 FIC communication wiring
.3 Complete programming training and commissioning of system
.4 FIC conduit, wiring and accessories
.5 Electrical supply for control equipment and device
.6 Other works required for complete operation
- 1.3 SLEEVES AND OPENINGS .1 Unless otherwise indicated on drawings, wherever piping passes through a wall, a floor, a ceiling or a roof, contractor responsible for piping and for the installation of piping shall supply and install sleeves made of steel pipe before concrete is poured. Whenever sleeves have not been put in place before pouring of concrete, openings shall be done with a rotating drill or other means approved by Consultant. When work is to be done in an existing building, contractor responsible for the supply and installation of piping shall bore all openings having a diameter of 152 mm (6") or less. Openings for a diameter of more than 152 mm (6") in existing buildings are under the responsibility of the general contractor.
- .2 All work required to be redone for repairing plaster, concrete and paint around openings shall be under the responsibility of general contractor.
- .3 Whenever openings are under the responsibility of another division, contractor for whom the opening is required shall indicate to contractor responsible for making the openings their exact location and size.
- .4 If openings need to be done in load-bearing elements such as beams, it is required to obtain authorization from structural

engineer or architect.

.5 Sleeves and openings shall have an inside diameter that takes into account the type of piping, the thickness of insulation material and the type of fire-stop system (Service Penetration Assemblies) to be used. If sleeves are to be installed in a floor other than one poured directly on the ground, they shall extend 100 mm (4") above the finished floor. Sleeves shall be schedule 40 steel with anchors fixed at the center. 16 gage welded steel sleeves can be used only if inside diameter required for sleeve does not correspond to standard diameter of schedule 40 piping.

.6 When sleeves must be installed in openings made with a rotating drill, sleeves shall be held in place with a mix of "expanding concrete" poured between the sleeve and the concrete wall of the opening. Seal the joint between the sleeve and a concrete floor with a silicon sealer.

.7 Space around piping, conduits, electrical or control wiring, instrument wiring, shall be sealed with appropriate material by contractor of Division 25.

.1 In foundation walls, this space shall be sealed with the use of modular devices such as "Link-Seal" model LS, complete with sleeve model CS.

.2 In fire-rated floors or walls, the space between the schedule 40 steel sleeve and piping or conduits, as well as between ducts and fire-stop separation element shall be sealed with fire-stopping material that will remain in place and not allow passage of flames or smoke when exposed to fire, as described in N.B.C. standard.

Fire-stopping material shall be installed in accordance with ULC certified assemblies and identified by SP numbering (Service Penetration Assemblies).

Contractor shall obtain from supplier of fire-stop material all technical reports and certificates pertaining to materials to be used along with the ULC listing and SP number corresponding to the assembly to be installed on site.

.3 In other partitions, seal openings between sleeve and piping and between sleeve and partition with fiberglass wool insulation and waterproof caulking that is fire retardant and non-hardening. Seal on both sides of partition.

.8 Whenever joint between walls, ceilings or floors and the piping is exposed, chrome flanges shall be installed around piping to conceal the joint.

1.4 ACTION AND
INFORMATIONAL
SUBMITTALS

.1 Quality Control:
.1 Provide equipment and material from manufacturer's regular production, CSA certified, manufactured to standard quoted plus additional specified requirements.

- .2 Where CSA certified equipment is not available submit such equipment to inspection authorities for special inspection and approval before delivery to site.
 - .3 Submit proof of compliance to specified standards with shop drawings and product data, Product Data and Review Process. Label or listing of specified organization is acceptable evidence.
 - .4 In lieu of such evidence, submit certificate from testing organization, approved by Consultant, certifying that item was tested in accordance with their test methods and that item conforms to their standard/code.
- .2 For materials whose compliance with organizational standards/codes/specifications is not regulated by organization using its own listing or label as proof of compliance, furnish certificate stating that material complies with applicable referenced standard or specification.
 - .3 Permits and fees: in accordance with general conditions of contract.
 - .4 Submit certificate of acceptance from authority having jurisdiction to Consultant.
 - .5 Existing devices intended for re-use: submit test report.
- 1.5 COMMISSIONING
- .1 Final Report: submit report.
 - .1 Include measurements, final settings and certified test results.
 - .2 Bear signature of commissioning technician and supervisor
 - .3 Report format to be approved by Consultant before commissioning is started.
 - .4 Revise "as-built" documentation, commissioning reports to reflect changes, adjustments and modifications to EMCS as set during commissioning.
 - .5 Recommend additional changes and/or modifications deemed advisable in order to improve performance, environmental conditions or energy consumption.
- 1.8 QUALITY ASSURANCE
-
- .1 Provide record of successful previous installations submitting tender showing experience with similar installations utilizing computer-based systems.
 - .2 Ensure qualified supervisory personnel continuously direct and monitor Work and attend site meetings.

1.9 DELIVERY,
STORAGE AND
HANDLING .1 Material Delivery Schedule: provide Consultant with schedule within 2 weeks after award of Contract.

PART 2 - PRODUCTS

2.1 EQUIPMENT .1 Complete list of equipment and materials to be used on project and forming part of bid documents by adding manufacturer's name, model number and details of materials, and submit for approval.

2.2 PANELS .1 Wall mounted enameled steel cabinets with hinged and key-locked front door.
.2 Multiple panels as required to handle requirements with additional space to accommodate 25% additional capacity as required by Consultant without adding additional cabinets.
.3 Panels to be lockable with same key.

2.3 REGULATION SYSTEM .1 The new chiller includes a DDC control panel and the contractor connects all devices to panel.
.2 The existing building management system is "Dimax". This EMS will replace in the future.
.3 The contractor should disconnect and connect existing device on a chilled water system and new chillers. This include:
.1 Chiller
.2 Pump and starter
.3 Bypass valve
.4 A9A ventilation system control with new electric control for replacing the pneumatic control. This system is to maintain control temperature in the mechanical room.

PART 3 - EXECUTION

3.1 INSTALLATION .1 Install equipment components so that manufacturer's and CSA labels are visible and legible after commissioning is complete.
.2 Install field control devices in accordance with manufacturers

recommended methods, procedures and instructions.

.3 Temperature transmitters, humidity transmitters, current-to-pneumatic transducers, solenoid air valves, controllers, relays: install in NEMA I enclosure or as required for specific applications, except for starter enclosure. Provide for electrolytic isolation in cases when dissimilar metals make contact.

.4 Support field-mounted panels, transmitters and sensors on pipe stands or channel brackets.

.5 Components which measure, detect or transmit data for temperature, humidity, flow, pressure, etc., shall be located so they accomplish their task with precision and reliability.

.7 All control panels, including junction boxes, shall be installed on the wall, ± 4.9 ft (1.5 m) from the floor and be accessible. No panel can be installed on ventilation systems or ducts, unless otherwise specified. If necessary, contractor shall build his own galvanized steel supports and supply an installation drawing to be previously approved by Consultant.

.8 Conduits and wiring shall follow building lines. Do not insulate. Install drainage and evacuation devices at low points.

.11 Do not run exposed conduits in normally occupied spaces unless otherwise indicated or unless impossible to do otherwise. Consultant to review before starting Work. Wiring in mechanical rooms, wiring in service rooms and exposed wiring must be in conduit.

2.7 WIRING

- .1 Conduits, grommets
- .1 All conductors shall be installed in metal conduits inside mechanical rooms or in any exposed location. As well, all wiring contained within cinder block or concrete walls, or in any location that is not accessible upon completion of all works, shall be installed in metal conduits.
- .2 For gypsum walls and suspended ceilings, wiring can be type FT4, shall be properly attached and shall be aligned with building axis.
- .3 Conduits shall be concealed wherever possible and run parallel to building lines.
- .4 Whenever necessary to compensate for vibrations or expansion, flexible conduit not exceeding length of 2 m (6') shall end run.
- .5 Conduits shall be supported near joints. Refer to electrical code for further details.
- .6 For particular locations (humid, dusty, etc.), conduits and hardware shall be chosen to suit application.
- .2 Outlet and pull boxes : made of galvanized steel and of size

and characteristics to meet code requirements. Mounted recessed wherever possible. Minimum one pull box every 30 m (100'). Contractor is responsible for locating them during installation.

- .3 Conductors and identification
 - .1 All conductors shall be continuous from their source up to point of connection and shall be clearly identified by a same number at both ends. Use of a letter as prefix is acceptable to discern from existing wiring. Terminal blocks shall have identical identification.
 - .2 Markers used to identify conductors shall be "Brady" brand or approved equivalent.
- .4 Choice of conductors
 - .1 Supply conductors (120 V a.c.): conductors used for supply of control panels shall be RW90 copper, of a rating that meets requirements of Canadian Electrical Code, and of required color. Grounding conductors shall be green. Minimum rating of all 120 V a.c. supply conductors shall be No. 12 AWG.
 - .2 Control conductors (120 V a.c.): conductors used for control shall be TEW-105 copper and of a rating that meets requirements of Canadian Electrical Code. Minimum rating shall be No. 14 AWG. In general, these conductors shall be used in starters.
 - .3 Conductors for analog and digital signals (30 V d.c. or less):
 - .1 Copper and of an appropriate rating (minimum 18 AWG). Twisted by pairs, with PVC sheath rated to 221 °F (105 °C) and 300 volts RMS. Properly identified accordingly.
 - .1 Pair: FT4-600 V, orange.
 - .2 Triple: FT4- 600 V, orange
 - .2 Shielded sheath, made up of spiraled aluminum sheet with draining wire (100 % coverage). Coverage shall be by pairs of wire.
 - .3 Shielding sheath shall be firmly connected and grounded at point closest to source. Opposite end shall be glued to wire sheath close to point of connection.
 - .4 Follow manufacturer's recommendations regarding use of shielding and rating of wires.
 - .5 Shielded wires shall be grouped in conduits separated from control wiring (120 V a.c. or more). They shall also be grouped on separate connection terminal blocks.
 - .4 Conductors for computer and video signals: coaxial cable, RG-59/u No. 8241, rated JAN-C-17A. Cables used shall be designed for computer communications and tested for uniform efficiency.
- .5 Wiring color according to the following :
 - .1 Line 120 V a.c. – black

- .2 Neutral 120 V a.c. – white
- .3 Switch 120 V a.c. – red
- .4 24 V d.c. wiring – blue and orange (input/output)
- .5 Ground – green
- .6 24 V d.c. – blue (supply)

.6 Grounding :

- .1 All electrical circuits must be grounded, even those that are less than 30 V d.c. One of the contactors from the secondary side of the control transformers (usually the white one) must be physically connected to the mass. Ensure continuity between mass and grounding of building. Mounting plate of control panels and junction box must be electrically insulated from the box. Boxes must be grounded with stranded copper wire No. 8 AWG. There must be two grounding bars inside each cabinet, one located on the mounting plate (insulating ground), and the other located in the bottom or top of the cabinet (safety ground). Ground bars must be identified as following :
« Insulated grounding » or « Uninsulated grounding ».

« Insulated grounding », identified



and « Uninsulated grounding » identified



.7 Power supply :

- .1 120 V a.c., 15 A, power supply circuit originating from an electrical panel supplied by Electrical Contractor. These electrical panels shall be used for power supply of control panels (controllers) and local panels.

.8 Contractor must make sure to properly locate opening for cables in the control panels and junction boxes. Each control panel is divided into two voltage zones, 120 V a.c. and 24 V d.c. or less including communication. These zones must be clearly identified in the panels and on the drawings. As well, spaces must be specifically attributed for the voltage classes.

- .1 No 120 V a.c. wire or cable shall use space provided or used for 24 V d.c. or less, unless it is to cross it perpendicularly, if need be. As well, no 24 V d.c. or communication cable or wire shall use space used for 120 v a.c. unless it is to cross it perpendicularly, if need be.

PART 1 - GENERAL

1.1 REFERENCES

- .1 American National Standards Institute/American Water Works Association (ANSI/AWWA)
 - .1 ANSI/AWWA C111/A21.11 last edition, Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

- .2 American Society of Mechanical Engineers (ASME)
 - .1 ASME B16.1 last edition, Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.
 - .2 ASME B16.3 last edition, Malleable Iron Threaded Fittings: Classes 150 and 300.
 - .3 ASME B16.5 last edition, Pipe Flanges and Flanged Fittings: NPS ½ through NPS 24 Metric/Inch Standard.
 - .4 ASME B16.9 last edition, Factory-Made Wrought Buttwelding Fittings.
 - .5 ASME B18.2.1 last edition, Square Hex, Heavy Hex and Askew Head Bolts and Hex, Heavy Hex, Hex Flange, Loded Head and Lag Screws (Inch Series).
 - .6 ASME B18.2.2 last edition, Nuts for General Applications: Machine Screw Nuts, Hex, Square, Hex Flange, and Coupling Nuts (Inch Series).

- .3 ASTM International
 - .1 ASTM A 47/A 47M last edition, Standard Specification for Ferritic Malleable Iron Castings.
 - .2 ASTM A 53/A 53M last edition, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated Welded and Seamless.
 - .3 ASTM A 536 last edition, Standard Specification for Ductile Iron Castings.
 - .4 ASTM B 61 last edition, Standard Specification for Steam or Valve Bronze Castings.
 - .5 ASTM B 62 last edition, Standard Specification for Composition Bronze or Ounce Metal Castings.
 - .6 ASTM E 202 last edition, Standard Test Method for Analysis of Ethylene Glycols and Propylene Glycols.

- .4 CSA International
 - .1 CSA B242 last edition, Groove and Shoulder Type Mechanical Pipe Couplings.
 - .2 CSA W48 last edition, Filler Metals and Allied Materials for Metal Arc Welding.

- .5 Manufacturer's Standardization of the Valve and Fittings Industry (MSS)
 - .1 MSS-SP-67 last edition, Butterfly Valves.

- .2 MSS-SP-70 last edition, Gray Iron Gate Valves, Flanged and Threaded Ends.
- .3 MSS-SP-71 last edition, Gray Iron Swing Check Valves Flanged and Threaded Ends.
- .4 MSS-SP-80 last edition, Bronze Gate, Globe, Angle and Check Valves.
- .5 MSS-SP-85 last edition, Gray Iron Globe and Angle Valves, Flanged and Threaded Ends.

PART 2 - PRODUCTS

2.1 PIPE

- .1 Steel pipe: to ASTM A 53/A 53M, Grade B, as follows:
 - .1 To NPS 6: Schedule 40.
 - .2 NPS 8 and over, 10.
 - .3 NPS 12 and over, 10 mm wall thickness.

2.2 PIPE JOINTS

- .1 NPS 2 and under: screwed fittings with PTFE tape.
- .2 NPS 2-1/2 and over: welding fittings and flanges to CSA W48.
- .3 Roll grooved: standard coupling to CSA B242.
- .4 Flanges: raised face, weld neck to ANSI/AWWA C111/ A21.11.
- .5 Orifice flanges: slip-on raised face, 2100 kPa.
- .6 Flange gaskets: to ANSI/AWWA C111/ A21.11.
- .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.

2.3 FITTINGS

- .1 Screwed fittings: malleable iron, to ASME B16.3, Class 150.
- .2 Pipe flanges and flanged fittings:
 - .1 Cast iron: to ASME B16.1, Class 125.
 - .2 Steel: to ASME B16.5.

2.4 VALVES

- .3 Butt-welding fittings: steel, to ASME B16.9.
- .4 Unions: malleable iron, to ASTM A 47/A 47M and ASME B16.3.
- .5 Fittings for roll grooved piping: malleable iron to ASTM A 47/A 47M.
- .1 Connections:
 - .1 NPS 2 and smaller: screwed ends.
 - .2 NPS 2-1/2 and larger: grooved ends.
- .2 Gate valves: to MSS-SP-80:
 - .1 NPS 2 and under:
 - .1 Mechanical Rooms: Class 125, rising stem, split wedge disc.
 - .2 NPS 2-1/2 and over:
 - .1 Mechanical Rooms: rising stem, split wedge disc, bronze trim.
- .3 Butterfly valves: to MSS-SP-67:
 - .1 NPS 2-1/2 and over: lug type grooved ends.
- .4 Globe valves: to MSS-SP- 80:
 - .1 NPS 2 and under:
 - .1 Mechanical Rooms: with PTFE disc.
 - .2 NPS 2-1/2 and over:
 - .1 With bronze disc, lead free trim
- .5 Balancing, for TAB:
 - .1 Sizes: calibrated balancing valves, as specified this section.
 - .2 NPS 2 and under:
 - .1 Mechanical Rooms: globe, with plug disc.
- .6 Drain valves: Gate, Class 125, non-rising stem, solid wedge disc.
- .7 Bypass valves on gate globe valves NPS 8 and larger: NPS 3/4, Globe, with PTFE disc.
- .8 Swing check valves: to MSS-SP-71.
 - .1 NPS 2 and under:
 - .1 Class 125, swing, with composition disc.
 - .2 NPS 2-1/2 and over:
 - .1 Grooved ends.
- .9 Silent check valves:
 - .1 NPS 2 and under:

- .1 Bronze fileted
- .2 NPS 2-1/2 and over:
 - .1 Grooved ends.
- .10 Ball valves:
 - .1 NPS 2 and under: MSSP 110, 4 MPA, type EH6 Bronze body.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

- .1 Install piping with accordance to manufacturer of equipment and regulation device requirement.
- .2 Install piping parallel to wall and with minimum space. Consider the installation for hanger installation.
- .3 Scope of piping for drain of 1:700 for main and 1:100 for branch. Lower point with drain valve with cap and retaining chain.
- .4 Connection, thread and flange on pipe installation should be conform to instructions of manufacturer and ANSI.

3.2 VALVE INSTALLATION

- .1 Install valve for vertical or horizontal stem position.
- .2 Valve and check should be the same size of pipe.
- .3 Install valve at each equipment on important branch.
- .4 Install check at pump discharge.
- .5 Valve at more than 3 meters of floor require a special chain operator.
- .6 Butterfly lug valve is for removable equipment.

3.3 CIRCUIT BALANCING VALVES

- .1 Install flow balancing valves as indicated.

- .2 Remove handwheel after installation and when TAB is complete.
- .3 Tape joints in prefabricated insulation on valves installed in chilled water mains.

- 3.4 CLEANING, FLUSHING AND START-UP
 - .1 In accordance with section of specification.
 - .2 When pressure test is completed, flush and clean piping.

- 3.5 TESTING
 - .1 Test system at 1.5 time of operating system pressure. The pressure test not lower than 862 kPA.

- 3.6 BALANCING
 - .1 Balance water systems to within plus or minus 5 % of design output.

- 3.7 WATER CHARGING
 - .1 Include mixing tank and positive displacement pump for water charging.
 - .2 Retest for concentration to ASTM E 202 after cleaning.

PART 1 - GENERAL

1.1 REFERENCES

- .1 American Society of Heating Refrigeration and Air-Conditioning Engineers (ASHRAE)
 - .1 Standard 90.1 last edition, Energy Standard for Buildings Except Low-Rise Residential Buildings.
- .2 Electrical Equipment Manufacturers Advisory Council (EEMAC)
- .3 Canada Green Building Council (CaGBC)
 - .1 LEED Canada-NC Version 1.0 last edition, LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations (including Addendum 2007).
 - .2 LEED Canada-CI Version 1.0 last edition, LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Guide For Commercial Interiors.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Pond: conform to CSA-B214.
- .2 Acceptable brand: Armstrong, Grunfoss, Plad.

2.2 IN-LINE
CIRCULATORS

- .1 Volute: cast iron radially split, with screwed or flanged design suction and discharge connections.
- .2 Impeller: alloy steel.
- .3 Shaft: stainless steel with bronze sleeve bearing, integral thrust collar.
- .4 Seal assembly: mechanical for service to 135 degrees C.
- .5 Coupling: rigid self-aligning.

- .6 Motor: to NEMA MG 1.
- .7 Capacity: as indicated.
- .8 Design pressure: 860 kPa.

2.3 VERTICAL
IN-LINE CIRCULATORS

- .1 Volute: cast iron radially split, with tapped openings for venting, draining and gauge connections, with screwed or flanged suction and discharge connections.
- .2 Impeller: corrosion resistant steel.
- .3 Shaft: stainless steel with bronze sleeve bearing, integral thrust collar.
- .4 Seal assembly: mechanical for service to 135 degrees C.
- .5 Coupling: flexible self-aligning.
- .6 Capacity: as indicated.
- .7 Design pressure: 1200 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.

3.2 INSTALLATION

- .1 Install hydronic pumps to: CSA-B214.
- .2 In line circulators: install as indicated by flow arrows.
 - .1 Support at inlet and outlet flanges or unions.
 - .2 Install with bearing lubrication points accessible.
- .3 Base mounted type: supply templates for anchor bolt placement.
 - .1 Include anchor bolts with sleeves. Place level, shim unit and grout.

- . 2 Align coupling in accordance with manufacturer's recommended tolerance.
- . 3 Check oil level and lubricate. After run-in, tighten glands.
- . 4 Ensure that pump body does not support piping or equipment.
 - . 1 Provide stanchions or hangers for this purpose.
 - . 2 Refer to manufacturer's installation instructions for details.
- . 5 Pipe drain tapping to floor drain.
- . 6 Install volute venting pet cock in accessible location.
- . 7 Check rotation prior to start-up.
- . 8 Install pressure gauge test cocks.

3.3 START-UP

- . 1 General:
 - . 1 In accordance with Section 01 91 13 - General Commissioning (Cx) Requirements.
 - . 2 In accordance with manufacturer's recommendations.
- . 2 Procedures:
 - . 1 Before starting pump, check that cooling water system over-temperature and other protective devices are installed and operative.
 - . 2 After starting pump, check for proper, safe operation.
 - . 3 Check installation, operation of mechanical seals, packing gland type seals. Adjust as necessary.
 - . 4 Check base for free-floating, no obstructions under base.
 - . 5 Run-in pumps for 12 continuous hours minimum.
 - . 6 Verify operation of over-temperature and other protective devices under low- and no-flow condition.
 - . 7 Eliminate air from scroll casing.
 - . 8 Adjust water flow rate through water-cooled bearings.
 - . 9 Adjust flow rate from pump shaft stuffing boxes to manufacturer's recommendation.
 - . 10 Adjust alignment of piping and conduit to ensure true flexibility.
 - . 11 Eliminate cavitation, flashing and air entrainment.
 - . 12 Adjust pump shaft seals, stuffing boxes, glands.
 - . 13 Measure pressure drop across strainer when clean and with flow rates as finally set.

- .14 Replace seals if pump used to degrease system or if pump used for temporary heat.
- .15 Verify lubricating oil levels.

3.4 PERFORMANCE
VERIFICATION (PV)

- .1 Verify that manufacturer's performance curves are accurate.
- .2 Ensure valves on pump suction and discharge provide tight shut-off.
- .3 Net Positive Suction Head (NPSH):
 - .1 Application: measure NPSH for pumps which operate on open systems and with water at elevated temperatures.
 - .2 Measure using procedures prescribed.
 - .3 Where procedures do not exist, discontinue PV, report to Departmental Representative and await instructions.
- .4 Multiple Pump Installations - Series and Parallel:
 - .1 Repeat PV procedures specified above for pump performance and pump BHP for combinations of pump operations.
- .5 Mark points of design and actual performance at design conditions as finally set upon completion of TAB.

PART 1 - GENERAL

1.1 REFERENCES

- .1 American Society of Mechanical Engineers (ASME)
 - .1 ASME B16.22 last edition, Wrought Copper and Copper Alloy Solder - Joint Pressure Fittings.
 - .2 ASME B16.24 last edition, Cast Copper Pipe Flanges and Flanged Fittings: Class 150, 300, 400, 600, 900, 1500 and 2500.
 - .3 ASME B16.26 last edition, Cast Copper Alloy Fittings for Flared Copper Tubes.
 - .4 ASME B31.5 last edition, Refrigeration Piping and Heat Transfer Components.
- .2 American Society for Testing and Materials International (ASTM)
 - .1 ASTM A 307 last edition, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - .2 ASTM B 280 last edition, Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.
- .3 Canadian Standards Association (CSA International)
 - .1 CSA B52 last edition, Mechanical Refrigeration Code.
- .4 Environment Canada (EC)
 - .1 EPS 1/RA/1 last edition, Environmental Code of Practice for the Elimination of Fluorocarbon Emissions from Refrigeration and Air Conditioning Systems.
- .5 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).

PART 2 - PRODUCTS

2.1 REFRIGERANT DISPOSAL

- .1 Recover and dispose the refrigerant of existing refrigeration system in accordance with environment regulation and law.
- .2 The waste refrigerant must be disposed by the contractor

and evacuated out of the site.

- 2.2 TUBING
- .1 Processed for refrigeration installations, deoxidized, dehydrated and sealed.
 - .1 Hard copper: to ASTM B 280, type ACR.
 - .2 Annealed copper: to ASTM B 280, with minimum wall thickness as per CSA B52 and ASME B31.5.
- 2.3 FITTINGS
- .1 Service: thick wall design pressure 2070 kPa and temperature 121 degrees C.
 - .2 Brazed:
 - .1 Fittings: wrought copper to ASME B16.22.
 - .2 Joints: silver solder, 15% Ag-80% Cu-5%P and non-corrosive flux.
 - .3 Flanged:
 - .1 Bronze or brass, to ASME B16.24, Class 150 and Class 300.
 - .2 Gaskets: suitable for service.
 - .3 Bolts, nuts and washers: to ASTM A 307, heavy series.
 - .4 Flared:
 - .1 Bronze or brass, for refrigeration, to ASME B16.26.
- 2.4 PIPE SLEEVES
- .1 Hard copper or steel, sized to provide 6 mm clearance around between sleeve and uninsulated pipe or between sleeve and insulation.
- 2.5 VALVES
- .1 22 mm and under: Class 500, 3.5 Mpa, globe or angle non-directional type, diaphragm, packless type, with forged brass body and bonnet, moisture proof seal for below freezing applications, brazed connections.
 - .2 Over 22 mm: Class 375, 2.5 Mpa, globe or angle type, diaphragm, packless type, back-seating, cap seal, with cast bronze body and bonnet, moisture proof seal for below freezing applications, brazed connections.

- .3 Receiver:
 - .1 Install receiver on liquid line for over-pressure protection.
 - .2 Conform to ASME and service pressure of 4140 kPA (600 psig) for 410 refrigerant.
 - .3 Accessories:
 - .1 Mounting bracket
 - .2 Services valves with gasket
 - .3 Relief valve for 3444 kPA 500 psi)
 - .4 Receiver for exterior installation with anti-corrosive paint and attached to chiller in accordance with manufacturer.
 - .5 Receiver 900 mm length, 225 mm diameter for 40 kg refrigerant charge.

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 GENERAL

- .1 Install in accordance with CSA B52, EPS1/RA/1 and ASME B31.5.

3.3 BRAZING PROCEDURES

- .1 Bleed inert gas into pipe during brazing.
- .2 Remove valve internal parts, solenoid valve coils, sight glass.
- .3 Do not apply heat near expansion valve and bulb.

3.4 PIPING INSTALLATION

- .1 General:
 - .1 Hard drawn copper tubing: do not bend. Minimize use of fittings.
- .2 Suction lines:

- . 1 Pitch at least 1:240 down in direction of flow to prevent oil return to compressor during operation.
- . 2 Provide trap at base of risers.
- . 3 Provide inverted deep trap at top of risers.

3.5 PRESSURE AND LEAK TESTING

- . 1 Close valves on factory charged equipment and other equipment not designed for test pressures.
- . 2 Leak test to CSA B52 before evacuation to 2MPa and 1MPa on high and low sides respectively.
- . 3 Test Procedure: build pressure up to 35 kPa with refrigerant gas on high and low sides. Supplement with nitrogen to required test pressure. Test for leaks with electronic or halide detector. Repair leaks and repeat tests.

3.6 FIELD QUALITY CONTROL

- . 1 Site Tests/Inspection:
 - . 1 Close service valves on factory charged equipment.
- . 2 Ambient temperatures to be at least 13 degrees C for at least 12 hours before and during dehydration.
- . 3 Use copper lines of largest practical size to reduce evacuation time.
- . 4 Use two-stage vacuum pump with gas ballast on 2nd stage capable of pulling 5Pa absolute and filled with dehydrated oil.
- . 5 Measure system pressure with vacuum gauge. Take readings with valve between vacuum pump and system closed.
- . 6 Triple evacuate system components containing gases other than correct refrigerant or having lost holding charge as follows:
 - . 1 Twice to 14 Pa absolute and hold for 4 h.
 - . 2 Break vacuum with refrigerant to 14 kPa.
 - . 3 Final to 5 Pa absolute and hold for at least 12 h.
 - . 4 Isolate pump from system, record vacuum and time readings until stabilization of vacuum.
 - . 5 Submit test results to Departmental Representative.
- . 7 Charging:
 - . 1 Charge system through filter-drier and charging valve on high side. Low side charging not permitted.
 - . 2 With compressors off, charge only amount

necessary for proper operation of system. If system pressures equalize before system is fully charged, close charging valve and start up. With unit operating, add remainder of charge to system.
. 3 Re-purge charging line if refrigerant container is changed during charging process.

. 8 Checks:

- . 1 Make checks and measurements as per manufacturer's operation and maintenance instructions.
- . 2 Record and report measurements to Departmental Representative.

. 9 Manufacturer's Field Services:

- . 1 Have manufacturer of products, supplied under this Section, review Work involved in the handling, installation/application, protection and cleaning, of its product[s] and submit written reports, in acceptable format, to verify compliance of Work with Contract.
- . 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.
- . 3 Schedule site visits, to review Work, at stages listed:
 - . 1 After delivery and storage of products, and when preparatory Work, or other Work, on which the Work of this Section depends, is complete but before installation begins.
 - . 2 Twice during progress of Work at 25% and 60% complete.
 - . 3 Upon completion of the Work, after cleaning is carried out.
- . 4 Obtain reports, within 3 days of review, and submit, immediately, to Departmental Representative.

3.7 DEMONSTRATION

. 1 Instructions:

- . 1 Post instructions in frame with glass cover in accordance with CSA B52 and high pressure equipment regulation.

PART 1 - GENERAL

- 1.1 REFERENCES
- .1 American Society of Mechanical Engineers (ASME)
 - .1 ASME Boiler and Pressure Vessel Code, Section VII last edition.
 - .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).

PART 2 - PRODUCTS

- 2.1 SUSTAINABLE REQUIREMENTS
- .1 The labour and test for treatment provided by contractor but chemical and equipment provided by Owners.
- 2.2 MANUFACTURER
- .1 Equipment, chemicals, service provided by Owners.

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 OF MECHANICAL SYSTEM
- .1 Provide copy of recommended cleaning procedures and chemicals for approval by Departmental Representative.
 - .2 Flush mechanical systems and equipment with approved cleaning chemicals designed to remove deposition from construction such as pipe dope, oils, loose mill scale and

other extraneous materials. Use chemicals to inhibit corrosion of various system materials that are safe to handle and use.

- . 3 Examine and clean filters and screens, periodically during circulation of cleaning solution, and monitor changes in pressure drop across equipment.
- . 4 Drain and flush system[s] until alkalinity of rinse water is equal to make-up water. Refill with clean water treated to prevent scale and corrosion during system operation.
- . 5 Disposal of cleaning solutions approved by authority having jurisdiction.
- . 6 Furnish the attestation letter provided by water treatment specialized contractor.

3.3 CLEANING

- . 1 Proceed in accordance with specification.
- . 2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

PART 1 - GENERAL

- 1.1 REFERENCES
- .1 Air-Conditioning, Heating and Refrigeration Institute (AHRI)
 - .1 AHRI-550/590 last edition, Performance Rating of Water Chilling Packages Using the Vapor Compression Cycle.
 - .2 CSA International
 - .1 CSA B52-05 SMART, Mechanical Refrigeration Code.
 - .3 Environment Canada, (EC)/Environmental Protection Services (EPS)
 - .1 EPS 1/RA/2 last edition, Environmental Code of Practice for Elimination of Fluorocarbons Emissions from Refrigeration and Air Conditioning Systems.

- 1.2 MAINTENANCE MATERIAL SUBMITTALS
- .1 Supply spare parts as follows: filter dryer.

- 1.3 DELIVERY, STORAGE AND HANDLING
- .1 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
 - .2 Storage of material keep in protected area, not affect the integrity of equipment. Replace the defect equipment by new equipment.

PART 2 - PRODUCTS

- 2.1 GENERAL
- .1 Provide complete air cooled scroll type chiller package including: 4 to 8 compressors; double circuit evaporator; double circuit condenser, motor and motor starter; controls; control centre; piping; wiring; refrigeration and oil change; ready for connection to chilled water circuit interlocks, and electric power source, installed in welded steel frame with heavy gauge panels and access doors finished to manufacturers standard.

- . 2 Remote: insulated double thick.
- . 3 Remote double thick evaporator option (see localization on drawing): the evaporator connected to chiller by refrigeration piping installation and pipes to the outdoor chiller unit by contractor, evaporation with nitrogen/helium charge. Piping conform to B-52.
- . 4 The refrigeration charge furnished by the contractor in accordance with manufacturer instruction.
- . 5 Acceptable brand: Daikim, Mc Quay, Trane, York, Carrier.

2.2 CAPACITY

- . 1 Certified ratings based on AHRI 550/590:
 - . 1 375 kW, when cooling 16.2 L/s of water from 12.2 degrees C to 7 degrees C (10 l/s minimum and 25 l/s maximum water flow).
 - . 2 Air cooled condenser supplied with 35 degrees C entering air design ambient temperature
 - . 3 Power input, including electrical components: 188 kW.
 - . 4 Fouling resistance coefficient: 0.00025.
 - . 5 Refrigerant: 410 A or R134.
- . 2 Double power input not to exceed 99 kW each circuit and capable of operating within line voltages of 380 to 600 V.

2.3 COMPRESSOR

- . 1 Hermetic scroll design.
- . 2 Unloaded start without capacity modulation.
- . 3 Compressor to include suction and discharge shut-off valves; oil sight glass; separate circuit crankcase heater; suction filter and internal module protection.
- . 4 Provide nameplate to show capacity at design temperature, type of refrigerant used and total weight in system.

2.4 COMPRESSOR MOTOR

- . 1 Hermetic type with overload protection and manual restart: 600 V.

- 2.5 EVAPORATOR .1 High efficiency dual circuit brazed plate-to-plate, direct expansion: to CSA B52. Insulated the water side working pressure shall be a minimum of 4500 kPa.
- 2.6 CONDENSER .1 Air cooled:
- .1 Aluminum fins mechanically bonded to copper tube, pressure tested to 3.1 MPa.
 - .2 Direct driven, steel or aluminum propeller type fan, statically and dynamically balanced. Motor with overload protection, permanently lubricated ball bearings.
- 2.7 ELECTRICAL CONTROL CENTRE .1 A centrally located weatherproof control panel shall contain the field power connection points, control interlock terminals, and control system. Power and starting components shall include factory circuit breaker for fan motors and control circuit, individual contactors for each fan motor, solid-state compressor three-phase motor overload protection, inherent fan motor overload protection and two power blocks (one per circuit) for connection to remote, contractor supplied disconnect switches. Hinged access doors shall be locatable. Factory-mounted barrier panels or separate enclosures are required to protect against accidental contact with line voltage when accessing the control system.
- .2 The unit shall include high short circuit current rating (14 kA minimum) with single-point disconnect switch.
- .3 An advanced DDC microprocessor unit controller with a 5-line by 22-character liquid crystal display provides the operating and protection functions. The controller shall take preemptive limiting action in case of high discharge pressure or low evaporator pressure. The controller shall contain the following features as a minimum:
- .1 Equipment Protection
 - .1 The unit shall be protected in two ways: 1 by alarms that shut the unit down and require manual reset to restore unit operation, and 2 by limit alarms that reduce unit operation in response to some out-of-limit condition. Shut down alarms shall activate an alarm signal.
 - .2 Shutdown Alarms
 - .1 No evaporator water flow
 - .2 Sensor failures
 - .3 Low evaporator pressure

- .4 Evaporator freeze protection
- .5 Outside ambient temperature (auto-restart)
- .6 Motor protection system
- .7 Phase voltage protection (optional)
- .3 Limit alarms
 - .1 Condenser pressure stage down, unloads unit at high discharge pressures
 - .2 Low ambient lockout, shuts off unit at low ambient temperatures
 - .3 Low evaporator pressure hold, holds state #1 until pressure rises
 - .4 Low evaporator pressure unload, shuts off one compressor
- .4 Unit Enable Selection
 - .1 Enables unit operation from either local keypad, digital input, or BAS
- .5 Unit Mode Selection
 - .1 Selects standard cooling, ice, glycol, or test operation mode
- .6 Analog Inputs
 - .1 Reset of leaving water temperature, 4-20 mA
- .7 Digital Inputs
 - .1 Unit off switch
 - .2 Remote start/stop
 - .3 Flow switch
 - .4 Ice mode switch, converts operation and setpoints for ice production
 - .5 Motor protection
- .8 Digital outputs
 - .1 Shutdown alarm; field wired, activates on an alarm condition, off when alarm is cleared
 - .2 Evaporator pump; field wired, starts pump when unit is set to start
- .9 Condenser Fan Control
 - .1 The unit controller shall provide control of condenser fans based on compressor discharge pressure.
- .10 Building Automation System (BAS) Interface
 - .1 Factory mounted DDC controller(s) shall support operation on a BACnet®, Modbus® or LONMARK® network via one of the data link / physical layers listed below as specified by the successful Building Automation System (BAS) supplier.

2.8 REFRIGERANT CIRCUIT

- .1 Refrigerant piping and accessories in accordance with B-52 regulation, including:
 - .1 Electronic expansion valve
 - .2 Suction and hot gas regulation

- .3 Replacable filter dryer
 - .4 Solenoide valve
 - .5 Sight glass with humidity indicator
 - .6 Relief valve
- .2 Insulated suction pipe conform to ASTM C547
 - .3 Information for installation furnished by manufacturer.

PART 3 - EXECUTION

3.1 APPLICATION

- .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.
- .2 Notify Departmental Representative for inspection and damage.

3.2 GENERAL

- .1 Provide appropriate protection apparatus.
- .2 Install unit as indicated, to manufacturers recommendations, and in accordance with EPS 1/RA/2.
- .3 Ensure adequate clearances for servicing and maintenance.
- .4 Manufacturer to approve installation, to supervise startup and to instruct operators. Include 2 days per unit.

3.3 CLEANING

- .1 Remove surplus materials, excess materials, rubbish, tools and equipment.

PART 1 - GENERAL1.1 REFERENCES

- .1 Canadian Standards Association (CSA International)
 - .1 CSA C22.10-10, Canadian Electrical Code, Part 1 (20th Edition), Safety Standard for Electrical Installations.
 - .2 CSA C22.2
 - .3 CAN/CSA-C22.3 No. 1-01(Update March 2005), Overhead Systems.
 - .4 CAN3-C235-83(R2000), Preferred Voltage Levels for AC Systems, 0 to 50,000 V.
- .2 Electrical and Electronic Manufacturer's Association of Canada (EEMAC)
 - .1 EEMAC 2Y-1-1958, Light Gray Colour for Indoor Switch Gear.
- .3 Institute of Electrical and Electronics (IEEE)/National Electrical Safety Code Product Line (NESC)
 - .1 IEEE SP1122-2000, The Authoritative Dictionary of IEEE Standards Terms, 7th Edition.

1.2 DEFINITIONS

- .1 Electrical and electronic terms: unless otherwise specified or indicated, terms used in these specifications, and on drawings, are those defined by IEEE SP1122.

1.3 DESIGN REQUIREMENTS

- .1 Operating voltages: to CAN3-C235.
- .2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard.
 - .1 Equipment to operate in extreme operating conditions established in above standard without damage to equipment.
- .3 Language operating requirements: provide identification nameplates and labels for control items in English and French.
- .4 Use one nameplate or label for each language.

1.4 ACTION AND
INFORMATIONAL
SUBMITTALS

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data: submit WHMIS MSDS in accordance with Section 02 81 01 - Hazardous Materials.
- .3 Shop drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Quebec.
 - .2 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure co-ordinated installation.
 - .3 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.
 - .4 Indicate on drawings clearances for operation, maintenance, and replacement of operating equipment devices.
 - .5 Submit one copy of 600 x 600 mm minimum size drawings and product data to inspection authorities.
 - .6 If changes are required, notify Consultant of these changes before they are made.
 - .7 List of submit drawing:
 - .1 Breaker
 - .2 Fluorescent tube
 - .3 Lighting material including ballast

1.5 QUALITY
ASSURANCE

- .1 Qualifications: electrical Work to be carried out by qualified, licensed electricians who hold valid Master Electrical Contractor license or apprentices in accordance with authorities having jurisdiction as per the conditions of Provincial Act respecting manpower vocational training and qualification.
 - .1 Employees registered in provincial apprentices program: permitted, under direct supervision of qualified licensed electrician, to perform specific tasks.
 - .2 Permitted activities: determined based on training level attained and demonstration of ability to perform specific duties.

1.6 SYSTEM STARTUP

- .1 Instruct Consultant and operating personnel in operation, care and maintenance of systems, system equipment and components.
- .2 Arrange and pay for services of manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components and instruct operating personnel.
- .3 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant will aspects of its care and operation.

1.7 OPERATING INSTRUCTIONS

- .1 Provide for each system and principal item of equipment as specified in technical sections for use by operation and maintenance personnel.
- .2 Operating instructions to include following:
 - .1 Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.
 - .2 Start up, proper adjustment, operating, lubrication, and shutdown procedures.
 - .3 Safety precautions.
 - .4 Procedures to be followed in event of equipment failure.
 - .5 Other items of instruction as recommended by manufacturer of each system or item of equipment.
- .3 Print or engrave operating instructions and frame under glass or in approved laminated plastic.
- .4 Post instructions where directed.
- .5 For operating instructions exposed to weather, provide weather-resistant materials or weatherproof enclosures.
- .6 Ensure operating instructions will not fade when exposed to sunlight and are secured to prevent easy removal or peeling.

PART 2 - PRODUCTS2.1 MATERIALS AND EQUIPMENT

- .1 Provide material and equipment in accordance with Section 01 61 00 - Common Product Requirements.

- .2 Material and equipment to be CSA certified or other authority having jurisdiction by RBQ. Where CSA certified material and equipment are not available, obtain special approval inspection authorities before delivery to site and submit such approval as described in PART 1 - SUBMITTALS.
- .3 Factory assemble control panels and component assemblies.

2.2 WARNING SIGNS

- .1 Warning Signs: in accordance with requirements of Consultant.
- .2 Porcelain enamel signs, minimum size 175 x 250 mm.

2.3 WIRING TERMINATIONS

- .1 Ensure lugs, terminals, screws used for termination of wiring are suitable for either copper or aluminum conductors.

2.4 EQUIPMENT IDENTIFICATION

- .1 Identify electrical equipment with nameplates as follows:
 - .1 Nameplates: lamicoïd 3 mm thick plastic engraving sheet black face, white core, lettering accurately aligned and engraved into core, mechanically attached with self tapping screws].
 - .2 Sizes as follows:

NAMEPLATE SIZES

Size 1	10 x 90 mm	1 line	3 mm high letters
Size 2	40 x 90 mm	3 lines	5 mm high letters
Size 3	75 x 175 mm	2 or 3 lines	12 mm high Letters
Size 4	25 x 65 mm	1 line	5 mm high letters
Size 5	10 x 65 mm	1 line	5 mm high letters

- .2 Wording on nameplates to be approved by Consultant prior to manufacture.
- .3 Allow for minimum of twenty-five (25) letters per nameplate.

- .4 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.
- .5 Disconnects, starters and contactors: indicate equipment being controlled and voltage.
- .6 Terminal cabinets and pull boxes: indicate system and voltage.

2.5 WIRING IDENTIFICATION

- .1 Identify wiring with permanent indelible identifying markings, coloured plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.
- .2 Maintain phase sequence and colour coding throughout.
- .3 Colour coding: to CSA C22.10.
- .4 In each panel and junction box, each conductor will be identified by circuit number or function.

2.6 CONDUIT AND CABLE IDENTIFICATION

- .1 Colour code conduits, boxes and metallic sheathed cables.
- .2 Code with plastic tape or paint at points where conduit or cable enters wall, ceiling, or floor, and at 15 m intervals.
- .3 Colours: 50 mm wide prime colour and 30 mm wide auxiliary colour.

	Prime	Auxiliary
up to 600 V	Yellow	
Ground	Green	White
Communication Systems	Blue	

2.7 FINISHES

- .1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.
 - .1 Paint outdoor electrical equipment "equipment green" finish.

2.8 ARC FLASH

- .1 Complete existing arc flash report for control panel of air cooled chiller.
- .2 Install label as per standards IEEE 1584.

PART 3 - EXECUTION

- 3.1 INSTALLATION
- .1 Do complete installation in accordance with CSA C22.10 except where specified otherwise.
 - .2 Do overhead and underground systems in accordance with CSA C22.3 No.1 except where specified otherwise.
- 3.2 NAMEPLATES AND LABELS
- .1 Ensure manufacturer's nameplates, CSA labels and identification nameplates are visible and legible after equipment is installed.
- 3.3 CO-ORDINATION OF PROTECTIVE DEVICES
- .1 Ensure circuit protective devices such as overcurrent trips, relays and fuses are installed to required values and settings.
- 3.4 FIELD QUALITY CONTROL
- .1 Load Balance:
 - .1 Measure phase current to panelboards with normal loads (lighting) operating at time of acceptance; adjust branch circuit connections as required to obtain best balance of current between phases and record changes.
 - .2 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.
 - .2 Conduct following tests in accordance with Section 01 45 00 - Quality Control.
 - .1 Power generation and distribution system including phasing, voltage, grounding and load balancing.
 - .2 Circuits originating from branch distribution panels.
 - .3 Lighting and its control.
 - .4 Motors, heaters and associated control equipment including sequenced operation of systems where applicable.
 - .5 Insulation resistance testing:
 - .1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.
 - .2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.
 - .3 Check resistance to ground before energizing.
 - .3 Carry out tests in presence of Consultant.
 - .4 Provide instruments, meters, equipment and personnel required to

conduct tests during and at conclusion of project.

.5 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.
- .3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

3.5 CLEANING

- .1 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.
- .2 Clean and prime exposed non-galvanized hangers, racks and fastenings to prevent rusting.

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS .1 Section 26 05 00 Common work result for electrical.

1.2 PRODUCT DATA .1 Provide product data in accordance with Section 01 33 00 - Submittal Procedures.

PART 2 - PRODUCTS

2.1 BUILDING WIRES .1 Conductors: stranded for 10 AWG and larger. Minimum size: 12 AWG.
.2 Copper conductors: size as indicated, with 600 V insulation of cross-linked thermosetting polyethylene material rated RW90 XLPE.

2.2 TECK 90 CABLE .1 Cable: in accordance with Section 26 05 00 - Common Work Results for Electrical.
.2 Conductors:
.1 Grounding conductor: copper.
.2 Circuit conductors: copper.
.3 Insulation:
.1 Cross-linked polyethylene XLPE.
.2 Rating: , 600 V.
.4 Inner jacket: polyvinyl chloride material.
.5 Armour: interlocking galvanized steel.
.6 Overall covering: thermoplastic polyvinyl chloride, compliant to applicable Building Code classification for this project.
.7 Fastenings:
.1 One hole malleable iron straps to secure surface

- cables 50 mm and smaller. Two hole steel straps for cables larger than 50 mm.
- .2 Channel type supports for two or more cables at 1000 mm centers.
 - .3 Threaded rods: 6 mm diameter to support suspended channels.
- .8 Connectors:
- .1 Watertight, approved for TECK cable.
- 2.3 ARMoured CABLES
- .1 Conductors: insulated, copper, size as indicated.
 - .2 Armour: interlocking type fabricated from galvanized steel strip.
- 2.4 CONTROL CABLES
- .1 Type: LVT: 2 soft annealed copper conductors, sized as indicated:
 - .1 Insulation: thermoplastic.
 - .2 Sheath : thermoplastic jacket.
- PART 3 - EXECUTION
- 3.1 FIELD QUALITY CONTROL
- .1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.
 - .2 Perform tests using method appropriate to site conditions and to approval of Consultant and local authority having jurisdiction over installation.
 - .3 Perform tests before energizing electrical system.
- 3.2 GENERAL CABLE INSTALLATION
- .1 Cable Colour Coding: to Section 26 05 00 - Common Work Results for Electrical.
 - .2 Lace or clip groups of feeder cables at distribution centres, pull boxes, and termination points.

3.3 INSTALLATION OF
BUILDING WIRES

- .1 Install wiring as follows:
 - .1 In conduit systems in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.

3.4 INSTALLATION OF
TECK90 CABLE (0
-1000 V)

- .1 Group cables wherever possible on channels.
- .2 Install cable exposed, securely supported by straps or hangers.
- .3 Use Teck cable where indicated.

3.5 INSTALLATION OF
ARMOURED CABLES

- .1 Group cables wherever possible on channels.

3.6 INSTALLATION OF
CONTROL CABLES

- .1 Install control cables in conduit.
- .2 Ground control cable shield.

PART 1 - GENERAL

1.1 RELATED
REQUIREMENTS

- .1 Section 26 05 00 – Common work results for electrical.

1.2 REFERENCES

- .1 Canadian Standards Association (CSA International)
 - .1 CAN/CSA C22.2 No. 18-98(R2003), Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware, A National Standard of Canada.
 - .2 CSA C22.2 No. 45-M1981(R2003), Rigid Metal Conduit.
 - .3 CSA C22.2 No. 56-04, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
 - .4 CSA C22.2 No. 83-M1985(R2003), Electrical Metallic Tubing.
 - .5 CSA C22.2 No. 211.2-M1984(R2003), Rigid PVC (Unplasticized) Conduit.
 - .6 CAN/CSA C22.2 No. 227.3-05, Nonmetallic Mechanical Protection Tubing (NMPT), A National Standard of Canada (February 2006).

1.3 ACTION AND
INFORMATIONAL
SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product data: submit manufacturer's printed product literature, specifications and datasheets.
 - .1 Submit cable manufacturing data.
- .3 Quality assurance submittals:
 - .1 Test reports: submit certified test reports.
 - .2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 - .3 Instructions: submit manufacturer's installation instructions.

PART 2 - PRODUCTS

2.1 CONDUITS

- .1 Rigid metal conduit: to CSA C22.2 No. 45, hot dipped galvanized steel threaded.
- .2 Electrical metallic tubing (EMT): to CSA C22.2 No. 83, with couplings and with expanded ends threaded.
- .3 Rigid pvc conduit: to CSA C22.2 No. 211.2.
- .4 Flexible metal conduit: to CSA C22.2 No. 56 liquid-tight flexible metal.

2.2 CONDUIT
FASTENINGS

- .1 One hole malleable iron straps to secure surface conduits 50 mm and smaller.
 - .1 Two hole steel straps for conduits larger than 50 mm.
- .2 Beam clamps to secure conduits to exposed steel work.
- .3 Channel type supports for two or more conduits at 1.5 m on centre.
- .4 Threaded rods, 6 mm diameter, to support suspended channels.

2.3 CONDUIT
FITTINGS

- .1 Fittings: to CAN/CSA C22.2 No. 18, manufactured for use with conduit specified. Coating: same as conduit.
- .2 Ensure factory "ells" where 90 degrees bends for NPS 1, 25 mm and larger conduits.
- .3 Watertight connectors and couplings for EMT.
 - .1 Set-screws are not acceptable.

2.4 EXPANSION
FITTINGS FOR RIGID
CONDUIT

- .1 Weatherproof expansion fittings with internal bonding assembly suitable for 100 or 200 mm linear expansion.
- .2 Watertight expansion fittings with integral bonding jumper

Chillers replacement

CONDUITS,
CONDUIT FASTENINGS
AND CONDUIT FITTINGS

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suitable for linear expansion and 19 mm deflection and ensure continue ground.

- . 3 Weatherproof expansion fittings for linear expansion at entry to panel.

2.5 FISH CORD

- . 1 Polypropylene.

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 INSTALLATION

- . 1 All work in sections 26 are in conduit and respect follows.
- . 2 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.
- . 3 Conceal conduits except in mechanical and electrical service rooms.
- . 4 Use rigid hot dipped galvanized steel threaded conduit except where specified otherwise.
- . 5 Use electrical metallic tubing (EMT) anywhere, except in cast concrete.
- . 6 Use rigid PVC conduit in exterior area.
- . 7 Use flexible metal conduit for [connection to motors in dry areas.
- . 8 Use liquid tight flexible metal conduit for connection to motors or vibrating equipment in damp, wet or corrosive locations.
- . 9 Minimum conduit size for lighting and power circuits: 19 mm.

- .10 Bend conduit cold:
 - .1 Replace conduit if kinked or flattened more than 1/10th of its original diameter.
- .11 Mechanically bend steel conduit over [19 mm] diameter.
- .12 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.
- .13 Install fish cord in empty conduits.
- .14 Remove and replace blocked conduit sections.
 - .1 Do not use liquids to clean out conduits.
- .15 Dry conduits out before installing wire.

3.3 SURFACE
CONDUITS

- .1 Run parallel or perpendicular to building lines.
- .2 Locate conduits behind infrared or gas fired heaters with 1.5 m clearance.
- .3 Run conduits in flanged portion of structural steel.
- .4 Group conduits wherever possible on [suspended] [surface] channels.
- .5 Do not pass conduits through structural members except as indicated.
- .6 Do not locate conduits less than 75 mm parallel to steam or hot water lines with minimum of 25 mm at crossovers.

3.4 CLEANING

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

PART 1 - GENERAL

1.1 ACTION AND
INFORMATIONAL
SUBMITTALS

- .1 Provide submittals in accordance with Section [01 33 00 - Submittal Procedures].
- .2 Submit product data sheets for sills, busbars and compartments. Include product characteristics, physical size and finish.
- .3 Manufacturer's Instructions: provide to indicate special handling criteria, installation sequence, cleaning procedures.

PART 2 - PRODUCTS

2.1 EXISTING
INSTALLATION

- .1 The existing MCC is trademark Square D, class 8998.
- .2 All the work to be in MCC will be by manufacturer's technician.

2.2 FINISHES

- .1 Apply finishes in accordance with Section 26 05 00 - Common Work Results for Electrical.
- .2 Paint motor control centre exterior light gray and interiors white.

2.3 SOURCE QUALITY
CONTROL

- .1 Provide manufacturer's type test certificates including short circuit fault damage certification up to short circuit values specified under bus bracing.
- .2 Consultant to witness standard factory testing of complete motor control centre including operation of switches, circuit breakers, starters and controls.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Replace breaker and overload by new product compatible with existing installation.
- .2 Obstruct all opening in the door after meter removed.
- .3 Replace identification.

3.2 FIELD QUALITY CONTROL

- .1 Perform tests in accordance with Section [26 05 00 - Common Work Results for Electrical].
- .2 Ensure moving and working parts are lubricated where required.

PART 1 - GENERAL

1.1 QUALITY ASSURANCE .1 Provide mock-ups in accordance with Section 01 45 00 - Quality Control.

PART 2 - PRODUCTS

2.1 LAMPS .1 Fluorescent lamps to be - T8, 32 Watt, medium bi-pin, rapid-start, 4100 K, 36,000 hour lamp life, 2950 initial lumens, CRI 85. Warranty 2 years.

2.2 BALLASTS .1 Fluorescent ballast: CBM and CSA certified, energy efficient type programmed start, T8, 60 Hz.
.1 347 V, 60 Hz for use with 2-32W.
.2 Totally encased and designed for 40 degrees Celsius ambient temperature.
.3 Power factor: minimum 95 % with 95% of rated lamp lumens.
.4 Current crest factor: 1.7 maximum.
.5 Harmonics: 10 % maximum THD.
.6 Operating frequency of electronic ballast: 42 kHz minimum.
.7 Total circuit power: 62 Watts.
.8 Ballast factor: greater than 0.90.
.9 Sound rated: Class A.
.10 Mounting: integral with luminaire.
.11 Model: Philips Advance # GOP-2PSP32-5C or Osram Sylvania and GE.
.12 Warranty: 5 years

2.3 MANUFACTURER ACCEPT .1 Hubbell, Cooper, Philips

PART 3 - EXECUTION

- 3.1 INSTALLATION .1 Locate and install luminaires as indicated.
- 3.2 WIRING .1 Connect luminaires to lighting circuits:
.1 Install flexible or rigid conduit for luminaires as indicated.
- 3.3 LUMINAIRE SUPPORTS .1 Suspend with chain.



**INSTITUTIONAL ACCESS
CPIC CLEARANCE REQUEST**

**ACCÈS À UN ÉTABLISSEMENT
DEMANDE DE VÉRIFICATION
DU DOSSIER AU CIPC**

PUT AWAY ON FILE – CLASSER AU DOSSIER
ADMINISTRATIVE OR OPERATIONAL FILE
DOSSIER ADMINISTRATIF OU OPÉRATIONNEL
▶ Original = 3170-12

▶ PLEASE PRINT INFORMATION CLEARLY - VEUILLEZ ÉCRIRE EN LETTRES MOULÉES

Institution – Établissement	Request received / Demande reçue le	Date (YYAA-MM-DJ)	PUT AWAY ON FILE / CLASSER AU DOSSIER ▶ 3170-12
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A. PERSONAL INFORMATION – RENSEIGNEMENTS PERSONNELS

Surname / Nom de famille	Full name (no nicknames or initials) / Nom au complet (pas de surnoms ou d'initiales)	Maiden name (if applicable) / Nom de jeune fille (s'il y a lieu)
Date of birth / Date de naissance (YYAA-MM-DJ)	Place of birth – Lieu de naissance / City/Town – Ville ou municipalité	Province/State – Province ou état
Country – Pays		

B. PHYSICAL DESCRIPTION – DESCRIPTION PHYSIQUE

<input type="checkbox"/> Male / Homme	<input type="checkbox"/> Female / Femme	Height – Grandeur	Weight – Poids	Eye color – Couleur des yeux	Hair color / Couleur des cheveux
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C. ADDRESS – ADRESSE

Street – Rue	City/Town – Ville ou municipalité	Province	Postal Code - Code postal	Telephone number – Numéro de téléphone Home – Domicile / Work – Bureau
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Representing (name of company/organization) – Représente (nom de la compagnie ou de l'organisation)

D. GENERAL INFORMATION – RENSEIGNEMENTS GÉNÉRAUX

1. Have you ever been convicted of a criminal offence for which you have not been granted a pardon, or an offence for which you have been granted a pardon and such a pardon has been revoked? Avez-vous déjà été reconnu coupable d'une infraction criminelle pour laquelle on ne vous a pas octroyé un pardon ou d'une infraction pour laquelle on vous a octroyé un pardon qui a été révoqué?	<input type="checkbox"/>	Yes / Oui	<input type="checkbox"/>	No / Non
2. Do you personally know of any person incarcerated in a correctional facility? Connaissez-vous personnellement une personne qui est incarcérée dans un établissement correctionnel?	<input type="checkbox"/>	Yes / Oui	<input type="checkbox"/>	No / Non
3. Do you have any reason to believe coming into contact with this person could pose a risk to your or their personal safety? Avez-vous des raisons de croire que le fait d'entrer en contact avec cette personne pourrait présenter un risque pour votre sécurité personnelle ou la sienne ?	<input type="checkbox"/>	Yes / Oui	<input type="checkbox"/>	No / Non
4. Are you related/associated to an inmate or on an inmate's visiting list? Êtes-vous apparenté ou associé à un détenu ou inscrit sur la liste des visiteurs d'un détenu?	<input type="checkbox"/>	Yes / Oui	<input type="checkbox"/>	No / Non

If you have answered YES to any of the above, please explain below. – Si vous avez répondu OUI à une des questions ci-dessus, veuillez fournir une explication ci-après.

E. SIGNATURE (When sections A to E are filled out completely, please return the completed form to the institution for approval.)

(Une fois que les sections A à E ont été remplies, veuillez retourner le formulaire dûment rempli à l'établissement aux fins d'approbation.)

In making this application, I hereby give the Correctional Service of Canada my consent to use the information provided on this form to conduct such inquiries with police authorities as may be necessary to ascertain my suitability. Finally, I acknowledge that the Correctional Service of Canada has no responsibility for any harm that may come to me in the course of my activities, except where such harm is a direct result of negligence on the part of an employee(s) of the Service.

NOTE: Access may be denied for submitting false information. Passes may be issued for those receiving clearance and approval.

En soumettant la présente demande, j'autorise le Service correctionnel du Canada à se servir des renseignements fournis dans le formulaire afin de mener, auprès des services de police, toute enquête jugée nécessaire pour vérifier mon admissibilité. Par ailleurs, je conviens que le Service correctionnel du Canada ne peut être tenu responsable d'un préjudice subi dans le cadre de mes activités sauf si ce préjudice est directement attribuable à la négligence d'un ou de plusieurs employés du Service.

NOTA : Tout demandeur qui fournit de faux renseignements peut se voir refuser l'accès à l'établissement. Un laissez-passez peut être émis aux demandeurs dont la demande d'accès est approuvée.

Applicant's signature – Signature du demandeur	Date (YYAA-MM-DJ)
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F. FOR OFFICE USE ONLY – RÉSERVÉ AU SCC

Reason for clearance – Motif justifiant la demande d'accès

Department making the request (please print) / Unité qui soumet la demande (en lettres mouluées s.v.p.)	Signature of Division Head / Signature du chef de la division	Date (YYAA-MM-DJ)
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<input type="checkbox"/> No criminal record / Aucun casier judiciaire	<input type="checkbox"/> A possible criminal record #: / Numéro du casier judiciaire	Last entry: / Dernière entrée : ▶
<input type="checkbox"/> An outstanding warrant/charge held by: / Auteur du mandat non exécuté/accusation en instance : ▶		

SIGNATURES

<input type="checkbox"/> Approved / Approuvée	<input type="checkbox"/> Not approved / Non approuvée	The individual has been advised. – Le demandeur a été informé de la décision.	<input type="checkbox"/> Yes / Oui	<input type="checkbox"/> No / Non	By: / Par :
Security Intelligence Officer / Agent de renseignements de sécurité	Date (YYAA-MM-DJ)	Institutional Head / Directeur de l'établissement	Date (YYAA-MM-DJ)	Visit Review Board / Comité des visites	Date (YYAA-MM-DJ)