

# Renovation and upgrading of the administrative building located at 264 chemin du Quai, Cap-aux-Meules, QC, Canada

Project R.117756.009

## Re-roofing and condenser replacement ARCHITECTURE AND ENGINEERING SPECIFICATIONS DOCUMENT

Issued for tender

August 25th 2022



Transport  
Canada



Public Services and  
Procurement Canada

Approved on: 2022-08-25

Responsible for building code compliance review :

Architecture :

Electrical :



2022-09-19

Mechanical :



2022-09-19

END OF SECTION 00 01 07

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1.1 PROJECT DESCRIPTION

- .1 The work covered by this contract is the rehabilitation and upgrading of the administrative building located at 264 chemin du Quai, Cap-aux-Meules, QC. Canada.

1.2 DESCRIPTION OF THE WORK

- .1 The work of this contract comprises but not limited to the roof replacement, the condenser removal, the addition of a heat pump including a new concrete slab on the ground as well as the reinforcement of steel joists.

1.3 TURNAROUND TIME

- .1 Begin work in accordance with the offer acceptance notice and complete work according to the dates specified in the contract.
- .2 Respect the restrictions related to the site of work as described in Section 1.29 of this Division.

1.4 ACCESS TO WORK SITES

- .1 The construction site is located at Cap-aux-Meules on the Iles-de-la-Madeleine (Quebec), at 264 du Quai Street.
- .2 The Contractor will be requested to provide a site layout including access, location of dumpsters and recycling, security fencing and other relevant elements prior to the beginning of the work.
- .3 Prior to mobilization at job site, the contractor shall submit all relevant information and documentation to the Departmental Representative to obtain a construction permit issued by the local authorities, if required.
  - .1 Documents to be submitted by the contractor for review and approval by the Departmental Representative:
    - .1 Environmental Management Plan (EMP) listing measures to be implemented by the contractor on the job site. The EMP must be written and submitted at least five (5) working days prior to the commencement of work.
      - 1. The EMP and it's plans must be prepared by qualified environmental professionals. The EMP shall include, but not be

limited to, details of the site monitoring frequency and a list of high-risk construction activities that require the presence of qualified environmental professionals on site.

- .4 A Transport Canada access permit is required to access to any Transport Canada (TC) land.
  - .1 Prior to job site mobilization, the Contractor shall provide an approximate number of vehicles which will be operating on site everyday as well as a license plate number list for their access.
- .5 Remove temporary access structures and restore access and work areas to their original condition upon completion of the work, at the Contractor's expense, unless otherwise specified.
- .6 For access requiring the use of public roads, make all arrangements, obtain all required permits, and limit job site activities to these roads. Respect the load limits indicated by authorities having jurisdiction.
  - .1 The contractor must maintain and clean public roads and minimize its presence on areas where sediment and construction debris are a concern to the public.
- .7 Secure work areas as per approved procedures. This includes the use of welded wire construction fence of at least 1.8 metres high to prevent public access to areas where construction activities are taking place and where construction materials are being stored.

#### 1.5 MINIMUM STANDARD

- .1 Materials shall be new and the work shall conform to the latest applicable minimum standards of the Canadian General Standards Board, Canadian Standards Association, 2015 National Building Code of Canada (NBC), ASTM, and applicable provincial and municipal codes and all other national and international standards.
- .2 In case of discrepancy or contradiction, the most stringent requirements will apply.

#### 1.6 ABBREVIATIONS

- .1 The following is a list of abbreviations used:
  - .1 ASTM - American Society for Testing and Materials
  - .2 ACI - American Concrete Institute

- .3 ANSI - American National Standards Institute
- .4 CSA - Canadian Standards Association
- .5 CWB - Canadian Welding Bureau
- .6 NBC - National Building Code
- .7 CCM - Critical Path Method
- .8 CGSB - Canadian General Standards Board
- .9 CAN2, CAN3 - National Standards of Canada published by CGSB
- .10 GTC - General Terms and Conditions
- .11 TC - Transport Canada
- .12 PSAC - Public Services and Procurement Canada

## 1.7 DEFINITIONS

The following definitions apply unless the context clearly indicates otherwise.

- .1 Plans and/or specifications
  - .1 Plans - Drawings listed in the "List of Drawings".
  - .2 Specifications - The items covered by the "Table of Contents" of the Specifications, as well as addendums and any other related written communication issued by the Departmental representative to the Contractor in connection with the Work.

1.8 CONTRACTOR'S OFFICE

- .1 The contractor shall have a site trailer for his own use.
- .2 The site office shall not be located within the Transport Canada building.

1.9 EXPLOSIVES

- .1 The use of explosives is prohibited on this project.

1.10 REVIEWS

- .1 Inspect the work site, review conditions that may affect the work and ensure familiarity with existing site conditions.
- .2 Provide photos of the surrounding properties, structures and objects that may be damaged or subject to future claims.

1.11 CLEANING

- .1 Clean and maintain the area daily. Avoid any accumulation of debris or garbage.
- .2 Remove scrap and waste from construction activities and send to an off-site location weekly.
- .3 Upon completion of the work, remove surplus materials, tools, fixtures, scrap and debris and dispose of them as per approved off-site procedure.

1.12 FEES, PERMITS AND CERTIFICATES

- .1 Pay all fees and obtain all necessary permits to complete the work. Provide plans and information necessary for the issuance of acceptance certificates. Upon request, submit inspection certificates as proof that the work meets the requirements of the authority having jurisdiction.

1.13 FIRE SAFETY INSTRUCTIONS

- .1 Comply with the 2015 National Building Code of Canada (NBC) provisions for fire safety during construction and the 2015 National Fire Code (NFC) provisions for fire prevention, firefighting and life safety in buildings.

1.14 ON-SITE QUALITY CONTROL

- .1 Have the work performed by qualified apprentices or certified workers in accordance with the provincial Workforce Skills and Training Act.

- .2 Identify tasks and activities that apprentices can perform, based on their level of training and the skills they demonstrate to perform specific tasks.

1.15 HAZARDOUS MATERIALS

- .1 Comply with Workplace Hazardous Materials Information System (WHMIS) requirements for the use, handling, storage and disposal of hazardous materials, as well as the labeling and provision of Material Safety Data Sheets (MSDS).

1.16 TEMPORARY UTILITIES

- .1 Make all arrangements with utility providers for temporary lighting, telephone, electricity and water to meet operational requirements for construction work, if required.

1.17 MATERIALS TO BE REMOVED

- .1 Unless otherwise specified, materials and equipment to be removed become the property of the Contractor and shall be removed from the site of the Work.

1.18 PROTECTIVE MEASURES

- .1 Protect finished works from damage until possession is taken.
- .2 Protect structures from damage caused by rain, wind or any other weather conditions.
- .3 Protect structures or properties and infrastructure adjacent to the work from dust and dirt that may be spread outside the work areas.
- .4 Protect workers and other users of the work area from hazards.
- .5 Monitor weather conditions (heavy rain or snowfall) and plan activities accordingly to minimize damage to the site or structure.

1.19 CUTTING, TRIMMING AND REFURBISHING

- .1 Repair, replace, and refinish existing surfaces and items damaged by the work to the satisfaction of the Departmental Representative and at the Contractor's expense.
- .2 Items repaired, replaced and refinished shall be at least equivalent to those in place prior to damage.

1.20 SIGNS AND SAFETY INSTRUCTIONS

- .1 Provide standard signage and safety devices to facilitate vehicular traffic or to convey information or instructions, equipment operating instructions, safety instructions, etc., written in both official languages or using easily understood graphic symbols; have such signage approved by the Departmental Representative.
- .2 No advertising will be allowed by the contractor on this project.

1.21 USE OF THE SITE AND FACILITIES

- .1 Perform the work with minimal disruption to normal operations and traffic in the area. This includes vehicular, bicycle and pedestrian traffic. Make arrangements with the Departmental Representative to facilitate the completion of the work.
- .2 Where public safety is reduced as a result of the work, the Contractor shall take all temporary measures necessary to ensure that adequate safety is maintained.

1.22 TEMPORARY FACILITIES

- .1 Provide and maintain adequate storage facilities. The Departmental Representative shall approve the type and location of such facilities.
- .2 Observe and enforce construction safety measures as required by the authority having jurisdiction.
- .3 Provide and maintain enclosures, protection work, guardrails, palisades, barricades, warning signs and similar items as required.
- .4 Provide sufficient hygienic portable chemical toilet facilities for use by all persons on the site.
- .5 Existing washroom facilities within the Transport Canada building will not be available for use.
- .6 Surround the work area and storage area with security fencing as directed by the departmental representative.

1.23 ACCESS TO THE SITE

- .1 Design, construct and maintain access and egress areas from the work area in accordance with municipal, provincial and other authorities having jurisdiction. These areas include stairs, pathways, vehicle ramps or ladders and shall be independent of areas of the building not affected by the work or where the work

has been completed.

**1.24 GUARANTEES**

- .1 Prior to completion of the work, gather all manufacturers' warranties and submit them to the Departmental Representative.

**1.25 CLEANING**

- .1 Clean up the work area as required. At the end of each work period, or more often if requested by the Departmental representative, remove debris from the work area, carefully store used materials, and clean up the area.
- .2 Upon completion of work, remove scaffolding, temporary protective devices and excess materials. Correct defects when work is substantially completed.
- .3 Clean up the areas of the work and restore them to at least equivalent condition to that which existed prior to the commencement of the work, to the satisfaction of the Departmental representative.

**1.26 PROJECT MEETINGS**

- .1 The contractor, subcontractors and supplier representatives must attend meetings and be empowered and authorized to speak on behalf of the parties they represent.
- .2 Pre-construction meetings
  - .1 Within five (5) working days next to the acceptance notice reception, hold a meeting including people involved into the project to discuss administrative procedures and define responsibilities.
  - .2 Determine the time and location of the meeting and notify the parties involved at least five (5) working days prior to the meeting.
- .3 Progress Meetings
  - .1 During construction and two (2) weeks prior to project completion, schedule at least one progress meetings.
  - .2 Notify stakeholders at least five (5) business days prior to meetings.
  - .3 The Contractor shall take minutes of the meetings, prepare and distribute the minutes to the attendees as well as to affected parties absent from the

meetings, within two (3) working days after the meetings are held.

**1.27 CONTRACTUAL DOCUMENTS**

.1 The drawings and the specifications are complementary. Items shown or referred to in one and not in the other are presumed to be included in the contract work.

.1 If there is a discrepancy between the drawings and the specifications, notify the Departmental Representative immediately for clarification.

.2 The Contractor shall be responsible for printing or photocopying the required drawings and specifications for:

- .1 Suppliers;
- .2 Subcontractors;
- .3 Drawings and specifications on site;
- .4 The drawings of the project file.

1.28      LABORATORY TESTING SERVICES

- .1      Unless otherwise specified, the contractor shall be responsible for the cost of inspection and testing as part of the quality assurance process for the following:
  - .1 concrete testing;
  - .2 backfill compaction;
  - .3 soil inspection of excavated foundations.
- .2      Provide safe work areas and assistance with testing procedures, including provision of materials or services and coordination of work, as required by the testing laboratory and as directed by the Departmental Representative.
- .3      Where testing requested by the Departmental Representative reveals non-compliance of the work with the requirements of the specifications, the contractor shall be responsible for the cost of the initial testing and any additional testing required to verify the acceptability of the corrections made.

1.29      WORK SCHEDULE

- .1      The service must meet or exceed the following deadlines:
  - .1      Date of Notice of Acceptance of Offer : Date A
  - .2      Mobilization: Date A + 2 weeks
- .2      Submit the work schedule (in MCC format) within five (5) working days of Notice of Acceptance of Offer. The progress schedule shall indicate the scope of work to be performed during each two (2) week period. Attach the progress schedule with a cost breakdown of each lump sum payment item.
- .3      At the request of the Departmental representative, resubmit the schedule with all revisions made to show the status of the work and changes to meet the approved completion dates within ten (10) working days.
- .4      Take all actions required to complete the work according to the schedule submitted and approved by the Departmental representative.
- .5      Do not change the approved schedule without the approval of the departmental representative.
- .6      The requirements of Section 01 33 00 - DOCUMENTS AND SAMPLES TO BE SUBMITTED

apply to the scheduling of the work.

- .7 Perform work during "normal business hours", Monday through Friday from 7:00 a.m. to 6:00 p.m.
- .8 Notify the departmental representative and request 48 hours advance notice that if the work was to be performed "outside of normal working hours". The after-hours period is from 6:00 p.m. to 7:00 a.m. Monday through Friday and anytime on Saturdays and Sundays.

#### 1.30 ORGANIZATION OF WORK

- .1 Organize the work according to the elevations and dimensions shown on the plans and verified or determined in the field.
- .2 Notify the Departmental Representative immediately of any discrepancies between the field measurements and the dimensions shown on the plans.
- .3 Assume responsibility for errors resulting from failure to verify dimensions, elevations and other pertinent data shown on the plans.

#### 1.31 BREAKDOWN OF COSTS

- .1 Prior to submitting an initial payment request, the contractor must submit a detailed cost breakdown for the contract, also indicating the overall contract price, as directed by the Departmental Representative. Once approved by the Departmental Representative, the cost breakdown will be used as a reference for progress payment calculations.

**END OF THE SECTION**

**PART 1 - GENERAL**

**1.1 REFERENCES**

- .1 SPAC/TC general administrative specifications.

**1.2 ADMINISTRATIVE PROCEDURES**

- .1 Submit to Departmental Representative submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .2 Do not proceed with Work affected by submittal until review is complete.
- .3 Present shop drawings, product data, samples and mock-ups in SI Metric units.
- .4 Where items or information is not produced in SI Metric units converted values may be acceptable.
- .5 Review submittals prior to submission to Departmental Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.
- .6 Notify Departmental Representative, in writing at the time of submission of documents and samples, identifying deviations from requirements of Contract Documents stating reasons for deviations.
- .7 Verify field measurements and affected adjacent Work are co-ordinated.
- .8 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative's review of submittals.
- .9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative review.
- .10 Keep a verified copy of each submission on site.

**1.3 SHOP DRAWINGS AND DATA SHEETS**

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details

- .2 Submit drawings stamped and signed by professional engineer registered or licensed in Canada, in the Province of Quebec.
- .3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.
- .4 Allow 10 business days for Departmental Representative's review of each submission.
- .5 Adjustment made to shop drawings by the Departmental Representative are not intended to vary the Contract Price. If this is the case, state such in writing to Departmental Representative prior to proceeding with the work.
- .6 Make changes in Shop Drawings as Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of of revisions other than those requested.
- .7 Accompany submissions with transmittal letter, containing:
  - 1. Date;
  - 2. Project title and number;
  - 3. Contractor's name and address;
  - 4. Identification and quantity of each shop drawing, product data and sample;
  - 5. Other pertinent data.
- .8 Submissions include:
  - 1. Date and revision dates;
  - 2. Project title and number;
  - 3. Name and address of:
    - a. the subcontractor-;
    - b. the supplier;
    - c. the manufacturer;
- .2 Contractor's stamp, signed by the Contractor's authorized representative, certifying

approval of submissions, verification of field measurements and compliance with Contract Documents.

1. Details of appropriate portions of Work as applicable:
  - .1 materials and manufacturing details;
  - .2 layout or configuration, with dimensions, including those taken on site, and clearances
  - .3 details of assembly or adjustment;
  - .4 characteristics such as power, flow rate or capacity;
  - .5 performance characteristics;
  - .6 reference standards;
  - .7 The operational weight;
  - .8 wiring diagrams;
  - .9 single line and schematic diagrams;
  - .10 Relationship to adjacent work.
- .9 Distribute copies of the shop drawings and data sheets once the Departmental Representative has completed the verification.
- .10 Submit one (1) electronic copy of the shop drawings prescribed in the technical sections of the specifications and as reasonably required by the Departmental Representative.
- .11 If no shop drawing is required due to the use of a standard manufactured product, submit one (1) electronic copy of the manufacturer's data sheets or documentation prescribed in the technical sections of the specification and required by the Departmental Representative.
- .12 Submit one (1) electronic copy of the test reports prescribed in the technical sections of the specifications and required by the Departmental Representative.
- .13 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
- .14 Testing must have been completed within three (3) years of date of contract award for project.
- .15 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material

meets specification requirements.

- .16 Certificates must be dated after contract award and indicate the project designation.
- .17 Submit one (1) electronic copy of the manufacturer's instructions prescribed in the technical sections of the specification and required by the Departmental Representative.
- .18 Submit one (1) electronic copy of the manufacturer's field inspection reports prescribed in the technical sections of the specifications and required by the Departmental Representative.
- .19 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- .20 Delete information that does not apply to the work.
- .21 Supplement standard information to provide details applicable to project.
- .22 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, [transparency] [copies] will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

#### 1.4 SAMPLES

Submit two (2) product samples for review as specified in the technical sections of the specifications to the Departmental Representative:

- .1 Label samples with their origin and intended destination.
- .2 Notify Departmental Representative in writing, at the time of submission of deviation in samples from the requirements of Contract Documents.
- .3 Where colour, pattern or texture is criterion, submit full range of samples.
- .4 Adjustments made on samples by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.
- .5 Make changes in samples which [Departmental Representative may require, consistent with Contract Documents.

- .6 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.5 MOCK-UPS

- .1 Mock-up: work performed on site using the prescribed materials and method of execution.
- .2 Construct in locations acceptable to Departmental Representative.
- .3 Once verified and approved, the mock-up will be used as a quality standard for this work.

1.6 GENERAL NOTES SHOP DRAWINGS

- .1 Submit shop drawings for following items for verification prior to fabrication:
  - .1 Roofing components and material;
  - .2 Wrought metals;
  - .3 Electromechanical equipment
  - .4 Any other product, equipment or assembly for which shop drawings are generally required.
- .2 Shop drawings shall indicate or show materials, dimensions, thickness, finishes, connections, joints, method of attachment and number of anchorage devices, supports, anchorage reinforcements, details and accessories;
- .3 Shop drawings shall be seal and signed by a qualified structural engineer recognized in the Province of Quebec.

1.7 OPERATION AND MAINTENANCE MANUAL

- .1 Assembles, coordinates, links, and prepare a table on contents of the Operation and Maintenance Manual's data for each speciality.
- .2 Submit the Operations and Maintenance Manual to the Departmental Representative upon substantial completion of the work.
- .3 Upon completion of the work, submit to the Departmental Representative a copy of the French-language operations and maintenance manual, prepared as specified in this section.
- .4 Sort the data in the same numerical order as the specification sections.
- .5 Mark each section with a celluloid-covered tab attached to the stiff paper division sheet.

.6 Type up nomenclatures and remarks.

.7 Drawings, diagrams and manufacturers' publications must be legible.

a) Manuel

The manual is a structured compilation of operating and maintenance data, including information, documentation and technical details, describing the operation and maintenance of a component or system in accordance with the requirements of the appropriate individual sections of Divisions 02 and following.

b) Notebook

1. Provide an electronic copy in French in addition to the physical notebooks.

2. Provide the Operations and Maintenance Manual in three (3) copies.

3. Three (3) ring binder, consisting of loose bound sheets of 215 X 280 mm (letter size), with a hard vinyl cover and a pocket on the back of the signatures.

4. Indicate the contents of each notebook on a tab inserted in the pocket on the back of the notebook.

5. Contents:

.1 Include all of the following information in addition to the data specified in the appropriate individual sections of Divisions 02 and following:

.2 Cover page with the following information:

1. date of submission;

2. Project title, location and number;

3. Name, address and telephone number of the Contractor and any subcontractors.

6. Table of contents of each document submitted.

7. Equipment list.

8. Nameplate information such as equipment number, brand name, size, capacity or power, model number and serial number.

9. The details of the installation of the equipment.

10. Instructions for the operation of the equipment.

11. Instructions for the maintenance of the equipment.

12. Instructions for the maintenance of finishes.

13. The list of replacement equipment.

14. The list of special tools.
15. The list of spare parts.
16. Guarantees indicating:
  1. the name and address of the works;
  2. the effective date of the guarantee;
  3. the duration of the warranty;
  4. the subject matter of the warranty and the corrective action offered on the warranty;
  5. the signature and seal of the Contractor.
17. Copies of certificates of approval and other required certificates.
18. Shop Drawings: separately bind a complete set of the revised final shop drawings and data sheets.

## **PART 2 - PRODUCTS**

2.1 NOT APPLICABLE

## **PART 3 - EXECUTION**

3.1 NOT APPLICABLE

Not applicable.

END OF SECTION 01 33 00

## **PART 1        GENERAL**

**GENERAL NOTE:** in this section the term “site” includes all the facilities located at the site where the work is taking place (construction site, buildings, access, infrastructure, parkings, bays, etc.).

### **1.1        REFERENCES**

- .1        Province of Québec
  - .1        Loi sur la santé et la sécurité du travail L.R.Q., c. S-2.1 (Act respecting occupational health and safety).
  - .2        Code de sécurité pour les travaux de construction L.R.Q., c. S-2.1, r.4 (Safety code for the construction industry).

### **1.2        ACTION AND INFORMATIONAL SUBMITTALS**

- .1        Make submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2        Submit to Departmental representative, and the CNESST the site-specific prevention program, as outlined in article 1.10 of the current section, at least 10 days prior to the start of work.
- .3        Departmental representative will review Contractor’s site-specific prevention program and provide comments to Contractor within 10 days after receipt of the document. Revise plan as appropriate and resubmit to Departmental representative within 5 days after receipt of comments from Departmental representative. Departmental representative reserves the right not to authorize the start of work on the construction site as long as the content of the prevention program is not satisfactory. The Contractor shall then update his prevention program and resubmit it to the Departmental representative if the scope of work changes or if the working methods of the Contractor differ from his initial plans or for any other applicable new condition.
- .4        Departmental representative’s review of Contractor’s site-specific prevention program should not be construed as approval of the program and does not reduce the Contractor’s overall responsibility for construction Health and Safety during the work.
- .5        Submit copies of Contractor’s authorized representative’s construction site health and safety inspection reports to Departmental representative, [at least once a week].
- .6        Submit to Departmental representative within 24 hours a copy of any inspection report, correction notice or recommendation issued by Federal, Provincial and Territorial health and safety inspectors.
- .7        Submit to Departmental representative within 24 hours an investigation report for any accident involving injury and any incident exposing a potential hazard.

The investigation report shall contain at least the following:

1. date, time and place of accident;
  2. name of sub-contractor involved in the accident;
  3. number of persons involved and condition of wounded;
  4. witness identification;
  5. detailed description of tasks performed at the time of the accident;
  6. equipment being used to accomplish the tasks performed at the time of the accident;
  7. corrective measures taken immediately after the accident;
  8. causes of the accident;
  9. preventive measures that have been put in place to prevent a similar accident.
- .8 Submit to Departmental representative WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 Contractor must also keep one copy of these documents on the construction site.
- .9 Medical Surveillance: where prescribed by legislation, regulation or prevention program, submit certification of medical surveillance for construction site personnel prior to commencement of Work, and submit additional certifications for any new construction site personnel to Departmental representative.
- .10 Submit to Departmental representative an on-site Emergency Response Plan at the same time as the prevention program. The Emergency Response plan must contain the elements listed in the article "GENERAL REQUIREMENTS" of this section.
- .11 Submit to Departmental representative copies of all training certificates required for the application of the prevention program, in particular (if applicable) for the following:
- .1 first aid in the workplace and cardiopulmonary resuscitation;
  - .2 lockout-tagout procedures (mandatory for all work requiring lockout);
  - .3 safely operating forklift trucks (mandatory for all forklift usage);
  - .4 safely operating elevating work platforms (mandatory for the use of all elevating platforms);
  - .5 any other requirement of Regulations or the safety program.
- In addition, the certifications of the *Cours de santé et sécurité générale pour les chantiers de construction* (General Health and Safety Training for Construction Sites) shall be available on demand on the construction site.
- .12 Engineer's plans and certificates of compliance: Contractor must submit to the Departmental representative and to the *Commission des normes, de l'équité, de la santé et de la sécurité du travail* (CNESST) a copy signed and sealed by engineer of all plans and certificates of compliance required pursuant to the *Code de sécurité pour les*

*travaux de construction* (S-2.1, r.4) (Safety code for the construction industry) or by any other legislation or regulation or by any other clause in the specifications or in the contract. The Contractor must also submit a certificate of conformity signed by an engineer once the facility for which these plans were prepared has been completed and before a person uses the facility. A copy of these documents must be available on site at all times.

### **1.3 FILING OF NOTICE OF CONSTRUCTION SITE OPENING**

- .1 Notice of construction site opening shall be submitted to the CNESST before work begins. A copy of such notice and acknowledgment of receipt from the CNESST shall be submitted to Departmental representative.

At the completion of all the work, a notice of construction site closing shall be submitted to the CNESST, with a copy to Departmental representative.

- .2 The Contractor shall assume the role of being the Principal Contractor in the limits of the construction site and elsewhere where he must execute work within the framework of this project. The Contractor shall recognize the responsibility of being the Principal Contractor of the project and identify himself as such in the notice of the construction site opening he provides to the CNESST.
- .3 The Contractor shall accept to divide and identify the construction site adequately in order to define time and space at all times throughout the course of the project.

### **1.4 HAZARD ASSESSMENT**

- .1 The contractor must perform construction site specific safety hazard assessment related to project.

### **1.5 MEETINGS**

- .1 Schedule and administer Health and Safety meeting with Departmental representative prior to commencement of Work.
- .2 Contractor's representative with decision power must attend any meetings at which construction site safety and health issues are to be discussed.
- .3 If it is anticipated that there will be 25 workers or more on the construction site at any given time, the Contractor shall set up a worksite committee and hold meetings as required by the *Code de sécurité pour les travaux de construction* (S-2.1, r. 4) (Safety code for the construction industry). A copy of the minutes of the meetings of the committee shall be provided to the Departmental representative no later than 5 days after the committee meeting.

### **1.6 REGULATORY REQUIREMENTS**

- .1 Do the Work in accordance with Section 01 41 00 - Regulatory Requirements.

- .2 Comply with all legislation, regulations and standards applicable to the construction site and its related activities.
- .3 Comply with specified standards and regulations to ensure safe operations on a site containing hazardous or toxic materials.
- .4 Always use the most recent version of the standards specified in the *Code de sécurité pour les travaux de construction* (S-2.1, r.4) (Safety code for the construction industry), notwithstanding the date indicated in that *Code*.

#### **1.7 COMPLIANCE REQUIREMENTS**

- .1 Comply with the *Loi sur la santé et la sécurité du travail* (L.R.Q., c. S-2.1) (Act Respecting Occupational Health and Safety) and the *Code de sécurité pour les travaux de construction* (S-2.1, r. 4.) (Safety code for the construction industry) in addition to respecting all the requirements of this specification manual.

#### **1.8 RESPONSIBILITIES**

- .1 The Contractor must acknowledge and assume all the tasks and obligations which customarily devolve upon a principal Contractor under the terms of the *Loi sur la santé et la sécurité du travail* (L.R.Q., ch. S-2.1) (Act Respecting Occupational Health and Safety) and the *Code de sécurité pour les travaux de construction* (S-2.1, r.4) (Safety code for the construction industry).
- .2 The Contractor must be responsible for health and safety of persons on construction site, safety of property on construction site and for the protection of persons adjacent to construction site and the environment to the extent that they may be affected by conduct of the work.
- .3 No matter the size or location of the construction site, the Contractor must clearly define the limits of the construction site by physical means and respect all specific regulation requirements applicable in this regard. The means chosen to define the limits of the construction site must be submitted to the Departmental representative.
- .4 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific prevention Plan.

#### **1.9 WORK PERFORMED BY EXTERNAL CONTRACTORS**

- .1 On this construction site, it is anticipated that work will be performed by an external contractor that has not been hired by the Contractor:
- .2 The Contractor must take the necessary steps to protect the health and safety of external contractors that have no contractual link with the Contractor but have been mandated by the Departmental representative to perform certain work. In return, these external contractors are obligated to submit to the authority of the Contractor (Principal

Contractor). A subordination agreement must be signed by the Contractor and by each external contractor to this effect and submitted to the Departmental representative prior to the start of the work of each contractor (see the wording in the article HEALTH AND SAFETY SUBORDINATION AGREEMENT)

## **1.10 GENERAL REQUIREMENTS**

- .1 Before undertaking the work, prepare a site-specific prevention program based on the hazards identified according to the article 1.4 "HAZARD ASSESSMENT" and the article 1.11 "RISKS INHERENT TO THE WORKSITE" in this section. Apply this program in its totality from the start of the project until demobilization of all personnel from the construction site. The prevention program shall take into consideration the specific characteristics of the project and cover all the work to be executed on the construction site.

The safety program must include at least the following:

- .1 company safety and health policy;
- .2 description of the stages of the work;
- .3 total costs, schedule and projected workforce curves;
- .4 flow chart of safety and health responsibilities;
- .5 physical and material layout of the construction site;
- .6 risk assessment for each stage of the work, including preventive measures and the procedures for applying them;
- .7 identification of the preventive measures relative to the specific risks inherent to the worksite indicated in the article 1.11 "RISKS INHERENT TO THE WORKSITE" of this section;
- .8 identification of preventive measures for health and safety of employees and / or public works site as indicated in the article 1.12 "SPECIFIC REQUIREMENTS FOR THE HEALTH AND SAFETY OF OCCUPANTS AND PUBLIC" of this section;
- .9 training requirements;
- .10 procedures in case of accident/injury;
- .11 written commitment from all parties to comply with the safety program;
- .12 construction site inspection checklist based on the preventive measures;
- .13 emergency response plan which shall contain at least the following:
  - .1 construction site evacuation procedures;
  - .2 identification of resources (police, firefighters, ambulance services, etc.);
  - .3 identification of persons in charge of the construction site;
  - .4 identification of the first-aid attendants;
  - .5 communication organizational chart (including the person responsible for the site and the Departmental representative);

- .6 training required for those responsible for applying the plan;
- .7 any other information needed, in the light of the construction site's characteristics.

If available the Departmental representative will provide the evacuation procedures to the Contractor who shall then coordinate the construction site procedure with that of the site and submit it to the Departmental representative.

- .2 Departmental representative may respond in writing, where deficiencies or concerns are noted in the prevention program and may request resubmission with correction of deficiencies or concerns.
- .3 In addition to the prevention program, during the course of the work the Contractor shall elaborate and submit to the Departmental representative specific written procedures for any work having a high risk factor of accident (for example: demolition procedures, specific installation procedures, hoisting plan, procedures for entering a confined space, procedures for interrupting electric power, etc.) or at the request of the Departmental representative.
- .4 The Contractor shall plan and organize work so as to eliminate the danger at source or ensure collective protection, thereby minimizing the use of personal protective equipment.
- .5 Equipment, tools and protective gear which cannot be installed, fitted or used without compromising the health or safety of workers or the public shall be deemed inadequate for the work to be executed.
- .6 All mechanical equipment (for example, but not limited to: hoisting devices for persons or materials, excavators, concrete pumps, concrete saws) shall be inspected before delivery to the construction site. Before using any mechanical equipment, the Contractor shall obtain a certificate of compliance signed by a qualified mechanic dated less than a week prior to the arrival of each piece of equipment on the construction site; the certificate shall remain on the construction site and transmitted to the Departmental representative on demand.
- .7 Ensure all inspections (daily, periodic, annual, etc.) for the hoisting devices for persons or materials required by the current standards are carried out and be able to provide a copy of the inspection certificates to the Departmental representative on demand.
- .8 The Departmental representative can at all times, if he suspects a malfunction or the risk of an accident, order the immediate stop of any piece of equipment and require an inspection by a specialist of his choice.
- .9 The Departmental representative must be consulted for the location of storing gas cylinders and tanks on the construction site.

**1.11 RISKS INHERENT TO THE WORKSITE**

- .1 In addition to the risks related to the tasks to be carried out, personnel responsible for the execution of the work on the construction site will be exposed to the following risks, inherent to the area where the work will be executed..

At the worksite there is in particular the presence of the following:

- .1 overhead power lines;
- .2 underground services (electric, gas, vapour, water system, etc.);
- .3 trees and landscaping to preserve and protect;
- .4 body of water close by;

The Contractor shall process to a risk assessment of the site to validate this information and see if other risks are present on the site. It must include in its prevention program all risks that have been identified.

**1.12 SPECIFIC REQUIREMENTS FOR THE HEALTH AND SAFETY OF OCCUPANTS AND PUBLICS**  
**SPEC NOTE: Indicate the times when people, other than the construction workers will be on the site (employees, public, visitors, others). If the site is non-occupied, delete the following paragraph.**

- .1 The worksite is occupied by employees and/or the public during the office hours. The Contractor shall consider the following specific requirements for the protection of employees and / or the public:
- .1 Controlled access to the site
  - .2 Garbage chute from the roof
- .2 These requirements must be included in the Contractor's site-specific safety plan as well as any other measures provided by the Contractor to protect the health and safety of employees and / or the public on the site.

**1.13 UNFORESEEN HAZARDS**

- .1 Whenever a source of danger not defined in the specifications or identified in the preliminary construction site inspection arises as a result of or in the course of the work, the Contractor must immediately suspend work, notify the person responsible for health and safety on the construction site, take appropriate temporary measures to protect the workers and the public and notify Departmental representative, both verbally and in writing. Then the Contractor must do the necessary modifications to the prevention program or apply the security measures required in order to resume work.

**1.14 PERSON IN CHARGE OF HEALTH AND SAFETY**

- .1 When the hiring of a safety officer is not required or if this person is hired by the Departmental representative, the Contractor shall designate a competent person to supervise and take responsibility for health and safety, no matter the size of the construction site or how many workers are present at the workplace. This person shall be on construction site at all times and be able to take all necessary measures to ensure the health and safety of persons and property at or in the immediate vicinity of the construction site and likely to be affected by any of the work. The Contractor shall submit the name of this person to the Departmental representative before the start of work.

**1.15 POSTING OF DOCUMENTS**

- .1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on construction site in accordance with Acts and Regulations of the Province, and in consultation with Departmental representative.
- .2 At a minimum, the following information and documents must be posted in a location readily accessible to all workers:
  - .1 notice of construction site opening;
  - .2 identification of principal Contractor;
  - .3 company OSH policy;
  - .4 site-specific prevention program;
  - .5 emergency plan;
  - .6 minutes of worksite committee meetings;
  - .7 names of worksite committee representatives;
  - .8 names of the first-aid attendants;
  - .9 action reports and correction notices issued by the CNESST.

**1.16 INSPECTION OF THE CONSTRUCTION SITE AND CORRECTION OF NON-COMPLIANCES**

- .1 Inspect the construction site and complete the construction site inspection checklist and submit it to the Departmental representative in accordance with the article 1.2 "ACTION AND INFORMATIONAL SUBMITTALS" in this section.
- .2 Immediately take all necessary measures to correct any situations deemed non-compliant during the inspections mentioned in the previous paragraph or noticed by the authorities having jurisdiction or the Departmental representative or his agent.
- .3 Submit to Departmental representative written confirmation of all measures taken to correct the situation in case of non-compliance in matters pertaining to health and safety.
- .4 The Contractor shall give the safety officer or, where there is no safety officer, the person assigned to safety and health responsibilities, full authority to order cessation

and resuming of work as and when deemed necessary or desirable in the interests of safety and health. This person should always act so that the safety and health of the public and construction site workers and environmental protection take precedence over cost and scheduling considerations.

- .5 The Departmental representative or his agent may order cessation of work if the Contractor does not make the corrections needed to conditions deemed non-compliant in matters pertaining to health and safety. Without limiting the scope of the preceding articles, the Departmental representative may order cessation of work if, in his view, there is any hazard or threat to the safety or health of construction site personnel or the public or to the environment.

#### **1.17 PREVENTION OF VIOLENCE**

- .1 Health and safety management of Public Works and Government Services Canada construction sites includes the implementation of measures designed to protect the psychological health of all persons who access the construction site where the work is taking place. Consequently, in addition to physical violence, verbal abuse, intimidation and harassment are not tolerated on the construction site. Any person who demonstrates such actions or behaviors will receive a warning and/or could be definitely expelled from the construction site by the Departmental representative.

#### **1.18 POWDER ACTUATED DEVICE**

- .1 Use powder actuated devices only after receipt of written permission from Departmental representative.
- .2 Any person using an explosive actuated tool shall hold a training certificate and meet all requirements of Section 7 of the *Code de la sécurité pour les travaux de construction* (S- 2.1, r. 4). (Safety code for the construction industry)
- .3 Any other explosive-actuated device shall be used in accordance with the manufacturer's directions and applicable standards and regulations.

#### **1.19 USE OF PUBLIC ROADS**

- .1 Where it is necessary to encroach on a public road for operational reasons or to ensure the security of the workers, the occupants or the public (for example: the use of scaffolding, cranes, excavation work, etc.), the Contractor shall obtain at his own expense any authorizations and permits required by the competent authority.
- .2 The Contractor shall install at his own expense any signage, barricades or other devices needed to ensure the safety and security of the public and the Contractor's own facilities.

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**1.20 LOCKOUT-TAGOUT**

- .1 For all work on electrically or otherwise energized equipment, the Contractor shall draw up and implement a general lockout-tagout procedure and submit it to the Departmental representative.
- .2 Supervisors and all workers concerned by work requiring lockout-tagout must have received training on lockout-tagout procedures by a recognized organization; Contractor shall submit training certificates to the Departmental representative.
- .3 Before starting the lockout-tagout procedure of a piece of equipment on an occupied site, Contractor must coordinate his work with the representative of the site if the interruption of the power sources can have an impact on the operations of the site or on its occupants.
- .4 Contractor must designate a qualified person as responsible for the lockout-tagout and must make sure that that person prepares a lockout-tagout data sheet for each piece of equipment involved. The lockout-tagout data sheet must be submitted to the Departmental representative at least 48 hours before the beginning of the work. The Departmental representative will review the data sheet with the representative of the site if the work takes place in an existing building. The data sheets for lockout-tagout must contain at least the following information:
  - .1 description of work to carry out;
  - .2 identification, description and location of the circuit and/or equipment to lockout-tagout;
  - .3 identification of energy sources that feeds the equipment;
  - .4 identification of each cutout point;
  - .5 sequence of lockout-tagout and the release of residual energy as well as the sequence of unlocking;
  - .6 list of material needed for the lockout-tagout;
  - .7 method of verification of zero energy implementation;
  - .8 name and signature of the person who prepared the data sheet.

When required by the Departmental representative, Contractor must record all this information on the site's representative form.

- .5 At the time of lockout-tagout, the person responsible must date the data sheet and ensure that each worker involved in the work on the circuit/equipment to lockout-tagout puts his name on the data sheet and signs it.

**1.21 ELECTRICAL WORK**

- .1 Contractor shall ensure that all electrical work is executed by qualified resources in accordance with the provincial regulation respecting vocational training and qualification.

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- .2 Contractor shall respect all requirements of standard CSA Z462 *Workplace Electrical Safety Standard*.
  - .3 No repairs or alterations shall be carried out on any live equipment except where complete disconnection of the equipment is not feasible.
  - .4 Contractor shall respect all requirements prescribed in paragraph "LOCKOUT-TAGOUT" in this section.
  - .5 Contractor shall advise in writing the Departmental representative of all the work that cannot be done with de-energized equipment and obtain his authorization. Contractor shall demonstrate to the Departmental representative that it is impossible to do the work with de-energized equipment and provide all the information necessary to request and obtain an energized electrical work permit (indicate working procedures, arc flash hazard analysis, protective perimeter, protective equipment, etc.) before the beginning of the work, excluding for the exceptions indicated in standard CSA Z462 Workplace electrical safety.
  - .6 The energized electrical work permit on must contain at least the following elements:
    - .1 description of the circuit and equipment and its location;
    - .2 justification for having to do the work in an energized condition;
    - .3 description of safe work practices to apply;
    - .4 results of the shock hazard analysis;
    - .5 limit of the protective perimeter against electric shocks;
    - .6 results of the arc flash hazard analysis;
    - .7 description of the arc flash protection boundary;
    - .8 description of the personal protective equipment required;
    - .9 description of the means to limit access to unqualified persons;
    - .10 proof that an information session has been carried out;
    - .11 approval signature of the energized electrical work (by a person in authority or by the owner).
  - .7 If for the operational requirements of the occupants of the site the representative of the site requires that the Contractor performs work in an energized condition, the Contractor shall obtain all the information required to request and obtain obtain an energized electrical work permit (indicate working procedures, arc flash hazard analysis, protective perimeter, protective equipment, etc.) and have it signed by the representative of the site assigned by the Departmental representative before the beginning of the work.

## **1.22 ASBESTOS EXPOSURE**

- .1 It is not anticipated that the work covered by the present specifications involves the manipulation of materials containing asbestos; however, if the Contractor or the Departmental representative or his agent discover materials which are susceptible of

containing asbestos, the Contractor must immediately stop the work and advise the Departmental representative. If more investigation demonstrates that the materials do contain asbestos, the Contractor shall comply with the following requirements.

- .1 Prior to starting any work likely to emit asbestos dust, the Contractor must:
  - .1 Provide a written procedure for the work, identifying the risk level of the work (low, moderate, high), as defined in section 3.23 of the *Code de la sécurité pour les travaux de construction* S-2.1, r- 4, (Safety code for the construction industry). This procedure must take into account all the requirements of that section 3.23.
  - .2 Submit certificates that demonstrate that all workers involved in the work have received training on asbestos hazards and on the procedure required in the preceding paragraph.
  - .3 Demonstrate that he has all the material and equipment required on hand to respect the procedure and for safely conducting the work.

#### 1.23 FUNGAL CONTAMINATION

- .1 It is not anticipated that the work covered by the present specifications involves the manipulation of materials contaminated by mould; however, if the Contractor or the Departmental representative or his agent discover materials which are susceptible of being contaminated by mould, the Contractor must immediately stop the work and advise the Departmental representative. If more investigation demonstrates that the materials do contain mould, the Contractor shall comply with the following requirements.
  - .1 Prior to starting any work where workers are likely to be in contact with materials contaminated by mould, the Contractor must:
    - .1 Provide a written procedure for the work which respects all the requirements of the *Code de la sécurité pour les travaux de construction* S-2.1, r- 4, (Safety code for the construction industry), as well as the requirements indicated in the document "*Mould Guidelines for the Canadian Construction Industry*" published by the Canadian Construction Association (<https://www.cca-acc.com/wp-content/uploads/2019/02/Mould-guidelines2018.pdf>).
    - .2 Demonstrate that he has all the material and equipment required on hand to respect the procedure and for safely conducting the work.

#### 1.24 EXPOSURE TO SILICA

- .1 For any interior or exterior work generating silica, the Contractor must respect the following requirements, in addition to those in the *Code de sécurité pour les travaux de construction* S-2.1, r.4 (Safety code for the construction industry).

- .1 Work in wet environment or use tools with the inflow of water in order to reduce dustiness, if not, collect dust at the source and retain it with a high-efficiency filters not to propagate dust in the environment.
- .2 Clean surfaces and tools with water, never with compressed air.
- .3 Sand and pickle surfaces by using an abrasive containing less than 1% of silica (also called amorphous silica).
- .4 Install shields or other containment device to prevent silica dust from migrating toward other workers or the public.
- .5 Wear individual respiratory and ocular protection equipment during all the operations that could generate silica dust in accordance with the requirements of the *Code de sécurité pour les travaux de construction, S-2.1, r.4* (Safety code for the construction industry).
- .6 Wear coveralls to prevent contamination outside the construction site.
- .7 Do not eat, drink, or smoke in a dusty environment.
- .8 Wash the hands and the face before drinking, eating or smoking.

#### 1.25 SANDBLASTING

- .1 Prior to starting any sandblasting work, the Contractor must:
  - .1 Provide a written procedure of the work that meets the requirements of section 3.20. of the *Code de sécurité pour les travaux de construction, S-2.1, r.4* (Safety code for the Construction Industry).
  - .2 Demonstrate that he has all the material and equipment required on hand to respect the procedure and for safely conducting the work.
  - .3 All sanding and sandblasting work shall be done by using an abrasive containing less than 1% of silica.

#### 1.26 LEAD-BASE PAINT REMOVAL

- .1 Prior to all work where workers are likely to handle materials containing lead-base paint or other substances containing lead, the Contractor must:
  - .1 Provide a written procedure for the work which respects all the requirements of the *Code de sécurité pour les travaux de construction S-2.1, r- 4*, (Safety code for the construction industry), as well as the requirements indicated in the document “*Guideline for Lead on Construction Projects*” published by the Ontario Ministry of Labour ([Lead on Construction Projects | Ontario Ministry of Labour \(gov.on.ca\)](http://www.ontario.ca/lead)) as well as the requirements described in the document « *L'exposition au plomb* » published by the CNESST (<https://www.cnesst.gouv.qc.ca/Publications/200/Documents/DC200-16161-1web.pdf>). If there is a discrepancy between the Québec regulation and the Ontario document, the most stringent requirement shall apply.
  - .2 Demonstrate that he has all the material and equipment required on hand to respect the procedure and for safely conducting the work.

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**1.27 EXPOSURE TO ANIMALS' FECAL DROPPINGS**

- .1 Prior to all work where workers are likely to come in contact with materials contaminated by animal's fecal droppings, the Contractor must:
  - .1 Provide a written procedure for the work which respects all the requirements of the *Code de sécurité pour les travaux de construction* S-2.1, r- 4, (Safety code for the construction industry), as well as the requirements indicated in these documents:
    - .1 « *Des fientes de pigeons dans votre lieu de travail : méfiez-vous* » published by the CNESST (<https://arpac.org/wp-content/uploads/2018/04/fientes-pigeons.pdf>) – in French only
    - .2 « *Ces pigeons empoisonneurs* » published by the APSAM (<https://www.apsam.com/sites/default/files/docs/publications/revue/vol13-no2p2.pdf>) – in French only;
    - .3 « Les risques sanitaires reliés aux déjections de pigeon en milieu de travail au Québec: Mesures de prévention » published by the Régie Régionale de la Santé et des Services Sociaux de Montréal-Centre (<http://www.santecom.qc.ca/bibliothequevirtuelle/santecom/3556700038163.pdf>) – in French only.
  - .2 Demonstrate that Contractor has all the material and equipment required on hand to respect the procedure and for safely conducting the work.

**1.28 RESPIRATORY PROTECTION**

- .1 Contractor must ensure that all workers who must wear a respirator as part of their duties have received training for that purpose as well as fit testing of their respirator, in accordance with CSA Standard Z94.4 *Selection, use and care of respirators*.
- .2 Submit the fit test certificates to the Departmental representative upon request.

**1.29 FALL PROTECTION**

- .1 Plan and organize work so as to eliminate the risk of fall at the source or ensure collective protection, thereby minimizing the use of personal protective equipment. When personal fall protection is required, workers must use a safety harness that complies with CSA standard CAN/CSA Z-259.10 M90. A safety belt must not be used as fall protection.
- .2 Every person using an elevating platform (scissors, telescopic mast, articulated mast, rotative mast, etc.) must have a training regarding this equipment.
- .3 The use of a safety harness is mandatory for all elevating platforms with telescopic, articulate or rotative mast.
- .4 Define the limits of the danger zone around each elevating platform.

- .5 All openings in a floor or roof must be surrounded by a guardrail or provided with a cover fixed to the floor able to withstand the loads to which it could be exposed, regardless of the size of the opening and the height of the fall it represents.
- .6 Everyone who works within two metres from a fall hazard of three metres or more must use a safety harness in accordance with the requirements of the regulation, unless there is a guardrail or another device offering an equivalent safety.
- .7 Despite the requirements of the regulation, the Departmental representative may require the installation of a guardrail or the use of a safety harness for specific situations presenting a risk of fall less than three metres.

### 1.30 SCAFFOLDING

- .1 In addition to the requirements of the *Code de sécurité pour les travaux de construction* (Safety code for the construction industry), the Contractor who uses scaffolding must respect the following requirements:
- .2 Foundation
  - .1 Scaffolding shall be installed on a solid foundation so that it does not slip or rock.
  - .2 Contractors wishing to install scaffolding on a roof, overhang, canopy or awning shall submit their calculations and loads, as well as plans signed and sealed by an engineer to the Departmental representative and obtain his authorization before beginning installation.
- .3 Assembly, bracing and mooring
  - .1 All scaffolding shall be assembled, braced and moored in accordance with the manufacturer's instructions and the provisions of the *Code de sécurité pour les travaux de construction* (Safety code for the construction industry).
  - .2 Where a situation requires the removal of part of the scaffolding (e.g., crosspieces), the Contractor shall submit to the Departmental representative an assembly procedure signed and sealed by an engineer certifying that the scaffolding assembled in that manner will allow the work to be done safely given the loads to which it will be subject.
  - .3 For scaffolding where the span between two supports is greater than three metres, the Contractor shall provide the Departmental representative an assembly plan signed and sealed by an engineer.
- .4 Protection against falls during assembly
  - .1 Workers exposed to the risk of falling more than three metres shall be protected against falls at all times during assembly.
- .5 Platforms

- .1 Scaffolding platforms shall be designed and installed in accordance with the provisions of the *Code de sécurité pour les travaux de construction* (Safety code for the construction industry).
- .2 If planks are used, they shall be approved and stamped in accordance with section 3.9.8 of the *Code de sécurité pour les travaux de construction* (Safety code for the construction industry)
- .3 Scaffolding comprised of four sections (or six metres) high or more shall have a full platform covering the entire surface between the putlogs every three metres high or fraction thereof, and the components of that platform shall not be moved at any time to create an intermediate landing.
- .6 Guardrails
  - .1 A guardrail shall be installed on every landing.
  - .2 Cross braces shall not be considered as guardrails.
  - .3 If the platforms are not covering the entire surface between the putlogs, the guardrail must be installed just above the edge of the platform so that there is no empty horizontal space between the platform and the guardrail.
  - .4 Where scaffolding has four sections (or six metres) high or more and full platforms are required, the guardrails shall be installed on each landing at the start of work and shall remain in place until the work is completed.
- .7 Access
  - .1 The Contractor shall ensure that access to the scaffolding does not compromise worker safety.
  - .2 Where the platforms of the scaffolding are comprised of planks, ladders shall be installed in such a way that planks extending beyond the platform do not block the way up or down.
  - .3 Notwithstanding the provisions of the *Code de sécurité pour les travaux de construction* (Safety code for the construction industry), stairs shall be installed on all scaffolding that have six or more rows of uprights or is six sections (or nine metres) high or higher.
- .8 Protection of the public and occupants
  - .1 When scaffolding are installed in a zone accessible to the public, the Contractor shall take the necessary measures to prevent the public from having access to them and, if applicable, to the work or storage area located in the vicinity of these scaffolding.
  - .2 Contractor must install covered walkways, nets or other similar devices to protect workers, the public and the occupants against falling objects. The means of protection must be approved by the Departmental representative.
- .9 Engineering plans

- .1 In addition to those required by the *Code de sécurité pour les travaux de construction* (Safety code for the construction industry), the Departmental representative reserves the right to require engineering plans for other types or configurations of scaffolding.
- .2 A plan, signed and sealed by an engineer, is required for all scaffolding that will be covered with a canvas, a tarpaulin or any other material that offers wind resistance.
- .3 A certificate of conformity signed by an engineer is required in all cases where an engineering plan is required-and this, before anybody uses the facility. A copy of these documents must be available on the construction site at all times.

### **1.31 EXCAVATION WORK**

- .1 In addition to the requirements of the *Code de sécurité pour les travaux de construction* (Safety code for the construction industry), the Contractor who performs the digging of trenches or excavations must respect the following requirements:
  - .1 Fill out the following form and submit it to the Departmental representative before beginning to excavation work.
  - .2 Submit to the Departmental representative, as appropriate, the following documents:
    - .1 plans and specifications, signed and sealed by an engineer, of the shoring needed to be installed for the excavation work; or
    - .2 engineer's advice specifying the wall angles of the trench or excavation.



## Excavation guidelines

N° \_\_\_\_\_ of \_\_\_\_\_

This directive is provided as an example by the Commission de la santé et de la sécurité du travail (CSST). It contains the main instructions that the employer should give to the person responsible for the work on the site and to the operator of the earth-moving machine.

Company name

Project name

Address of the site

Project no.

Construction start date

### Field survey

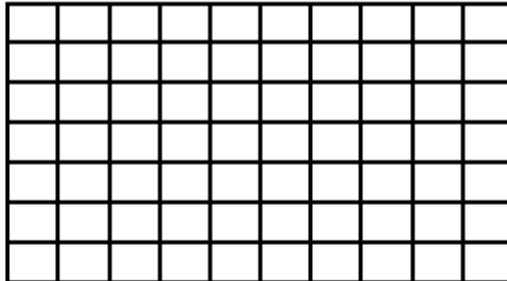
Chaining or axes: from \_\_\_\_\_ to \_\_\_\_\_ Attached plan ☐ Plan no. : \_\_\_\_\_

### Working method to use

While making sure the excavation walls do not pose the risk of landslide

- ☐ dig and shore according to the plans and specifications of the engineer ;
- ☐ dig and shore using a trench box ;
- ☐ dig without shoring as long as one of the following conditions is respected:
  - ☐ rock is sound;
  - ☐ no worker goes down in the trench or excavation;
  - ☐ the walls are dug according to the engineer's advice.

### Dimensions of excavation (Dig according to the following profile.)



	Minimum	Maximum
H Depth		
Wb Width at bottom		
Width at top		

### Safety measures

Deposit the materials at a distance of at least 1.2 metre (4 feet) from top of walls.

Do not allowed any vehicle to come closer than 3 metres (10 feet) from top of walls.

- ☐ Respect the engineer's plan concerning work in the proximity of an existing facility.
- ☐ Follow the location plan to locate the underground infrastructures.
- ☐ Install signaling devices prescribed in the traffic plan (barriers, visual references, etc.).
- ☐ Assign a flag person or more to control the flow of traffic.
- ☐ Respect the procedure prescribes for work near power lines.
- ☐ Provide protection devices for the workers, such as concrete crash barriers.

Name

Signature

Occupation

Date

Telephone no.

Directive submitted

- ☐ to the responsible of the work on the site
- ☐ to the operator of the earth-moving machine

Document 004 (2011-40)

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**1.32 LIFTING LOADS WITH CRANE OR BOOM TRUCK**

- .1 Unless specified otherwise, the Contractor must prepare a hoisting plan and submit it to the Departmental representative for all lifting operations done with a crane or a boom truck at least 5 days before these lifting operations begin. The hoisting plan must contain at a minimum the information listed at the end of this article.
- .2 The hoisting plan must be signed and sealed by an engineer for the following lifting operations:
  - .1 lifting of concrete panels;
  - .2 lifting mechanical/electrical equipment on a roof or on the floor of a building;
  - .3 lifting of loads encroaching on the public road;
  - .4 lifting large or very heavy loads;
  - .5 all other lifting operation, in accordance with the requirements of the Departmental representative.
- .3 In addition to the above requirements, the Contractor must plan the hoisting operations in a way as to avoid that the loads pass over the occupied zones on the site. When there is no alternative, the hoisting plan must absolutely be signed and sealed by an engineer and must guarantee the security of the occupants in that zone; the plan must also be approved by the Departmental representative. The Departmental representative can, if he deems necessary, require that the work be done at night or on weekends.
- .4 Upon the beginning of the work on the construction site, the Contractor must submit the list of the hoisting plans anticipated for the whole project to the Departmental representative. That list shall be updated as needed if changes occur during the work.
- .5 In addition to the mechanical service inspection certificate, the annual inspection certificate and the crane logbook must be aboard all cranes and boom truck cabs.
- .6 The entire lifting area shall be marked off to prevent the entry of non-authorized persons.
- .7 The Contractor shall carefully inspect all of the slings and lifting accessories and make sure that those in poor condition are destroyed and scrapped.
- .8 Compressed-gas cylinders shall be lifted with a basket specially designed for this purpose.
- .9 The hoisting plan must include, at minimum, the following information:
  - .1 Sketch indicating at a minimum, the location of the crane, the surrounding facilities, the zone covered by the hoisting operations, the pedestrian's pathways and vehicular routes, the security perimeter, etc.
  - .2 Weight of loads
  - .3 Dimensions of loads
  - .4 List of hoisting devices and weight of each
  - .5 Total weight lifted

- .6 Maximum height of obstacles to clear
- .7 Height of loads lifting relative to the surface of the roof (in the case of loads to be placed on roofs)
- .8 Use of guide cables
- .9 Type of crane used
- .10 Crane capacity
- .11 Boom length
- .12 Boom angle
- .13 Crane's radius of action
- .14 Deployment of stabilizers
- .15 Percentage usage of the crane's capacity
- .16 Verification confirmation of hoisting equipment
- .17 Identification of the crane operator and the person responsible for the hoisting operations with date and signatures

### 1.33 HOT WORK

- .1 Hot work means any work where a flame is used or a source of ignition may be produced, i.e., riveting, welding, cutting, grinding, burning, heating, etc.
- .2 Before the beginning of each shift of work and for each sector, the Contractor must obtain a "Hot Work Permit" emitted by the person responsible for the site.
- .3 A working portable fire extinguisher suitable to the fire risk shall be available and easily accessible within a 5 m radius from any flame, spark source or intense heat.
- .4 The Contractor must appoint an individual to do continuous monitoring of the fire risks for a period of one (1) hour after the end of the shift of hot work. This individual shall sign the section for this purpose on the permit and give it to the person in charge of the construction site after the one-hour period.
- .5 When the hot work is done in areas where there is combustible materials or where the walls, ceilings or floors are made of or covered with combustible materials, a final inspection of the work area must be scheduled four (4) hours after the work has finished. Unless specified otherwise by the Departmental representative, the Contractor must assign a person to carry out this monitoring.
- .6 Welding and cutting
  - .1 In addition to the requirements prescribed in the preceding paragraphs, the Contractor must respect the following requirements:
    - .1 Welding and cutting work must be carried out in accordance with the requirements of the *Code de Sécurité pour les travaux de construction*, S-2.1, r.4 (Safety code for the construction industry) and CSA standard W117.2, Safety in Cutting, Welding and Allied Processes.

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- .2 Air extraction system with filters must be used for all welding and cutting work performed inside.
  - .3 Stop all activities producing flammable or combustible gas, vapours or dust in the vicinity of the welding or cutting work.
  - .4 Store all compressed gas cylinder on a fireproof fabric and make sure that the room is well ventilated.
  - .5 Store all oxygen cylinders more than 6 metres from a flammable gas cylinder (ex: acetylene) or a combustible such as oil or grease, unless the oxygen cylinder is separated from it by a wall made of non-combustible material as mentioned in the article 3.13.4 of the *Code de sécurité pour les travaux de construction, S-2, r. 6* (Safety code for the construction industry)
  - .6 Store the cylinders far from all heat sources.
  - .7 Not to store the cylinders close to the staircases, exits, corridors and elevators.
  - .8 Do not put acetylene in contact with metals such as silver, mercury, copper and alloys of brass having more than 65% copper, to avoid the risk of an explosive reaction.
  - .9 Check that welding equipment with electric arc has the necessary tension and are grounded.
  - .10 Ensure that the conducting wires of the electric welding equipment are not damaged.
  - .11 Place the welding equipment on a flat ground away from the bad weather.
  - .12 Install fireproof canvas when the welding work is done in a superposition and where there is the risk of falling sparks.
  - .13 Move away or protect the combustible materials which are closer than 15 metres from the welding work.
  - .14 Prohibition to weld or cut any closed container.
  - .15 Do not perform any cutting, welding or work with a naked flame on a container, a tank, a pipe or other container containing a flammable or explosive substance unless:
    - .1 they have been cleaned and air samples indicating that work can be done without danger has been taken; and
    - .2 provisions to ensure the safety of the workers have been made.

#### 1.34 ROOFING WORK

- .1 Protection against fall from heights
  - .1 Installation of guardrails is mandatory at all times; however, the installation of a warning line is allowed to define the limits of the work zones provided that all

the requirements of the articles 2.9.4.0 and 2.9.4.1 of the *Code de sécurité pour les travaux de construction* (Safety code for the Construction Industry) are respected.

- .2 The guardrails must remain in place until the end of the project. The Departmental representative will authorize their dismantling when he can confirm that all the work, inspections and corrections have been made.
  - .3 Workers installing guardrails must wear safety harnesses.
  - .4 Workers installing and modifying guardrails or flashing shall wear safety harnesses in the event guardrails must be moved temporarily.
  - .5 Workers shall wear safety harnesses when receiving material and giving directions to the crane operator next to a drop.
  - .6 Safety harnesses shall be worn when carrying out work next to a drop where collective protection is not sufficiently safe.
  - .7 The Contractor shall provide a fastening method and safety cable system compliant with section 2.10.12 of the *Code de sécurité pour les travaux de construction (L.R.Q., S-2.1, r.4)* (Safety code for the Construction Industry) for each construction site or location.
- .2 Lifting of materials
- .1 For all winch installations, the Contractor shall provide the Departmental representative with the installation method recommended by the manufacturer. If unavailable, the Contractor shall then provide an installation procedure signed and sealed by an engineer. The installation procedure must take into account load-bearing capacity, the amount, weight and location of counterweight and any other detail that may affect the capacity and stability of the device.
  - .2 The Contractor shall carefully inspect all of the slings and lifting accessories and make sure that those in poor condition are destroyed or scrapped.
  - .3 Compressed-gas cylinders shall be lifted with a basket specially designed for this purpose.
  - .4 In all cases where a crane or boom truck is used, the Contractor must respect the requirements of the paragraph Lifting Loads With Crane or Boom Truck, in this section.
- .3 Protection against burns
- .1 Individuals assigned to the boilers shall wear long sleeves, safety glasses and a face shield when filling the boilers.
  - .2 Individuals working with asphalt or other hot liquids shall wear gloves, long sleeves and safety glasses.
- .4 Protection against fire

- .1 The storage and use of propane cylinders shall comply with the standard CAN/CSA-B149.2, *Propane Storage and Handling Code*. The cylinders shall be stored outdoors, in a safe place, away from any unauthorized handling, in a storage cabinet specially designed for this purpose. The cylinders shall be securely kept upright and locked at all times in a place where no vehicles are allowed unless the cylinders are protected by barriers or similar protection.
- .2 The number of propane cylinders on the roof shall not exceed the number of cylinders necessary for a day's work, and cylinders shall at all times be secured upright or held in a cart designed for this purpose.
- .3 All hot work (burning, heating, riveting, welding, cutting, grinding, etc.) must be done in accordance with paragraph "Hot Work" in this section.
- .5 Material and waste management
  - .1 On the roof, light material and sheet material shall be kept in containers or be securely fastened. In the event this requirement is disregarded in the slightest way, the Departmental representative may disallow the storage of materials on the roof.
  - .2 Waste shall be discarded as produced using a waste chute or appropriate containers. The Contractor shall provide the means to prevent waste from being carried away by the wind.
  - .3 All waste must be removed from the roof at the end of shifts.
  - .4 Unless otherwise authorized by the Departmental representative, all waste bins must be placed at least 3 m from any structure or building.
- .6 Protection of occupants and the public
  - .1 Contractor must install covered passageways, nets or other devices above the entrances and the exits of the building to protect the workers, the public and the occupants against falling object. The means of protection must be approved by the Departmental representative.
  - .2 A safety perimeter on the ground must be placed under the work zone in order to protect the workers, the public and the occupants.
  - .3 The ground construction site, material handling area and boiler area shall be clearly sealed off to prevent occupants or the public from accessing the construction site and areas.
  - .4 Before installing any device that may emit gas or fumes, the Contractor shall receive authorization from the person in charge of the construction site, who shall make sure that there is no risk of gas or fumes infiltrating the building's ventilation system.

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**1.35 STEEL STRUCTURE ERECTION OR DISMANTLING WORK**

- .1 In addition to respecting section 3.24 du *Code de sécurité pour les travaux de construction* (S-2.1, r.4) (Safety code for the Construction Industry), the Contractor must also respect the requirements described in the following paragraphs.
- .2 Contractor must submit the following documents to the Departmental representative before the beginning of steel structure erection work:
  - .1 erecting procedures in accordance with article 3.24.10 du *Code de sécurité pour les travaux de construction* (S-2.1, r.4) (Safety code for the Construction Industry);
  - .2 rescue procedures for the release of a worker suspended in a safety harness within a maximum of 15 minutes; procedures must be adapted to the construction site and in accordance with article 3.24.4 of that same code; the procedure must be accompanied by a written confirmation that it has been tested;
  - .3 statement from an engineer that the anchor rods have been installed in accordance with the anchoring plan as required by the article 3.24.12 of that same code;
  - .4 hoisting procedures in cases where the lifting is done in one of the ways described in the article 3.24.15 of that same code;
  - .5 name of the individual identified as rescuer and his rescue training certificate;
  - .6 name of the individual identified as first-aid attendant and his first-aid training certificate.
- .3 The Contractor must make sure that the following documents are available for consultation on construction site at all times:
  - .1 Steel structure manufacturer's erection plan in accordance with the requirements of article 3.24.9 du *Code de sécurité pour les travaux de construction* (S-2.1, r.4) (Safety code for the Construction Industry);
  - .2 Column anchor rods's anchoring plan in accordance with the requirements of article 3.24.11 du *Code de sécurité pour les travaux de construction* (S-2.1, r.4) (Safety code for the Construction Industry).

**1.36 WORK NEAR BODIES OF WATER**

- .1 For all work done near a body of water (such as work above water, work on a wharf, work on the edge of a watercourse, etc.), the Contractor must respect the requirement of the following paragraphs in addition to those of *Code de sécurité pour les travaux de construction* (Safety code for the Construction Industry).
- .2 The Contractor must plan his work in a way to implement safety measures to prevent any worker from falling in the water. The use of these measures should be favoured over the wearing of a life jacket.

- .3 Submit the following documents to the Departmental representative before the beginning of the work:
- .1 description of the body of water;
  - .2 description of the work done next to this body of water;
  - .3 plan of transportation on water adapted to the work and to the characteristics of the body of water;
  - .4 rescue plan adapted to the work and to the characteristics of the body of water;
- Each of the documents listed above must contain at a minimum the information required in section 11 of the *Code de sécurité pour les travaux de construction* (S-2.1, r.4) (Safety code for the Construction Industry).
- If there is the possibility that all or part of the work can be done during the winter, the safety measures included in the documents required above must be adapted accordingly.
- .4 The Contractor must submit to the Departmental representative the certificate of training required in article 11.2 du *Code de sécurité pour les travaux de construction* (S-2.1, r.4) (Safety code for the Construction Industry) for the following individuals:
- .1 the person assigned to prepare the documents required in the preceding paragraph; and
  - .2 each person responsible for the transport or rescue operations
- .5 If the rescue plan stipulates the use of a vessel, the Contractor must submit to Departmental representative the competency card or certificate for the individuals in the rescue team for his work, issued by Transport Canada.
- .6 The Contractor must include in his weekly inspection checklist the devices required in the articles 11.4 and 11.5 du *Code de sécurité pour les travaux de construction* (S-2.1, r.4) (Safety code for the Construction Industry).
- .7 Ensure that a rescue vessel moored and in the water is available at each place where a worker may fall in the water. However, a vessel may serve more than one workplace on the same construction site provided the distance between any of these workplaces and the vessel is less than 30 m.
- .8 Where the construction site is a wharf, a pier, a quay or any similar structure, a ladder with at least two (2) rungs below the surface of the water shall be installed on the front of the structure every 60 m.

### **1.37 INTERIOR USE OF INTERNAL COMBUSTION ENGINES**

- .1 In addition to respecting article 3.10.17 of the *Code de sécurité pour les travaux de construction* (S-2.1, r.4) (Safety code for the Construction Industry), the Contractor must also respect the requirements described in the following paragraphs.
- .2 The use of a gas-powered equipment inside a building is prohibited even if the building is provided with openings.

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- .3 The use of other equipment powered by an internal combustion engine inside a building must be submitted to the approval of the Departmental representative.
  - .4 For the use of any piece of equipment powered by an internal combustion engine inside a building, even if the building is provided with openings, the Contractor must install a ventilation system able to maintain the concentrations of toxic gases below the regulatory values. The stale air shall be exhausted outside the building.
  - .5 Before using equipment powered by an internal combustion engine, the Contractor must plan and write the following:
    - .1 number of fans to install;
    - .2 power of the fans;
    - .3 location of the fans;
    - .4 dimensions of the openings that will be open during the work.
  - .6 During the operation of equipment with internal combustion engine, the Contractor must measure the concentrations of carbon monoxide and nitrogen oxides in the work area and at the breathing area of the workers; the concentration levels measured must be recorded in a register every 30 minutes that must be available for consultation.
  - .7 If work is in an occupied building, the Contractor must also measure the concentrations of carbon monoxide and nitrogen oxides in the rooms next to the work area and the concentration levels measured must be recorded in a register every 30 minutes.
  - .8 If the carbon monoxide or nitrogen oxides detector alarm goes off during the work, the Contractor must stop the work and take the corrective measures required before resuming the work.
  - .9 A portable fire extinguisher must be available at all times in the work area during the use of equipment with internal combustion engines.
  - .10 The equipment must be maintained at a safe distance from all combustible material.
  - .11 The storage of fuel for any equipment with internal combustion engine is prohibited inside a building.

#### **1.38 TEMPORARY HEATING**

- .1 In addition to respecting section 3.11 of the *Code de sécurité pour les travaux de construction* (S-2.1, r.4) (Safety code for the Construction Industry), the Contractor must also respect the requirements described in the following paragraphs.
- .2 A portable fire extinguisher must be available at all times near the heating units, no matter what type of heating is used.
- .3 The heating units must always be used in accordance with the manufacturer's specifications.

- .4 If applicable, the canvas or tarpaulins used next to the heating units must be solidly fixed so as not to be projected on the heaters, on the pipes connected to the heaters or on any other heat source.
- .5 The gas cylinders must be installed in a way that they are protected from vehicle and other equipment traffic.
- .6 For the use of heating units other than electric, the Contractor must install a carbon monoxide detector in the work area, next to the heating units and/or the workers, throughout the course of the heating period. The Contractor must immediately apply the corrective measures required to the heating units if the detector's alarm goes off.
- .7 The Contractor must ensure a minimum surveillance of the heating units outside the hours of work (nights and weekends). He must submit a surveillance plan to the Departmental representative before the use of the heating units.

**1.39 WORK NEAR OVERHEAD POWER LINES**

- .1 When there is an overhead power line in the work zone and that the Contractor chooses to apply paragraph b) of article 5.2.2 of the *Code de sécurité pour les travaux de construction* (2.1, r.4) (Safety code for the Construction Industry), a copy of the agreement with the electrical power company and a copy of the work process, required in the article 5.2.2 b), must be submitted to the Departmental representative before the beginning of the work in relation to these documents.



## ANNEX HEALTH AND SAFETY SUBORDINATION AGREEMENT

**Project:** \_\_\_\_\_ **Address:** \_\_\_\_\_

### EXTERNAL CONTRACTOR

I hereby agree to submit to the authority of (name of the Principal Contractor's business) \_\_\_\_\_, which is the Principal Contractor for the project indicated above during the entire duration of our work on the construction site. Accordingly, I confirm that I have reviewed the Principal Contractor's prevention program, and I agree to:

- inform my employees of the content of the Principal Contractor's prevention program and ensure that its content are complied with at all times;
- apply the prevention program that is specific to the activities that we carry out under this project;
- inform the Principal Contractor of my actions or dealings on the construction site and obtain the Principal Contractor's agreement before the start of work; and
- follow the health and safety directives provided by the representative of the Principal Contractor on the construction site and, depending on requirements, attend training sessions and health and safety meetings organized by the representative of the Principal Contractor.

Name of representative: \_\_\_\_\_

Name of business: \_\_\_\_\_

Description of work to be done on the construction site: \_\_\_\_\_

Approximate dates of work (start-end): \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

### PRINCIPAL CONTRACTOR

I hereby agree to allow the business (name of external contractor) \_\_\_\_\_ to perform the work under this project indicated above and, as Principal Contractor, to take the necessary steps to protect the health and safety of workers on the construction site. Should the Contractor repeatedly refuse or fail to comply with my directives, I agree to inform PWGSC's Departmental Representative of this and to provide documentary evidence of my actions or dealings with the Contractor.

Name of representative: \_\_\_\_\_

Name of the Principal Contractor's business: \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Submit a completed and signed copy to PWGSC's Departmental Representative

**PART 1        GENERAL**

**1.1            RELATED SECTIONS**

- .1        Not applicable.

**1.2            CODES, STANDARDS AND OTHER REFERENCE DOCUMENTS**

- .1        Perform Work in accordance with National Building Code of Canada (2015 NBC) including amendments up to tender closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply.
- .2        The work must meet -or exceed requirements of:
  - .1        Contract documents.
  - .2        Specified standards, codes and referenced documents.

**1.3            HAZARDOUS MATERIAL DISCOVERY**

- .1        Asbestos: demolition of spray or trowel-applied asbestos is hazardous to health. Stop work immediately when material resembling spray or trowel-applied asbestos is encountered during demolition work and notify Departmental Representative.
- .2        Mould: stop work immediately when material resembling mould is encountered during demolition work and notify the Departmental Representative.

**1.4            SMOKE-FREE ENVIRONMENT**

- .1        Smoking restrictions as well as municipal by-laws must be respected.

**PART 2        PRODUCTS**

**2.1            NO OBJECT**

- .1        Not applicable.

**PART 3        EXECUTION**

**3.1            NO OBJECT**

- .1        Not applicable.

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**END OF THE SECTION**

**PART 1 - GENERAL**

1.1 RELATED SECTIONS

- .1 Not applicable

1.2 REFERENCES

- .1 References to relevant standards may be made in each section of the specification.
- .2 Conform to these reference standards, in whole or in part as specifically requested in specifications.
- .3 If there is question as to whether products or systems are in conformance with applicable standards, Departmental Representative reserves right to have such products or systems tested to prove or disprove conformance.
- .4 Cost for such testing will be born by Departmental Representative in event of conformance with Contract Documents or by Contractor in event of non-conformance.

1.3 QUALITY

- .1 Products, materials, equipment and articles incorporated in Work shall be new, not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.
- .2 Products found to be defective prior to completion of the work will be rejected, regardless of the findings of previous inspections. Inspections are not intended to relieve the Contractor of responsibility, but merely to reduce the risk of omission or error. The Contractor shall be responsible for the removal and replacement of defective products at his own expense, and shall be responsible for any delays and costs resulting therefrom.
- .3 Should disputes arise as to quality or fitness of products, decision rests strictly with Departmental Representative based upon requirements of Contract Documents.
- .4 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.

- 1.4 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.
- 1.5 STORAGE, HANDLING AND PROTECTION OF PRODUCTS
  - .1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.
  - .2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.
  - .3 Store products subject to damage from weather in weatherproof enclosures.
  - .4 Store cementitious products clear of earth or concrete floors, and away from walls.
  - .5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.
  - .6 Place lumber and sheet materials on rigid, flat supports so that they do not rest directly on the ground. Provide a slight slope to allow condensation water to drain away.
  - .7 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.
  - .8 Replace damaged products at no additional charge, to the satisfaction of the Departmental Representative to the case.
  - .9 Touch up damaged factory-finished surfaces to the satisfaction of the Departmental Representative. Use the same products for touch-ups as for the original finish. No finishing or touch-up product may be applied to name plates.
- 1.6 MANUFACTURER'S INSTRUCTIONS
  - .1 Unless otherwise specified in the specification, install or set up products according to the manufacturer's instructions. Do not rely on labels and containers provided with products. Obtain a copy of the manufacturer's written instructions directly from the manufacturer.
  - .2 Notify the Departmental Representative in writing of any discrepancies between the specification requirements and the manufacturer's instructions so that appropriate action can be taken.

- .3 If the manufacturer's instructions have not been followed, Departmental Representative may require, without increasing the contract price, the removal and re-installation of products that have been improperly placed or installed.
- 1.7 QUALITY OF WORKMANSHIP
  - .1 The work should be of the highest quality and should be carried out by tradesmen qualified in their respective disciplines.
  - .2 Do not employ persons who are unqualified or unfit to perform the work assigned to them. The Departmental Representative reserves the right to deny access to the work site to any person deemed incompetent or negligent.
- 1.8 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Departmental Representative, whose decision is final.
- 1.9 COORDINATION
  - .1 Ensure co-operation of workers in laying out Work. Maintain efficient and continuous supervision.
  - .2 Be responsible for coordination and placement of openings, sleeves and accessories.
- 1.10 ITEMS TO BE CONCEALED
  - .1 In finished areas conceal pipes, ducts and wiring in floors, walls and ceilings, except where indicated otherwise.
  - .2 Before concealing any items, inform the Departmental Representative of any abnormal situation or interference. Perform the installation as directed by the Departmental Representative.
- 1.11 REMEDIAL WORK
  - .1 Performs remedial work required to repair or replace parts or portions of the Work identified as defective or unacceptable. Coordinate adjacent affected Work as required.
  - .2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.
- 1.12 LOCATION OF FIXTURES
  - .1 Consider location of fixtures, outlets, and mechanical and electrical items indicated as approximate.

- .2 Inform Departmental Representative of any problems that may be caused by the choice of the location of an appliance or conflicting installation and proceed with the installation according to their instructions.

1.13 FASTENING

- .1 Unless otherwise specified, provide metal accessories and fasteners of the same texture, color and finish as the item being secured.
- .2 Avoid any electrolytic action between metals or materials of different nature.
- .3 Use non corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.
- .4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.
- .5 Keep exposed fastenings to a minimum, space evenly and install neatly.
- .6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

1.14 FASTENING - EQUIPMENT

- .1 Use fasteners of standard commercial shapes and sizes, of suitable material, with a finish suitable for the intended use.

1.15 PROTECTION OF WORKS IN PROGRESS

- .1 Do not overload any part of the building. Unless otherwise specified, obtain written permission from the Department Representative before cutting, drilling or bushing any framing sleeve.

1.16 EXISTING UTILITY

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

**PART 2 - PRODUCTS**

- 2.1 NO OBJECT
- .1 Not applicable.

**PART 3 - IMPLEMENTATION**

- 3.1 NO OBJECT
- .1 Not applicable.

**END OF THE SECTION**

**PART 1 - GENERAL**

**1.1 SCOPE OF WORK**

- .1 Clean up and dispose of in accordance with local ordinances and pollution control laws.
- .2 Do not bury debris and waste on the job site.
- .3 Place volatile waste in appropriate covered containers and remove from site daily.
- .4 Prevent the accumulation of waste that can be a source of accidents or fires.

**1.2 CLEANLINESS OF THE SITE**

- .1 Keep the job site clean and free of any accumulation of debris and waste materials, including those generated by the Departmental Representative or other contractors.
- .2 Evacuate debris and waste materials from the job site daily at predetermined times or dispose of them as directed by the Departmental Representative. Waste materials shall not be burned on the job site unless such disposal is authorized by the Departmental Representative.
- .3 Keep building access roads free of ice and snow. Pile snow in designated areas only.
- .4 Proceed in compliance and obtain permits from the appropriate authorities for the disposal of debris and waste materials.
- .5 Provide on-site containers for the disposal of debris and waste materials.
- .6 Waste containers must be covered and locked to prevent vandalism.
- .7 Provide and use separate, identified containers for recycling.
- .8 Dispose of debris and waste materials at designated disposal areas located in the near area.
- .9 Clean interior surfaces prior to the start of finishing work and keep these areas free of dust and other impurities during the works.
- .10 Store volatile wastes in closed metal containers and dispose of them off site at the end of each work period.

- .11 Ensure proper ventilation of the premises during the use of volatile or toxic substances. However, the use of the building ventilation system for this purpose is prohibited.
- .12 Use only the cleaning products recommended by the manufacturer of the surface to be cleaned, and use them according to the manufacturer's recommendations.
- .13 Schedule cleaning so that dust, debris, and other dirt that are raised do not fall back onto freshly painted wet surfaces and contaminate building systems.

1.3 FINAL CLEANING

- .1 Upon substantial completion of the Works, remove extra materials, tools, construction equipment and materials no longer required for the completion of the Works.
- .2 Before final inspection, remove excess materials, tools, equipment and construction materials.
- .3 Remove debris and waste materials, including those generated by the Departmental Representative or other contractors.
- .4 Dispose of waste materials off the job site at predetermined times or as requested by the Departmental Representative. Waste materials shall not be burned on the job site unless such disposal is authorized by the Departmental Representative.
- .5 Arrange for and obtain permits from the appropriate authorities for the disposal of debris and waste materials.
- .6 Clean and polish glass, mirrors, hardware, wall tiles, chrome or enamel surfaces, laminate surfaces, stainless steel or porcelain enamel components-, and mechanical and electrical appliances. Replace any broken, scratched or damaged glass.
- .7 Remove dust, stains, marks and scratches from decorative, mechanical and electrical equipment.
- .8 Clean reflectors, diffusers and other lighting surfaces.
- .9 Examine finishes, fixtures and materials to ensure that they meet prescribed requirements for function and construction quality.
- .10 Sweeps and cleans sidewalks, steps and other outdoor surfaces; sweeps or rakes the rest of the grounds.
- .11 Remove dirt and other visible elements on the exterior surfaces.

- .12 Clean and sweep roofs, gutters and other roofing elements.
- .13 Sweep and clean hard surfaced.
- .14 Carefully clean materials and equipment, and clean or replace filters on mechanical systems.
- .15 Clean roofs, drains, gutters and vertical runs.
- .16 Remove snow and ice from building access roads.

**PART 2 - PRODUCTS**

- 2.1 NO OBJECT
  - .1 Not applicable.

**PART 3 - IMPLEMENTATION**

- 3.1 NO OBJECT
  - .1 Not applicable.

END OF SECTION 01 74 11

**PART 1 - GENERAL**

**1.1 ADMINISTRATIVE PROCEDURES**

**.1 Pre-completion guarantee meeting**

- .1 One (1) week prior to completion of the work, hold a meeting with the Contractor's representative and the Departmental Representative.  
Project meetings, during which the following will be discussed
  - .1 the requirements of the work;
  - .2 the manufacturer's instructions for installation and the terms of the manufacturer's guarantee.
- .2 The Departmental Representative will establish the communication procedure to be followed in the cases indicated below.
  - .1 Defect notices for items, materials or systems covered by a guarantee.
  - .2 Prioritization of defect types.
  - .3 Determining a reasonable response time.
- .3 Provide the name, address and telephone number of the company responsible for performing the guarantee repair/troubleshooting.
- .4 Ensure that the company's offices are located within the local service area of the warranted item and that contact persons are available at all times and able to respond to inquiries regarding guarantee repairs/troubleshooting.

**1.2 DOCUMENTS/SAMPLES TO BE SUBMITTED FOR APPROVAL/INFORMATION**

- .1 Submit required documents and samples in accordance with Section 01 33 00 -Submittal procedures.
- .2 Two (2) weeks prior to Substantial Completion, submit to the Departmental Representative the French language Operations and Maintenance Manuals in electronic format.
- .3 Replacement materials and equipment, special tools and spare parts provided shall be of the same quality as the products used in the performance of the work.
- .4 Upon request, provide documentation confirming the type, source of supply and quality of products provided.

**1.3 PRESENTATION**

- .1 A digital copy of the documents is acceptable.

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- .2 Present the documents as a .zip file with a table of contents and tree diagram to make it easy to find the files.
  - .3 On the cover page in the nomenclature of each file and each document must be indicated the document designation, i.e. project file (typed or printed) the project designation as well as the table of contents.
  - .4 Organize the content by specification section numbers and the order in which they appear in the table of contents.
  - .5 The text should be the printed data provided by the manufacturer.
  - .6 Provide applicable CAD dwg files.

1.4 CONTENT OF THE PROJECT FILE

- .1 Table of contents of each volume: indicate the project designation;
  - .1 the date of the documents submittal;
  - .2 the name, address and telephone number of the Contractor and the names of their representatives;
  - .3 a list of products and systems, indexed by the contents of the volume.
- .2 For each product or system, indicate the following:
  - .1 the name, address and telephone number of subcontractors -and suppliers, as well as local distributors of materials and spare parts
- .3 Data sheets: mark each sheet to clearly identify specific products, parts and installation information; delete all irrelevant information.
- .4 Drawings: Drawings are used to complete the data sheets and to illustrate the relationship between the different elements of the equipment and systems; they include control and principle diagrams.
- .5 Text to complete the data sheets.
  - .1 Give instructions in a logical sequence for each procedure and incorporate the manufacturer's instructions.

1.5 DOCUMENTS AND SAMPLES TO BE INCLUDED IN THE PROJECT FILE

- .1 In addition to the documents listed in the General Conditions, keep a copy or set of the following documents on the job site:
  - .1 contractual drawings;
  - .2 spec document;

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- .3 addendum;
  - .4 Change orders and other contract amendments;
  - .5 revised shop drawings, technical data sheets and samples;
  - .6 records of tests performed on site;
  - .7 inspection certificates;
  - .8 certificates issued by the manufacturers.
  - .2 The Contractor shall establish a system for sharing and exchange of all the above documents, accessible by all subcontractors.
  - .3 Store project file documents and samples in the field office separate from the work documents.
    - .1 Provide filing cabinets and/or shelves and a secure storage area.
  - .4 Label documents and store them in accordance with the list of section numbers in the table of contents of the specifications document.
    - .1 Clearly print the project identifier on the label of each document.
  - .5 Keep project file documents clean, dry and readable.
    - .1 Do not use them as site documents.
  - .6 The Departmental Representative shall have access to documents and samples in the project file for inspection purposes.
- 1.6 RECORDING OF DATA IN THE PROJECT FILE
- .1 Record the information on a printed set of drawings available at the job site.
  - .2 Record information using felt tip markers with a different color for each major system.
  - .3 Record information as the work progresses.
    - .1 Do not conceal the works until the required information has been recorded.
  - .4 Contract and Shop Drawings: Update each item of data to show the work as it is, including the following.
    - .1 On-site modifications regarding to the dimensions and details of the work.
    - .2 Changes made as a result of change orders.
    - .3 Details not included in the original contract documents.
    - .4 References to shop drawings and related modifications.
  - .5 Specifications document : Update each item of data to describe the work as it is, including the following.

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- .1 The manufacturer's name, trademark and catalog number of each product actually installed, and in particular of optional and replacement items.
  - .2 Changes related to addendums or change orders.
  - .6 If applicable, provide digital photos for inclusion in the project file.
- 1.7 MATERIALS AND SYSTEMS
- .1 Consider only the items that apply to this project.
  - .2 For each piece of equipment and for each system, give a description of the assembly and its component parts.
    - .1 Indicate its function, normal operating characteristics and constraints.
    - .2 Indicate the characteristic graph, with technical data and test results; also give the complete list and commercial number of the parts that can be replaced.
  - .3 Provide lists of power circuits (distribution panels), including electrical characteristics, control circuits and telecommunications circuits.
  - .4 Provide color-coded wiring diagrams of installed equipment.
  - .5 Operating Procedures: Provide instructions and sequences for start-up, run-in and normal operation, as well as the following instructions:
    - .1 instructions for regulation, control, shutdown, decommissioning and emergency operation;
    - .2 instructions for summer and winter operation and any other special instructions.
  - .6 Maintenance: provide instructions for routine maintenance and troubleshooting as well as instructions for disassembly, repair and reassembly, alignment, adjustment, balancing and checking of components and systems.
  - .7 Provide maintenance and lubrication schedules and a list of required lubricants.
  - .8 Provide manufacturer's written instructions for operation and maintenance of components.
  - .9 Provide descriptions of the sequence of operations prepared by the various manufacturers of equipment and control/regulation devices.
  - .10 Provide the original manufacturer's parts list and the necessary illustrations, drawings and assembly diagrams for servicing.
  - .11 Provide control diagrams of installed control/regulation devices prepared by the various manufacturers.

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- .12 Provide Contractor's coordination drawings and color coded diagrams of installed piping.
  - .13 Provide a list of valve tag numbers, indicating the location and function of each device, and reference to control and schematic diagrams.
  - .14 Provide a list of original manufacturer's replacement parts and equipment with current prices and recommended quantities to be kept in stock.
  - .15 Provide test and balance reports.
  - .16 Additional requirements: as specified in the various technical sections of the specifications document.
- 1.8 MATERIALS AND FINISHING PRODUCTS
- .1 Building materials, finishes and other products to be applied: provide data sheets and indicate catalog number, dimensions, composition, and color and texture designations of products and materials.
    - .1 For supply purposes, provide the necessary information regarding special products.
  - .2 Provide instructions for cleaning agents and methods, recommended cleaning and maintenance schedules, and precautions against damaging methods and harmful products.
  - .3 Waterproofing and weathered products: Provide manufacturer's recommendations for cleaning agents and methods, recommended cleaning and maintenance schedules, and precautions against damaging methods and harmful products.
  - .4 Additional requirements: as specified in the various technical sections of the specifications document.
- 1.9 MATERIALS/MAINTENANCE MATERIALS
- .1 Spare parts
    - .1 Provide spare parts in the quantities specified in the various technical sections of the specifications document, if applicable.
    - .2 Replacement parts supplied shall be from the same manufacturer and of the same quality as the items incorporated in the construction works.
    - .3 Deliver and store spare parts at the specified location.
    - .4 Receive and list all parts.
      - .1 Submit the inventory list to the Departmental Representative.
      - .2 Insert the approved list in the maintenance manual.
    - .5 Keep a receipt for all parts delivered and submit it before final payment.

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- .2 Materials/replacement materials
    - .1 Provide replacement materials and equipment in the quantities indicated in the various technical sections of the specifications document, if applicable.
    - .2 Replacement materials and equipments shall be from the same manufacturer and of the same quality as the materials and equipment incorporated in the work.
    - .3 Deliver and store replacement materials/materials at the specified location.
    - .4 Receive and list replacement materials and equipment.
      - .1 Submit the inventory list to the Departmental Representative.
      - .2 Insert the approved list in the maintenance manual.
    - .5 Retain a receipt for all materials and equipment delivered and submit it prior to final payment.
  - .3 Special tools
    - .1 Provide special tools according to the quantities prescribed in the various technical sections of the specifications document, if applicable.
    - .2 Tools must be labeled with their function and the materials for which they are intended.
    - .3 Deliver and store special tools at the designated location.
    - .4 Receive and list special tools.
      - .1 Submit the inventory list to the Departmental Representative.
      - .2 Insert the approved list in the maintenance manual.
  - 1.10 TRANSPORTATION, STORAGE AND HANDLING
    - .1 Store spare parts, replacement materials and equipment, and special tools in a manner that prevents damage or deterioration.
    - .2 Store spare parts, replacement materials and equipment, and special tools in their original, undamaged packaging with the manufacturer's seal and label intact.
    - .3 Store items subject to weather damage in weatherproof enclosures.
    - .4 Store paint and products that may freeze in a heated and ventilated area.
    - .5 Evacuate damaged or deteriorated items or products, replace them with new ones at no additional cost, and submit to the Departmental Representative, for review.
  - 1.11 GUARANTEES
    - .1 Develop a guarantee management plan that includes all guarantee information.

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- .2 Two weeks prior to the pre-completion assurance meeting, submit the management plan to the Departmental Representative for approval.
  - .3 The guarantee management plan shall outline the actions and documentation that will ensure that the Departmental Representative is able to benefit from the guarantees included in the contract.
  - .4 The plan should be presented in narrative form and contain sufficient detail to be subsequently used and understood by maintenance and repair personnel.
  - .5 Submit to the Departmental Representative, for approval prior to the submission of each monthly payment estimate, information regarding the guarantees obtained during the construction phase.
  - .6 Record all information in a binder to be submitted for acceptance of the works. Comply with the following requirements.
    - .1 Separate each guarantee with tabbed sheets marked according to the table of contents.
    - .2 Develop a list of subcontractors, suppliers, and manufacturers, including the name, address, and telephone number of the designated representative for each.
    - .3 Obtain signed guarantees from subcontractors, suppliers and manufacturers within ten (10) days of completion of the applicable works.
    - .4 Ensure that the documents provided are in proper form, contain all required information and are notarized.
    - .5 Outline documents to be submitted when necessary.
    - .6 Retain guarantees until the time prescribed for their release.
  - .7 Except for items commissioned with the Departmental Representative approval, do not change the effective date of the guarantee until the date of substantial completion of the works has been determined.
  - .8 Nine (9) months after the date of acceptance of the work, conduct a guarantee inspection with the Departmental Representative
  - .9 The guarantee management plan must include or indicate the following.
    - .1 Roles and responsibilities of individuals associated with the various guarantees, including points of contact and telephone numbers of representatives within the Contractor's organizations, subcontractors, manufacturers, or suppliers involved in the work.
    - .2 The list and status of guarantee certificates for items subject to extended guarantees.

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- .3 A list of all equipment, components, systems or work packages covered by a guarantee, with the following information for each.
    - .1 The name of the item, material, system or batch.
    - .2 Model and serial numbers.
    - .3 Location.
    - .4 Names and phone numbers of manufacturers and suppliers.
    - .5 The name, address and telephone number of distributors of replacement parts and materials/materials.
    - .6 Guarantees and their terms, including a one (1) year general construction guarantee. The elements, materials or systems covered by an extended guarantee and the expiration date of each shall be indicated.
    - .7 Cross-references to guarantee certificates, where applicable.
    - .8 The effective date and expiration date of the guarantee.
    - .9 A summary of maintenance activities to be performed to ensure continued guarantee coverage.
    - .10 References to relevant operation and maintenance manuals.
    - .11 The name and telephone number of the organization and persons to call for guarantee service.
    - .12 Typical response and repair/breakdown times for the various warranted items.
  - .4 The Contractor's expression of intent to be present at the inspection scheduled nine (9) months after completion of the works.
  - .5 The procedure for labeling items, equipment and systems covered by an extended guarantee, and its status.
  - .6 Printed copies of operating and maintenance instructions installed near designated pieces of equipment whose operating characteristics are important for guarantee or safety reasons.
  - .10 Promptly respond to any verbal or written request for troubleshooting/repair work required under a guarantee.
  - .11 All verbal instructions must be followed by written instructions.
    - .1 The Departmental Representative may bring an action against the Contractor if the Contractor fails to comply with its obligations.

**PART 2 - PRODUCTS**

- 2.1 NO OBJECT
  - .1 Not applicable.

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**PART 3 - IMPLEMENTATION**

- 3.1 NO OBJECT
  - .1 Not applicable.

END OF THE SECTION

**PART 1 - GENERAL**

**1.1 REFERENCES**

- .1CSA S350, Code of Practice for Safety in Demolition of Structures

**1.2 CONDITION OF THE WORKS TO BE DEMOLISHED**

- .1 Undertake the demolition works in the current condition the day of the contract signature. The Departmental Representative shall be responsible for clearing the premises and areas where the work is to be performed of all furniture and other relevant items. In principle, and unless otherwise indicated on the demolition drawings concerning the items to be stored and reinstalled, any items remaining in the affected premises shall be cleared from the site.

**1.3 PROTECTIVE MEASURES**

- .1 Take all necessary precautions to prevent displacement or settlement of adjacent structures, services, traffic areas, soils and building parts. Provide and install necessary reinforcement and temporary support if needed.
- .2 If it appears that the work may constitute a danger to the building to be preserved or to adjacent structures and services, stop the work and notify the Departmental Representative.
- .3 Ensure that demolition does not obstruct drainage, electrical and mechanical systems which must remain in working order.

**PART 2 - PRODUCTS**

- 2.1 (Not applicable)

### **PART 3 - IMPLEMENTATION**

#### **3.1 WORKS**

1. Unless otherwise specified, clear the site of demolition debris in accordance with the requirements of the authorities having jurisdiction.
2. Carefully remove the following materials, store them in a well-protected area, and then have them reinstalled by qualified workers when the modification or repair work is completed (this list is not exhaustive):
  1. Mechanical equipment, as indicated in the engineer documents.
  2. Snow accumulation rods (basket indicators) that are attached to the drain strainers.
  3. Any other requested elements to be retained and reinstalled on the architectural plan.
3. Demolish all existing structures shown on the drawings.
  1. Demolish the existing roof composition as indicated on the architectural drawings.
  2. Existing metal flashings and fasteners.
  3. Perform bypass inspection as recommended by the AMCQ.
  4. Ensure that the decking is free of dust, any type of debris and traces of glue resulting from the demolition of the existing support panels.
  5. Ensure that no corrosion is present on the existing deck before installing any materials on the roof. If necessary, remove any rust from the surface with a steel brush and prime the deck with a primer that meets CSA S16.

#### **3.2 SECURITY CODE**

- .1 Execute demolition works in accordance with the requirements of the "Safety Code for Construction Work" published by the Government of Quebec and the ACNOR S350 standard.

#### **3.3 PREPARATORY WORK**

- .1 Follow directions in Divisions 23 and 26 for existing electromechanical systems to be interrupted or removed. Post warning signs on electrical equipment and conduits that are to remain energized during the work.

#### **3.4 DEMOLITION**

- .1 Demolish existing roof areas to allow the construction works as indicated on the drawings.
- .2 Follow the implementation requirements specified in Section 1.3.
- .3 Remove materials, service facilities and other equipment that interfere with the construction works and replace them as work progresses.
- .4 At the end of each work day, ensure that no structure can collapse or sag. Protect the interior and exterior portions of buildings that remain from the effects of demolition.
- .5 Demolish in a manner to minimize dust and keep dusty materials wet.
- .6 Dismantle structures to be demolished in small sections and carefully lower to the ground.
- .7 No demolition materials shall be sold or burned.
- .8 Environmental Protection
  - .1 Collect and free the site from every contaminated or hazardous materials as defined by the appropriate environmental protection authorities, taking all necessary safety precautions .
- .9 Transport demolition debris off the site and comply with environmental regulations for disposal and accumulation of debris.

### 3.5 ADDITIONAL PROTECTION AGAINST DUST

- .1 All drilling or cutting operations which may generate a large amount of dust shall be performed with tools equipped with a built-in vacuum system.
- .2 Minimize the spread of dust in occupied spaces.

### 3.6 REPAIR OF DAMAGE

- .1 Assume the cost and perform any repairs or replacements caused by excessive demolition or improper handling and storage of materials for reinstallation. Repair damage to existing buildings and facilities to remain. Repairs shall conform in any way to existing elements, materials and finishes, all to the approval of the Departmental Representative.
- .3 Assume the cost and perform any repairs or replacements required due to water infiltration into the building and adjacent areas caused by the re-roofing work.

- .2 Assume responsibility for injuries that may result from demolition work.

### 3.7 READY-FOR-WORKS SITE

- .1 Upon completion of demolition, elements, building parts and surfaces shall be delivered ready for the construction works.

END OF SECTION 02 41 13

**PART 1 - GENERAL**

**1.1 SEPARATE PRICES**

- .1 Provide a separate price (amount in excess of the base bid) to replace the extruded polystyrene panels with a thermal resistance of R30 with thicker panels offering a value of R41. Surface area to be insulated is  $\pm 360\text{m}^2$ .

**1.2 RELATED REQUIREMENTS**

- .1 Section 07 62 00 Flashing and sheet metal accessories.
- .2 All sections of Division 01 apply to this section.

**1.3 REFERENCES**

- .1 ASTM International Inc.
  - .1 ASTM C726-12, Standard Specification for Mineral Fiber Roof Insulation Board.
  - .2 ASTM C728-05, Standard Specification for Perlite Thermal Insulation Board.
  - .3 ASTM C1177/C1177M-08, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
  - .4 ASTM C1396/C1396M-13, Standard Specification for Gypsum Board.
  - .5 ASTM D41/D41M-11, Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing.
  - .6 ASTM D312-00(2006), Standard Specification for Asphalt Used in Roofing.
  - .7 ASTM D448-12, Standard Classification for Sizes of Aggregate for Road and Bridge Construction.
  - .8 ASTM D2178-04, Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing.
  - .9 ASTM D6162-00a (2008), Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fibre Reinforcements.

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- .10 ASTM D6163-00 (2008), Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fibre Reinforcements.
  - .11 ASTM D6164/D6164M-11, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements.
  - .12 ASTM D6222/D6222M-11, Standard Specification for Atactic Polypropylene (APP) Modified Bituminous Sheet Materials Using Polyester Reinforcement.
  - .13 ASTM D6223/D6223M-02(2009)e1, Standard Specification for Atactic Polypropylene (APP) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcement.
  - .14 ASTM D6509/D6509M-09, Standard Specification for Atactic Polypropylene (APP) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcement.
  - .2 Canadian General Standards Board (CGSB)
    - .1 NOTES TO EDITOR: CAN/CGSB 37.5, CGSB 37 GP 15M, CGSB 37 GP 19M and CAN/CGSB 37.29 were withdrawn in January 2005.
    - .2 CGSB 37GP9Ma83-, Unfilled Asphalt for Roofing Base Course and Moisture and Waterproofing
    - .3 CGSB 37GP56M80b-(A1985), Modified bituminous membrane, prefabricated and reinforced, for roofing.
  - .3 CAN/CGSB51-.33M89-, Vapour Barrier -Sheets, Except Polyethylene, for Buildings.
  - .4 Canadian Roofing Contractors Association (CRCA)
    - .1 Quotes, CACS Covers, 2011.
  - .5 Quebec Master Roofers Association
    - .1 Quote, AMCQ coverage
  - .6 Canadian Standards Association (CSA)/CSA International
    - .1 CSA A123.21-10, Standard Test Method for the Dynamic Wind Push-Off Strength of Mechanically Attached Membrane Roofing Systems

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- .2 CSA A123.-305 (R2010), Asphalt Saturated Organic Roofing Felt.
  - .3 CAN/CSA A123.4-04 (R2008), Bitumen for Waterproofing of Built-Up Roofing Systems.
  - .4 CSA A231.-106/CSA A231.-206 (R2010), Precast Concrete Paving Slabs/Precast Concrete Pavers.
  - .5 CSA O121-08, Douglas Fir Plywood.
  - .6 CSA O151-09, -Canadian Softwood -Plywood.
  - .7 Factory Mutual (FM Global)
    - .1 FM Approvals - Roofing Products.
  - .8 Health Canada - Workplace Hazardous Materials Information System (WHMIS)
    - .1 Material Safety Data Sheets (MSDS).
  - .9 Underwriters' Laboratories of Canada (ULC) CAN/ULC-S701-[05], Standard for Polystyrene Thermal Insulation, Boards and Pipe Coverings.
    - .1 CAN/ULCS702.-210, Standard for Mineral Fiber Thermal Insulation for Buildings.
    - .2 CAN/ULCS70411-, Standard for Polyurethane and Polyisocyanurate -Thermal Insulation: Faced Boards.
    - .3 CAN/ULC-S706-09, Standard for Wood Fibre Insulation Board for Buildings.
  - .10 Notwithstanding the fact that a specific year or edition is indicated for the references above, it is the responsibility of the subcontractor in this section to comply with the most current standards applicable at the time of bid submission.

#### 1.4 ADMINISTRATIVE PROCEDURES

- .1 One (1) week prior to the start of the work, hold a meeting with the Roofing Contractor's Representative and Departmental Representative to discussed about:
  - .1 the requirements for the work;
  - .2 the condition of the work and the roofing substrate;

- .3 coordination of the work of this section with the other trades;
- .4 the installation instructions provided by the manufacturer and the terms of the warranty.

1.5 DOCUMENTS/SAMPLES TO BE SUBMITTED FOR APPROVAL/INFORMATION

- .1 Submit required documents and samples in accordance with Section 01 33 00 -Documents and Samples to be Submitted.
- .2 Submit two (2) copies of the most current roofing material specification sheets specifying product characteristics, performance criteria, dimensions, limitations and finish.
- .3 Submit two (2) copies of the Material Safety Data Sheets (MSDS) required under WHMIS, as per Section 01 35 29.06 - Health and Safety. The MSDS must indicate the VOC content of the following products:
  - .1 primary;
  - .2 bituminous;
  - .3 sealants;
  - .4 filtering membrane.
- .4 Samples: Submit two (2) 2.2 kilograms containers of roofing aggregate and two (2) pieces of XPS insulation, each 12" (304.8 mm) length.
- .5 Manufacturer's Certificate: Submit a certificate stating that the products meet or exceed the prescribed requirements.
- .6 Test Reports and Evaluation Reports: Submit test reports from the laboratory certifying that the bitumen and membrane comply with the requirements of this section.
- .7 Manufacturer's installation instructions: indicate any special precautions for bonding the membrane sheets junctions.
- .8 Manufacturer's on-site inspection reports.
- .9 The reports shall indicate the installation methods, the ambient temperature and the wind speed during installation.

1.6 QUALITY ASSURANCE

- .1 The Contractor shall have a minimum of 5 years experience in the realization of roofs of the same type (modified bitumen system, protected membrane roof, commercial roof), this means that the foreman and at least one worker of the team shall have this minimum 5 years experience.
- .2 The Contractor shall demonstrate that no claims have been made for improper performance of roofing work.
- .3 The contractor shall provide references for at least two (2) similar projects (type of waterproofing system, area, etc.) completed within the last 5 years.
- .4 The Roofing Contractor and his subcontractors shall be certified by the membrane manufacturer.

1.7 FIRE PROTECTION

- .1 Portable fire extinguishers
  - .1 Portable fire extinguisher or permanent pressure fire extinguishers, refillable, equipped with a hose and a nozzle with a stopcock.
  - .2 ULC approved fire extinguishers for class A, B and C fires.
  - .3 One (1) fire extinguisher, 4.5 kg size or as indicated per torch user, on the roof, located within 6 m of the roof.
- .2 Ensures the presence of a fire safety officer for a period of one (1) hour after the end of the work day.

1.8 TRANSPORTATION, STORAGE AND HANDLING

- .1 Transport, store and handle materials and equipment in accordance with the manufacturer's written instructions and Section 01 61 00 -Common Product Requirements.
- .2 Safety: Comply with the safety requirements of the Workplace Hazardous Materials Information System (WHMIS) for the use, handling, storage and disposal of bitumen, sealants and caulking.
- .3 Store materials in a dry, weatherproof location and in such a way that they do not come into contact with the ground.

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- .4 Felt and membrane rolls should be stored vertically; in the case of membranes, the overlap edge should be at the top.
  - .5 Remove only the amount of material that will be used that day from the storage area.
  - .6 Make plywood walkways -over the completed work to allow for the passage of people and materials.
  - .7 Store sealants at or above 5 degrees Celsius.
  - .8 Protect the insulation materials from daylight and weather and from any harmful substances.
  - .1 Collect and sort waste plastic, paper packaging and corrugated cardboard in accordance with the waste management plan.
  - .2 Fold the metal strips, flatten them and place them in a designated area for recycling.

#### 1.9 WASTE MANAGEMENT AND DISPOSAL

- .1 Sort waste for reuse and recycling.
- .2 Remove all packaging materials from the job site and dispose of them at appropriate recycling facilities.
- .3 Place all paper, plastic, polystyrene, corrugated cardboard packaging materials in appropriate dumpsters set up on site for recycling.
- .4 Sort steel, metal, plastic waste for reuse/recycling and place in designated containers.
- .5 Place substances that meet the definition of hazardous or toxic materials in designated containers.
- .6 Handle and dispose of hazardous materials in accordance with regional and municipal regulations.
- .7 Clearly identify the location of storage areas for recovered materials and equipment. Protect these areas with barriers and safety devices.
- .8 Ensure that empty containers are sealed and stored securely.
- .9 Carry metal components, unused aggregates and gypsum materials to a recycling facility.

- .10 Carry unused paint, adhesives, sealants, bituminous products and coatings to an approved hazardous materials collection center.
- .11 No unused paint, sealant or asphalt products shall be discharged into a sewer, watercourse, lake, land or any other place where it may pose a health or environmental hazard.

#### 1.10 CONDITIONS OF IMPLEMENTATION

- .1 The roofing work shall be done, unless otherwise specified, according to the requirements and recommendations of the AMCQ.
- .2 At all times, follow the manufacturer's recommendations.
- .3 Do not proceed with the application of roofing materials when the temperature is below -18 degrees Celsius in the case of a membrane bonded by torch welding. Solvent-based adhesive should be applied at or above -5 degrees Celsius.
- .4 The roofing substrate must be dry, free of snow and ice. Use only dry materials and apply only when weather conditions will not allow moisture to enter the roofing system.

#### 1.11 EXTENDED WARRANTY

- .1 Regarding the works of the current section (07 52 00), the 12-month warranty period is extended to 60 months.

### **PART 2 - PRODUCTS**

#### 2.1 PERFORMANCE CRITERIA

- .1 It is essential that the various materials in the roofing system be compatible with each other. Provide the Departmental Representative with a written statement certifying that the materials and components of the roofing system, including sealants, as installed, are compatible.
- .2 Roofing system: complies with CSA A123.21 standard for dynamic wind uplift resistance.

#### 2.2 PRIMER

- .1 Primer based on bitumen, volatile solvents and adhesion promoter additives.
- .2 Conforms to ASTM D41

- .3 Density at 25°C : 0,94 kg/L
- .4 Consumption of 0,15L to 0,25L/m<sup>2</sup>
- .5 Solid content: 60%

## 2.3 WATERPROOFING SUPPORT PANELS

- .1 Lightweight concrete panels (for vertical surfaces only)
  - .1 Description: Lightweight concrete panel, 13mm thick, consisting of Portland cement, polymers and lightweight aggregates wrapped in a mesh. Non-combustible panels glued with adhesive.
- .2 Plywood
  - .1 For the first 610mm at the perimeter of openings and under mechanical equipment: Plywood conforming to CSA O121 or CSA O151 standard, exterior grade, 13mm thick, glued with adhesive to steel decking.

## 2.4 MEMBRANES

- .1 HORIZONTAL AND VERTICAL SURFACES UNDERLAYMENT MEMBRANE
  - .1 Description: 3mm thick membrane composed of SBS modified bitumen and non-woven polyester reinforcement.
  - .2 Surface/underface: Heat sealable plastic film / Heat sealable plastic film
  - .3 Weight: 3.6 kg/m<sup>2</sup> (0.7 lb/ft<sup>2</sup>)
  - .4 Ultimate elongation (after thermal conditioning) : 45%
  - .5 Dimensional stability, max L/T: ±0.5/±0.1
  - .6 Low temperature flexibility, max L/T: -18/-18 °C (0/0 °F)
  - .7 Complies to: CSA A123.23-15, Type B, Class 3
  - .8 Complies to standards: CGSB 37.56-M (9th draft)
  - .9 Conforms to the standard: ASTM D6164
- .2 MEMBRANES OF PARAPETS, MECHANICAL BASES AND OTHER LOW WALLS

.1 Description: 4mm thick granulated finishing membrane, composed of SBS modified bitumen and non-woven polyester reinforcement.

.2 Surface/underface:

.1 Granules / Thermofused plastic film

.2 Color of the surface of the granules: gray, as existing

.3 Complies with CSA A123.23-15, Type B, Class 1.

**.3 REINFORCING MEMBRANES AT HORIZONTAL/VERTICAL TRANSITIONS**

.1 Same specification as underlayment membrane in paragraph 1.

.2 Description: 180g/m<sup>2</sup> minimum non-woven polyester reinforcement membrane as prescribed by the manufacturer and as recommended by the AMCQ.

**.4 FLEXIBLE FLASHINGS**

.1 Description: Monolithic expansion joint that provides a complete seal at expansion joints and accommodates simultaneous movement in all three axes (horizontal, vertical and shear).

**.5 FLAME-BARRIER MEMBRANE**

.1 The membrane will be required at all locations where a risk of flame spread is present, primarily (but not exclusively) at the junction between existing parapets and walls and new membrane supports. See notes on architectural drawings details.

.2 Description: Perforated felt composed of flexible and robust reinforcement and organic fibers impregnated with asphalt unrolled in a bed of hot bitumen spread with a mop.

.3 Conform to ASTM D146.

**2.5 INSULATORS**

.1 Extruded polystyrene insulation

.1 Description: high density extruded polystyrene thermal insulation panels

with straight edges. They are composed of closed cell foam.

- .2 Total thermal resistance value of insulation shall be RSI 5.25 (R30): Install two (2) rows of insulation, thickness as required, with overlapped joints.
- .3 Compressive strength of 40psi
- .4 Complies with CAN/ULC-S701-1 type 4.

## 2.6 BATT INSULATION

- .1 Description: Rock fiber wool batt insulation.
- .2 Complies with CAN/ULC-S702 standard
- .3 Only if there is deteriorated material following demolition.

## 2.7 GEOTEXTILE MEMBRANE

- .1 Description: Filtering layer composed of a non-woven fabric of continuous and uniformly distributed synthetic polypropylene and polyester fibers
- .2 Thickness: 1mm
- .3 Permeability: 1.4 mm/sec (55 mil/sec)
- .4 Meets ASTM D5291, D5199
- .5 Complies with CAN/CGSB-148.1 (#7.3, 4, 10), 4.2 (#12.2, 11.1)

## 2.8 DRAINAGE PANEL

- .1 Description: 10mm high density drainage panel with a polyethylene core.
- .2 Drainage rate of 196L/min/m.lin
- .3 Compressive strength: 525 kPa (11,000 psi)
- .4 Meets ASTM D1621, 4716, 4751, 4491, 4632, 6241.

## 2.9 BALLAST

- .1 Description: 40-20 mm gravel without sharp edges. Particles must be solid, clean, non-friable and compliant to the CSA A23.2-9A durability standard. Resistance to disintegration by a magnesium sulfate solution shall be passed with a maximum

allowable loss of 20%.

- .2 The particle size analysis shall be performed in accordance with LC-21-040 and meet the limits of a 40-20 mm, Group 2 aggregate.

- .1 100% passing the 56 mm sieve
- .2 90 to 100% passing the 40 mm sieve
- .3 25 to 60% passing the 28 mm sieve
- .4 0 to 15 % passing the 20 mm sieve
- .5 0 to 5% passing the 10 mm sieve
- .6 1,5 % max passing the 0,08 mm sieve
- .7 The certificate of conformity, if requested, must be less than three (3) months old

- .3 Install the gravel according to the following specifications and installation patterns shown on the architectural plan:

- .1 General surface: 73 kg/m<sup>2</sup>
- .2 1220mm aisle at the perimeter of each basin and penetration: 156 kg/m<sup>2</sup>

#### 2.10 ADHESIVE

- .1 All roofing watertight elements must be glued to the deck. No mechanical fasteners should be used.
- .2 Description: Two component, low expansion polyurethane adhesive for bonding lightweight concrete or plywood backer boards to decking.
- .3 Complies with ASTM D 2556.
- .4 Apply adhesive to the convex grooves of the steel deck according to the manufacturer's recommendations. Make sure that the perforations of the acoustic deck remain free of all traces of adhesive.

2.11 SEALING PRODUCTS

- .1 Plastic mastic: black mastic based on SBS modified bitumen, fibers, mineral materials and solvent, conforming to CAN/CGSB37-.5 standard.
- .2 Complies with CAN/CGSB-37.5-M89 and ASTM D4586.

2.12 ROOF DRAINS

- .1 Drainage in accordance with AINSI A112.21.2 - Roof drains
- .2 Copper drain designed for inverted roof system.
- .3 Reference product: Refer to the mechanical engineer's documents for specifications.

2.13 SKYLIGHT SEALER

- .1 High performance silicone sealant compatible with acrylic and aluminum.
- .2 Meets ASTM C-920, Type-S, NS, Class 35 Use G standard
- .3 Minimum 25 year warranty.
- .4 Finish matching the substrate.

**PART 3 - EXECUTION**

3.1 QUALITY OF WORKMANSHIP

- .1 Examine the substrate, perform the preparatory work and install the roofing in accordance with the roofing manufacturer's specifications and the AMCQ roofing specifications, especially with respect to fire safety.

3.2 EXAMINATION AND PREPARATION OF SURFACES

- .1 Surface examination and preparation shall be in accordance with the instructions contained in the membrane manufacturer's technical documentation.
- .2 Prior to the beginning of work, the Departmental Representative and the roofing foreman will be responsible for inspecting and approving, among other things, the condition of the substrate (where applicable, slopes and backing), as well as the parapet vertical runs, roof drains, plumbing vents, ventilation outlets, etc., and the

construction joints. Where applicable, a notice of non-conformance will be issued to the contractor for correction. Beginning of the work will be interpreted as an acceptance of the site conditions.

- .3 Do not begin any part of the work until the surfaces are clean, smooth, dry and free of ice, snow and waste materials. The use of salts and calcium to remove ice or snow is prohibited.
- .4 Ensure that plumbing, carpentry and other work has been properly completed.
- .5 Do not install materials in rainy or snowy weather.

### 3.3 MODE OF EXECUTION

- .1 The roofing work should be done in a continuous manner as the surfaces are ready and the weather conditions acceptable.
- .2 Seal all joints of underlayments that are not covered with a finishing membrane the same day. Under no circumstances any moisture must be trapped in the joints prior to the installation of a second membrane.
- .3 Maintain roof waterproofing at all times, including during the performance of work by other trades and as work is performed (including drains and vents).

### 3.4 SITE PROTECTION

- .1 When transporting materials on roofs and performing roofing work, protect exposed surfaces of finished work to prevent damage. Make rigid panel walkways on roofs over placed materials to allow movement of workers and materials back and forth. Take full responsibility for any damage.

### 3.5 APPLICATION OF THE PRIMER

- .1 Wood, metal, concrete, masonry or gypsum sealant surfaces will be primed according to the manufacturer's recommendations (no primer is required on prepainted metals). All application surfaces shall be free of rust, dust and residues that may interfere with adhesion. The primed surface must be covered with the membrane as soon as possible (same day in the case of self-adhesive membranes).

### 3.6 INSTALLATION OF THE FLAME RETARDANT MEMBRANE

Note: Ensure that substrates, structures and associated building components do not present a fire hazard when using the torch. Do not weld over old wood or where chimney or draft

effects could push the flame into combustible materials that may be concealed. If necessary, consult the membrane manufacturer for alternative work methods.

- .1 Bond the membrane directly to an approved surface by removing the silicone film.

### 3.7 UNDERLAYMENT THERMOFUSED MEMBRANE INSTALLATION ON GENERAL ROOFING

- .1 Dry roll the underlayment onto the substrate, making sure to align the edge of the first border with the center of the drain (parallel to the edge of the roof).
- .2 At cross laps, cut the corner of the area to be covered by the next roll of membrane at an angle.
- .3 Weld the underlayment membrane with a torch to the prepared substrate.
- .4 Each edge shall overlap the previous edge laterally along the line of the edge and overlap 150 mm (6") at the ends. Spacing of cross joints should be at least 300 mm (12").
- .5 Avoid the formation of folds, swellings or bumps.

### 3.8 INSTALLATION OF THE HEAT-WELDED UNDERLAY ON THE UPSTANDS AND PARAPETS

Note: Ensure that substrates, structures and associated building components do not present a fire hazard when using the torch. Do not weld on wood or where chimney or draft effects could direct the flame to combustible materials that may be concealed. If necessary, consult the membrane manufacturer for alternative work methods.

- .1 The primer must be dry when the underlayment is applied.
- .2 At cross laps, cut the corner of the area to be covered by the next roll of membrane at an angle.
- .3 Each edge will overlap the previous one laterally along the line provided for this purpose, and 150 mm (6") at the ends.
- .4 The underlayment will be welded directly to the substrate from the bottom up with a torch.
- .5 Avoid the formation of folds, swellings or bumps.

### 3.9 INSTALLATION OF THE REINFORCEMENT GUSSETS

- .1 Install reinforcing gussets at all interior and exterior corners.

- .2 Install the gussets by heat welding after the installation of the underlayment.

3.10 INSTALLATION OF HEAT-WELDED REINFORCEMENT MEMBRANES

- .1 Install the reinforcing membranes as shown in the typical details in the membrane manufacturer's technical literature.

3.11 INSTALLATION OF THE HEAT-WELDED FINISHING COAT ON THE GENERAL AREA

- .1 From the drain, unroll the waterproofing membrane onto the underlayment, taking care to align the edge of the first strip with the edge of the roof.
- .2 At cross laps, cut the corner of the area to be covered by the next roll of membrane at an angle.
- .3 Each edge shall overlap the previous edge laterally along the line of the edge and overlap 150 mm (6") at the ends. Spacing of cross joints should be at least 300 mm (12").
- .4 Weld the top coat with a torch to the underlayment to create a slight (3 to 6 mm) accumulation of bitumen (1/8" to 1/4").
- .5 Be sure to proceed without overheating the membranes and their reinforcements.
- .6 Avoid the formation of folds, swellings or bumps.
- .7 Avoid passing on finished surfaces; use rigid panels if necessary.

3.12 INSTALLATION OF THE GRANULATED HEAT-WELDABLE FINISHING COAT ON THE UPSTANDS AND PARAPETS

- .1 This finish coat shall be laid in 1 m (3.25 ft) wide sections.
- .2 Each edge shall overlap the previous edge laterally along the line of the edge and shall overlap the running surface by 150 mm (6"). Upstand finish membranes should be offset a minimum of 100 mm (4") from the running surface finish layer to avoid overlayment.
- .3 At cross laps, cut the corner of the area to be covered by the next roll of membrane at an angle.
- .4 With a chalk line, draw a straight line across the running surface, 150 mm (6") from the upstands and parapets.

.5 Using a torch and a trowel with a rounded tip, embed the surface granules into the hot bitumen layer from the chalk line on the running surface to the edge of the upstand or parapet, as well as on the vertical granulated areas to be overlapped.

.6 This top coat will be torch welded directly to the underlayment from the bottom up.

.7 Avoid the formation of folds, swellings or bumps.

.8 Be sure to proceed without overheating the membranes and their reinforcements.

### 3.13 INSTALLATION OF INSULATION

.1 The printed side of the insulation boards must be installed directly on the substrate.

.2 Lay the insulation panels flat on the roof.

.3 Install the additional insulation panels, ensuring that the panel joints are offset

.4 Do not install more insulation than can be covered in one day.

### 3.14 INSTALLATION OF THE DRAINAGE PANEL

.1 Install the drainage panels directly on the insulation.

.2 Place the drainage panels side by side and cut around the edges according to the surface configuration.

### 3.15 INSTALLATION OF THE GEOTEXTILE MEMBRANE

.1 Overlap 300 mm (12") seams on the drainage panel.

### 3.16 BALLAST INSTALLATION

.1 After installing the geotextile membrane, place a dry stone ballast uniformly as soon as possible after the installation of the geotextile membrane.

.2 Place the stone ballast to obtain a uniform thickness over the entire surface.

.3 Spread more stone around the perimeter of the roof to a width of 1220 mm to increase the mass per unit area of the ballast as indicated in paragraph 2.9.

### 3.17 EXECUTION OF THE WATERPROOFING IN VARIOUS DETAILS

.1 Install the waterproofing membranes at the various roof details according to the typical details shown in the manufacturer's technical documentation.

.2 VENT FLASHING

- .1 To seal the sleeve plate to the membrane, prime the aluminum flange on both sides with a primer compatible with the membrane type as recommended by the manufacturer. Mud the plate in a bed of bituminous cement compatible with the waterproofing membrane. Apply a reinforcing strip and extend the finishing membrane to the sleeve. Apply a circular bead of elastomeric caulk around the sleeve over the finished membrane.
- .2 Install the cap according to the manufacturer's recommendations. The cap is caulked with a continuous bead of elastomeric sealant. Before installing the cap, apply the sealant between the inside of the vent pipe and the outside of the cap wall to prevent moist air from the plumbing system from condensing inside the cap and allowing water to get inside the sleeve.

.3 ROOF DRAINS

- .1 Install roof drains according to the manufacturer's best recommendations for the roofing system for which they are intended.
- .2 Plumbing installations shall be made and installed in accordance with the appropriate provincial, territorial or municipal regulations or, in the absence of such regulations, the current Canadian Plumbing Code.
- .3 Install the drain plate on the substrate in an adhesive bed, then mechanically fasten the drain to the substrate.
- .4 Weld a one (1) metre by one (1) metre diagonal reinforcing strip over the underlayment and the primed drain plate. Install the membrane up to the edge of the opening by punching the membrane where the fixations are planned.
- .5 Install the finishing membrane up to the edge of the opening.
- .6 Attach the strainer to the drain.
- .7 Install the stainless steel gravel guard according to the manufacturer's recommendations

3.18 CLEANING

- .1 Remove asphalt marks from finished surfaces.

- .2 Where finished surfaces become stained as a result of the work covered in this section, contact the manufacturer of the affected surface for cleaning advice and follow their documented instructions.
- .3 Repair or replace finished surfaces that have been altered or otherwise damaged as a result of the work covered in this section.
- .4 Remove uncured material with a clean soft cloth. If material is dry, remove excess material with a flat, sharp tool

END OF SECTION 07 52 00

**PART 1 - GENERAL**

1.1 RELATED REQUIREMENTS

- .1 All sections of Division 01 shall apply to this section.
- 1. Section 07 52 00 - Modified Bituminous Membrane Roofing.

1.2 REFERENCES

- .1 The Aluminum Association Inc (AAI)
  - .1 AAI-Aluminum Sheet Metal Work in Building Construction- 2002.
  - .2 AAI DAF4503-, Designation System for Aluminum Finishes.
- .2 American Society for Testing and Materials International (ASTM)
  - .1 ASTM A167- 99(2009), Specification for Stainless and HeatResisting -ChromiumNickel -Steel Plate, Sheet, and Strip.
  - .2 ASTM B3208, Standard Specification for Solder Metal.
  - .3 ASTM D52308, Standard Test Method for Specular Gloss.
  - .4 ASTM D82201-(2006), Standard Practice for Filtered OpenFlame -CarbonArc -Exposures of Paint and Related Coatings.
- .3 Canadian Roofing Contractors Association (CRCA)
  - .1 Estimates, covers 2011.
- .4 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB51-.32M77, Sheathing Membrane, Vapor Permeable.
- .5 Canadian Standards Association (CSA)/CSA International
  - .1 CSA A123.3- F05, Organic roofing felt impregnated with bitumen.
  - .2 AAMA/WDMA/CSA 101/I.S.2/A44011, North American Standard/Specification for Windows, Doors, and Unit Skylights.
  - .3 CSA B111- 1974(R2003), Wire Nails, Spikes and Staples.
- .6 Green Seal Environmental Standards
  - .1 Standard GS-11-10, 3rd Edition, Paints and Coatings.
  - .2 Standard GS-36-11, Commercial Adhesives.

- .7 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
  - .2 SCAQMD Rule #1168-05, Adhesives and Sealants.
- .8 Notwithstanding the fact that a specific year or edition is indicated for the referenced standards, it is the responsibility of the Subcontractor in this section to comply with the most current standards applicable at the time of bid submission.

1.3 DOCUMENTS/SAMPLES TO BE SUBMITTED FOR APPROVAL/INFORMATION

- .1 Submit required documents and samples in accordance with General Administrative Specifications - GAC 2015.

1.4 QUALITY ASSURANCE

- .1 Pre-construction Meeting: one (1) week prior to the beginning of the work covered by this section and the on-site installation work, hold a meeting with the Contractor's representative and the Departmental Representative at which will be discussed:
  - .1 The needs for the work;
  - .2 The conditions of execution and substrate condition;
  - .3 Coordination of work between trades;
  - .4 The manufacturer's installation instructions and the warranty terms.

1.5 TRANSPORTATION, STORAGE AND HANDLING

- .1 Transport, store and handle materials and equipment in accordance with the General Administrative Specifications - GAC 2015.

**PART 2 - PRODUCTS**

2.1 FOLDED METAL

- .1 Commercial grade 22 gauge enameled aluminum sheets.

2.2 PREFABRICATED VENT FLASHING

- .1 Description: Prefabricated insulated vent,  $\pm 457$ mm high (validate height and diameter

on site), made of a 3.18mm thick aluminum sleeve, factory made, ensuring watertightness around a plumbing vent pipe. Round base plate with a minimum diameter of 420mm. The sleeve is insulated from the inside with a factory-installed cylinder of flexible elastomeric thermal insulation.

- .2 Use only the cap provided by the manufacturer to complete the seal of the sleeve. The cap shall be caulked with a continuous bead of elastomeric sealant.

## 2.3 ACCESSORIES

- .1 Protective coating: bituminous paint.
- .2 Plastic mastic: conforms to CAN/CGSB 37.5.
- .3 Metal flashing underlayment: dry coating in accordance with CAN/CGSB51-.32.
- .4 Sealants: Non-staining, low modulus, neutral cure, one component silicone based, color to be selected by the Departmental Representative from colors offered by the manufacturer, conforming to ASTM C920, Type S, Grade NS, CAN/CGSB-19.13 and EIMA 300.01, latest editions.
- .5 Sealant: compatible with roofing membranes; coordinate with roofer.
- .6 Fastening tabs: made of the same material and of the same hardness as the sheet used, at least 50 mm wide and 1.5 mm thick or at least identical to the sheet to be fastened.
- .7 Fasteners: CSA B111 compliant, flat head, ring shank roofing nails of appropriate length and thickness for metal flashings.
- .8 Washers: made of the same material as the sheet metal used, 1 mm thick, with rubber gaskets.

## 2.4 FABRICATION

- .1 Metal flashings and other sheet metal components shall be formed in accordance with the details of the Canadian Roofing Contractors Association (CRCA) FL series drawings.
- .2 Aluminum flashings and other aluminum sheet metal components shall be fabricated in accordance with the requirements of the Aluminum Association as set out in AAI Aluminum Sheet Metal Work in Building Construction.

- .3 The pieces should be cut into lengths of up to 2400 mm. It is important to provide the necessary clearance at the joints for the expansion of the elements.
- .4 Exposed edges should be folded back 12 mm on their underside. Corners should be mitered and sealed with a sealant.
- .5 Items shall be shaped squarely, levelly, and accurately to the intended dimensions so that they are free from distortion or other defects that may impair their appearance or effectiveness.

## 2.5 METAL FLASHINGS

- .1 Flashings, copings and fascias shall be formed to the standard profiles with 22-gauge enameled aluminum sheet.

## **PART 3 - EXECUTION**

### 3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: Comply with the manufacturer's requirements, written recommendations, including any available technical bulletins, handling, storage and application instructions, and data sheets.

### 3.2 INSTALLATION

- .1 Ensure that all project details are in accordance with AMCQ technical data.
- .2 Install sheet metal work in accordance with the details and instructions published in AAI-Aluminum Sheet Metal Work in Building Construction and the indications on the drawings.
- .3 Shape flashings and fascia as shown on the drawings and as recommended by the AMCQ.
- .4 Bending of metal sheets is done using a bending machine designed for this purpose.
- .5 Conceal fasteners, except where the Departmental Representative has agreed that they may be left exposed.
- .6 Install an underlayment before installing the sheet metal elements. Secure it well and

make 100mm overlap joints.

- .7 Allow for expansion at the joints.
- .8 Bituminous membrane should be used where -the roof meets low walls, mounting frames or other vertical surfaces. Make single staple joints and secure them to the fastening strips.
- .9 Close the end joints and seal them with an appropriate caulking.
- .10 Install sealing sleeves at the prescribed locations around the elements passing through the roofing membrane, such as the passage of conduits to connect antennas.

### 3.3 CLEANING

- 1. Perform cleaning work in accordance with GCC 2015 and specification section 01 74 11.
- 2. Upon completion of installation and performance testing, remove excess materials, waste, tools and equipment from the site.
- 3. Leave the work area clean and free of grease, stains and fingerprints.

END OF SECTION 07 62 00

**PART 1 - GENERAL****1.1 REFERENCES**

- .1 National Research Council of Canada
- .1 National Plumbing Code, including Quebec amendments Application for Equivalency

**1.2 WORK DESCRIPTION**

- .1 All sections of Section 21 05 01 shall be complied with by this section.
- .2 The work includes, but is not necessarily limited to:
  - .1 Supply and install all plumbing fixtures shown on the plans and described in the specifications.
  - .2 Supply and install all required supports and hangers.
  - .3 Provide and install seismic protection systems applicable to plumbing.
  - .4 Provide and install identification of applicable plumbing systems and fixtures.
  - .5 Supply and install thermal insulation applicable to plumbing.
  - .6 Perform demolition work as indicated on the plans.
- .3 Refer to the Table of Contents for a list of sections applicable to plumbing.

**1.3 QUALITY ASSURANCE**

- .1 Qualification
  - .1 Installer shall be an expert in the field plumbing.

**PART 2 - PRODUCTS****2.1 NO OBJECT.****PART 3 - EXECUTION****3.1 NO OBJECT.**

END OF SECTION 22 05 00

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**PART 1 - GENERAL****1.1 REFERENCES**

- .1 ASTM International Inc.
  - .1 ASTM B 32, Standard Specification for Solder Metal.
  - .2 ASTM B 306, Standard Specification for Copper Drainage Tube (DWV).
  - .3 ASTM C 564, Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
- .2 Canadian Standards Association (CSA)/CSA International.
  - .1 CSA B67, Lead Water Distribution Pipe, Waste Pipe, Siphons, Elbows and Fittings.
  - .2 CAN/CSA B70, Cast Iron Sewer Pipe and Fittings and Methods of Connection.
  - .3 CAN/CSA B125.3, Plumbing Fittings.
  - .4 CAN/CSA B127.1, Asbestos Cement Drainage, Sewerage and Venting Pipe and Fittings.
  - .5 CAN/CSA B602, Mechanical Seals for Drainage, Ventilation and Sewer Pipe.
- .3 Canadian General Standards Board (CGSB/ONGC)
  - .1 CAN/CGSB 34.22, Asbestos Cement Drain Pipe.

**PART 2 - PRODUCTS****2.1 COPPER PIPE AND FITTINGS**

- .1 Sanitary sewage and ventilation pipes (except urinal drainage pipes), type DWV, intended for above ground installation:
    - .1 DN 2 ½ and under
    - .2 Conforms to ASTM B 306.
    - .3 Fittings with welded spigot and socket joints
      - .1 Cast brass fittings: Conform to CAN/CSA-B125.3.
      - .2 Forged copper fittings: conform to CAN/CSA-B125.3.
-

- .3 Soft solder: tin-antimony, 95/5, according to ASTM B 32.

## **2.2 VENT FLASHING**

- .1 460mm high insulated aluminum vent flashing.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- .1 Install piping in accordance with the Plumbing Code.
- .2 Install piping in accordance with Section 23 05 05 - Installation of Piping, and the requirements of this section.
- .3 Where slope is not specified, the pipe shall be sloped in accordance with the Plumbing Code.
- .4 Install copper pipe so that it does not come into contact with dissimilar metal and is not dented or flattened.
- .5 No copper pipe should come in contact with the concrete. Cast iron pipe should always be pulled out over the finished concrete surfaces before making connections to the copper piping.
- .6 Make the watertight connection of the drainage piping to the outside service piping brought in by another division. Provide all necessary accessories such as: joint, reducer, transition flange, anchor, threaded anchor rod for joint, etc. Be aware of the materials and diameters of the services provided by the other division.
- .7 Vent flashing
  - .1 Install a flashing at each vent outlet on the roof.
  - .2 It should be noted that the waterproofing between the flashing and the membrane is the responsibility of another section.

### **3.2 TEST**

- .1 Carry out the start-up in accordance with the general prescriptions.
- .2 Perform testing as recommended by the Plumbing Code, providing all necessary labor and equipment.

### **3.3 QUALITY CONTROL ON SITE**

- .1 Carry out quality control in accordance with general requirements.
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- .2 Rainwater drainage pipes (downspouts)
  - .1 Ensure that the curved roof grilles are securely fastened in place.
  - .2 Ensure that the flow control weirs are properly sized and installed.
  - .3 Ensure that means have been provided to allow for roof movement.

END OF SECTION 22 13 17

**PART 1 - GENERAL****1.1 WORK DESCRIPTION**

- .1 The work includes, but is not necessarily limited to:
  - .1 Supply and install all refrigeration networks and equipment.
  - .2 Supply and install all required supports and hangers.
  - .3 Provide and install seismic protection systems applicable to refrigeration.
  - .4 Provide and install network and appliance identification applicable to refrigeration.
  - .5 Supply and install insulation applicable to refrigeration
- .2 Refer to the table of contents for a list of sections applicable to refrigeration.
  - .1 Divisions 22, 23 are an integral part of this section as are the plans.
- .3 Install the factory prefabricated condenser unit by the ventilation contractor and make the DX cooling coil connections. Supply and install piping and accessories.
- .4 Supply and install all controls required for the proper operation of the systems such as electronic controllers, pressure controls, defrost timers and thermostats.
- .5 Coolant and lubricating oil charge.
- .6 The refrigeration contractor is a subcontractor to the ventilation contractor.
- .7 Complete start-up including start-up report giving motor amperage, operating pressures, minimum and maximum temperatures reached in each chamber.
- .8 Install the new heat pump and its accessories. Remove the existing outdoor condenser. Redo the refrigeration piping. Start-up with the manufacturer.
- .9 Provide for coordination with building services control.

**1.2 LIST OF SHOP DRAWINGS TO BE SUBMITTED**

- .1 The list of shop drawings to be submitted for approval is attached as Appendix "A".

**1.3 TABLES AND EQUIPMENT LIST**

- .1 See the equipment on the plans.
-

**1.4 QUALITY ASSURANCE**

**.1 Qualification**

.1 Installer shall be an expert in the field refrigeration

**PART 2 - PRODUCTS**

**2.1 NO OBJECT.**

**PART 3 - EXECUTION**

**3.1 DESCRIPTION OF THE WORK**

.1 Perform demolition work as indicated on the plans.

END OF SECTION 23 05 00.02

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## **PART 1 - GENERAL**

### **1.1      WORK DESCRIPTION**

- .1      The work includes, but is not necessarily limited to:
  - .1      Supply and install the refrigerant networks (for ventilation systems);
  - .2      Supply and install all required supports and hangers.
  - .3      Supply and install seismic protection systems applicable to ventilation-air conditioning.
  - .4      Provide and install the identification of the networks and devices applicable to the ventilation-air conditioning.
  - .5      Supply and install insulation applicable to the ventilation/air conditioning system.
  - .6      Provide integration drawings of all mechanical elements.
- .2      Perform any other additional work required for the installation and start-up of HVAC systems.
- .3      Coordinate and collaborate with responsible contractors:
  - .1      regulation and control systems, Division 25.

### **1.2      QUALITY ASSURANCE**

- .1      Qualification
  - .1      Installer shall be an expert in the field ventilation.

## **PART 2 - PRODUCTS**

### **2.1      GENERAL**

- .1      Materials and installation shall conform to NFPA 90A and NFPA 90B.
  - .2      Ceiling types and equipment sizes
    - .1      Before purchasing any equipment, check the dimensions of the modules of the new and/or existing false ceilings, so that the equipment such as grilles, diffusers, etc., can be perfectly integrated into them
-

**PART 3 - EXECUTION**

**3.1        DESCRIPTION OF THE WORK**

- .1        Perform demolition work as indicated on the plans.

**3.2        START-UP AND TESTING**

- .1        Carry out the start-up and test(s) in accordance with the specifications.
- .2        The manufacturer shall perform inspection or testing for the following items:
  - .1        Refrigeration network, sections 23 23 00

END OF SECTION 23 05 00.03

**PART 1 - GENERAL****1.1 REFERENCES**

- .1 American Society of Mechanical Engineers (ASME)
  - .1 ASME B31.1, Power Piping.
- .2 ASTM International
  - .1 ASTM A 125, Standard Specification for Steel Springs, Helical, Heat-Treated.
  - .2 ASTM A 307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
  - .3 ASTM A 563, Standard Specification for Carbon and Alloy Steel Nuts.
- .3 Factory Mutual (FM)
- .4 Underwriters' Laboratories of Canada (ULC)
- .5 Manufacturer's Standardization Society of the Valves and Fittings Industry (MSS)
  - .1 MSS SP 58, Pipe Hangers and Supports - Materials, Design and Manufacture.
  - .2 MSS SP 69, Pipe Hangers and Supports - Selection and Application.
  - .3 MSS SP 89, Pipe Hangers and Supports - Fabrication and Installation Practices.
- .6 National Fire Prevention Association (NFPA)
  - .1 NFPA 13, Standard for the Installation of Sprinkler Systems.

**PART 2 - PRODUCTS****2.1 SYSTEM DESCRIPTION**

- .1 Design requirements
    - .1 Piping support shall be made in accordance with the manufacturer's recommendations, using standard parts, components and assemblies.
    - .2 The maximum load ratings should be determined from the allowable stress indications contained in ASME B31.1 or MSS SP 58.
    - .3 Supports, guides and anchors must not transmit excessive heat to the building's framing members.
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- .4 Supports and hangers shall be designed to support piping and mechanical equipment under operating conditions, allow for contraction and expansion movements of the supported elements, and prevent excessive stresses on the piping and equipment to which it is connected.
- .5 Supports and hangers must be vertically adjustable after installation and during commissioning. The extent of adjustment shall be in accordance with MSS SP 58.

## **2.2 GENERAL**

- .1 Supports, hangers and bracing shall be manufactured in accordance with ANSI B31.1 and MSS SP 58.
- .2 All brackets must have at least the following three parts: anchor sleeve, hanger rod, collar or bracket.
- .3 All anchors installed in concrete structures must be approved to resist seismic loads, including those used for gravity supports. Anchor sleeves are therefore prohibited.
- .4 Hanger brackets on fire protection systems shall be installed in accordance with applicable NFPA standards.
- .5 All supports and hangers shall be:
  - .1 UL approved for Canada.
  - .2 Approved by the FM, for all fire protection installations.
- .6 The items in this section shall be used for support purposes only. They shall not be used to lift, elevate or mount other components or equipment.

## **2.3 SUSPENSION FOR PIPES**

- .1 Finish
    - .1 Supports and hangers must be galvanized.
    - .2 The elements shall be electroplated or hot-dipped.
    - .3 Black steel rods only will not be accepted.
    - .4 In the case of uninsulated copper pipes, use copper-plated supports. If no such support exists and for steel hangers that come into contact with copper piping, they must be copper-plated or epoxy-coated.
  - .2 Anchoring elements for suspensions attached to the bottom flange of an I-beam
    - .1 Cold pipes with a nominal diameter equal to or less than DN 2: C-flanges, made of malleable iron, with hardened steel socket set screws, locknut and carbon
-

steel clamp.

- .2 Chilled pipes with nominal diameter equal to or greater than DN 2 1/2 and hot pipes of any diameter: beam clamps, consisting of a clamp, eyebolt and extension made of malleable iron, with clamp, suspension rod, nuts and washers made of carbon steel, in accordance with MSS SP 58.
- .3 Anchoring elements for suspensions fixed on the top flange of an I-beam
  - .1 Chilled pipes with nominal diameter equal to or less than DN 2: C-fixing flanges for beam tops, made of ductile iron, with hardened steel socket set screws, lock nut and carbon steel clamp, in accordance with MSS SP 58.
  - .2 Cold pipelines of nominal diameter equal to or greater than DN 2 1/2 and hot pipelines of any diameter: malleable iron top beam fasteners consisting of a jaw, a hook rod, a spring washer, a plain washer and a nut, in accordance with MSS SP 58.
- .4 Anchoring elements for suspensions fixed in concrete structures
  - .1 Elements to be anchored in the ceiling: bracket, plate, fastener, dowels and welded eyebolt, in galvanized carbon steel, with eyebolt nut in galvanized forged steel, without welding. The eyelet must have a diameter of at least 6 mm greater than that of the rod.
  - .2 Concrete embedding brackets: with wedge and protection plate with breakable pad, in accordance with MSS SP 58.
- .5 Suspension rods: threaded, adjustable, in accordance with MSS SP 58.
  - .1 The suspension rods must not be subjected to any forces other than tensile forces.
- .6 Supporting elements: conform to MSS SP 58.
  - .1 For stationary copper pipes:
    - .1 Black steel elements with copper finish.
  - .2 Protective shields shall be provided for insulated piping.
  - .3 Supporting elements must be oversized to allow for lagging.
  - .4 Hinge elements shall be provided as required to allow for horizontal movement and vertical movement of the supported pipe.

## 2.4 WALL MOUNTS

- .1 Use to support non-expandable piping only.
-

.2 Description:

- .1 C-profile rail-mounted fastener system with curved edges;
  - .2 Made of galvanized steel or stainless steel.
  - .3 Clamps or fasteners appropriate to the pipe to be supported.
  - .4 Mounting plate in appropriate locations.
- .3 Leave a gap of 25 mm or more, as appropriate, to allow for heat transfer.

## 2.5 COLLARS FOR RISERS

- .1 Steel or cast iron piping :
  - .1 Galvanized carbon steel collars
  - .2 Complies with MSS SP 58, type 42.
- .2 Copper piping :
  - .1 Carbon steel collars with copper finish
  - .2 Complies with MSS SP 58, type 42.
- .3 Bolts: conform to ASTM A 307.
- .4 Nuts: conform to ASTM A 563

## 2.6 EQUIPMENT HOLDERS

- .1 When not supplied by the manufacturer of the equipment, the elements for supporting the equipment shall be made of structural steel.
- .2 These supports will be made of welded metal sections and constructed in accordance with good engineering practice and provincial codes pertaining to this work. This work will be performed by welders and skilled labour.

## 2.7 ANCHOR BOLTS AND TEMPLATES

- .1 Provide templates to determine the exact location of the anchor bolts.

## 2.8 MOUNTING BASES

- .1 For rack-mounted units: concrete bases at least 100 mm high, projecting 150 mm beyond the frame of the supported unit, with chamfered edges.
  - .2 Concrete: see structural Departmental Representative 's drawings. Coordinate exact location and dimensions of bases.
-

**PART 3 - EXECUTION****3.1 INSTALLATION**

- .1 Anti-vibration devices
    - .1 Provide anti-vibration devices at pumps, boilers, refrigeration units, cooling towers and other locations as indicated.
  - .2 Use adjustable hangers on horizontal piping.
  - .3 Collars for risers
    - .1 Secure the risers independently of the horizontal pipes to which they are connected, using clamps and shear pins welded to the riser.
    - .2 Tighten the bolts to the current torque.
    - .3 For steel piping, install clamps below a coupling or shear pin.
    - .4 For cast iron piping, install clamps below a gasket.
    - .5 Vertical piping shall be securely fastened to the base of the column and to all floors at floor level; the maximum distance between two supports shall never exceed 4500 mm.
  - .4 Anchoring elements for suspensions fixed in concrete structures
    - .1 Fasten the elements (plates and brackets) in the concrete structure with at least one (1) at each corner.
  - .5 Attach hangers to framing members. Provide and install any additional metal framing members required if structural supports are not in place at the intended installation points or if anchor sleeves are not located where required.
  - .6 Horizontal cast iron pipe shall be supported by two supports per section of pipe and on each side of the joints. The supports on cast iron pipe DN6 and smaller shall be specially designed steel and the supports on cast iron pipe DN8 and larger shall be specially designed cast iron saddles.
  - .7 Anchor sleeves :
    - .1 Coordinate the installation of the anchor sleeves in concrete with the structural Departmental Representative and install them according to his recommendations.
    - .2 Obtain permission before using vertical expansion anchor sleeves.
    - .3 Use at least two sockets to hold each bracket.
-

- .4 Do not hang anything from the metal deck.

### 3.2 SPACING BETWEEN SUPPORTS AND SUSPENSIONS

- .1 Plumbing system piping: Follow the requirements of the Plumbing Code and the specifications of the specification.
- .2 Fire protection system piping: as required by the fire code and NFPA 13.
- .3 Oil and gas pipelines with a nominal diameter equal to or less than DN 1/2: one (1) support/suspension every 1.8 m.
- .4 Copper piping with a nominal diameter equal to or less than DN 1/2: one (1) support/suspension every 1.5 m.
- .5 Support plastic piping according to manufacturer's recommendations.
- .6 Roll grooved and flexible jointed pipe: as shown in the table below with a minimum of one (1) support/suspension at each joint. The table applies to straight sections without load concentration and where full linear movement is not required.
- .7 One (1) support/suspension not more than 300 mm from each elbow.
- .8 Pipe suspension table :

Nominal diameter of the pipe DN	Stem diameter	Maximum spacing	
		Steel	Copper
up to 1 - 1/4	10 mm	2,1 m	1,8 m
1 - 1/2	10 mm	2,7 m	2,4 m
2	10 mm	3,0 m	2,4 m
2 - 1/2	10 mm	3,6 m	3,0 m
3	10 mm	3,6 m	3,0 m
3 - 1/2	10 mm	3,6 m	3,3 m
4	16 mm	3,6 m	3,6 m
5	16 mm	4,3 m	
6	22 mm	4,3 m	
8	22 mm	4,3 m	
10	22 mm	4,9 m	
12	22 mm	4,9 m	

- .9 For pipes with a nominal diameter greater than DN 12, comply with MSS SP 58.
- .10 Spacing between grouped pipe supports shall be based on the smallest pipe.

**3.3 INSTALLATION OF SUSPENSIONS**

- .1 Install the suspensions so that under operating conditions the rods are vertical.
- .2 Adjust the height of the rods so that the load is evenly distributed between the suspensions.

**3.4 DIELECTRIC FITTINGS**

- .1 Provide and install felt or rubber pads to prevent contact between dissimilar metal components.
- .2 Sticker tapes will not be accepted.

**3.5 HORIZONTAL MOVEMENT**

- .1 The skew of the suspension rods resulting from the horizontal movement of the pipe from the "cold" to the "hot" position shall not exceed 4 degrees from vertical.
- .2 When the horizontal movement of the pipe is less than 13 mm, shift the supports or hangers so that the rods are vertical in the "hot" position.

**3.6 FINAL SETTINGS**

- .1 Supports and suspensions
  - .1 Make sure that under operating conditions the suspension rods of the pipes are in a vertical position.
  - .2 Balance the loads.
- .2 Adjustable stirrups
  - .1 Tighten the vertical adjustment nut to optimize the performance of the caliper.
  - .2 Retighten the locknut after adjustment is complete.
- .3 C-clamps
  - .1 Attach the C-clamps to the bottom flange of the beams in accordance with the manufacturer's recommendations and tighten to the torque specified by the manufacturer.
- .4 Fixings for beams
  - .1 Using a hammer, firmly secure the jaw to the bottom flange of the beam.

END OF SECTION 23 05 29

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**PART 1 - GENERAL****1.1 REFERENCES**

- .1 Canadian Standards Association (CSA)/CSA International.
  - .1 CSA G40.20/G40.21, General requirements for rolled or welded structural steel.
- .2 Quebec Construction Code (CCQ)
- .3 National Fire Protection Association (NFPA)
  - .1 NFPA 13 - Standard for the Installation of Sprinkler Systems.
- .4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .5 Seismic Restraint Manual Guidelines For Mechanical Systems, from SMACNA.

**1.2 DEFINITIONS**

- .1 SPP: seismic protection system.

**1.3 DESCRIPTION**

- .1 Design, supply, and install a complete and functional seismic fastening system for mechanical and electrical equipment (new and/or relocated).
  - .2 Seismic protection systems must be compatible with and fully integrated into the following:
    - .1 the prescribed acoustic and anti-vibration devices;
    - .2 the design features of the building;
    - .3 electrical and mechanical installations.
  - .3 Protected equipment and systems need not remain in operation during and after an earthquake.
  - .4 During an earthquake, seismic protection devices and systems are used to prevent equipment and appliances from shifting, falling or tipping over, which could injure occupants.
  - .5 The design of seismic protection devices and systems must be entrusted by the Departmental Representative specialized in the field of earthquake engineering, recognized in the province of Quebec and a member in good standing of the Ordre des
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Ingénieurs du Québec. The project requirements shall be determined by the same Departmental Representative.

- .6 Any installed appliance that is to be suspended or removed and weighs more than 10 kg shall be securely fastened in accordance with these requirements.
- .7 Any equipment placed on a non-seismically approved suspended ceiling and weighing less than 10 kg shall be suspended independently of the ceiling.
- .8 It is the responsibility of the seismic Departmental Representative to determine if the building is an emergency building.
- .9 It is the responsibility of the seismic Departmental Representative to determine the connection points of the seismic protection devices and systems to the building structure in order to respect the resistance of the latter.

#### **1.4 DOCUMENTS/SAMPLES TO BE SUBMITTED FOR APPROVAL/INFORMATION**

- .1 Submit required documents and samples in accordance with general requirements.
  - .2 Shop Drawings: Shop drawings submitted must bear the seal and signature of the qualified earthquake Departmental Representative licensed to practice in the Province of Quebec.
  - .3 Submit the calculation data below.
    - .1 Working drawings (of the same quality and format as the drawings included in the tender documents), material lists, schematic diagrams and detailed specifications for the components of each of the planned seismic protection devices and systems.
    - .2 Separate shop drawings for each seismic protection device or system and each of its components.
    - .3 A document specifying the location of these devices and systems.
    - .4 Lists of the different types of seismic protection devices and systems and their associated components.
    - .5 A document showing or indicating the details of the anchoring and fastening devices, the anchor loads and the methods of connection to the framing members.
    - .6 A document specifying installation instructions and methods.
    - .7 Conservative or simplifying assumptions can be accepted.
  - .4 In the event that no seismic protection system is required, provide the Departmental
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Representative with a letter of explanation signed by the seismic Departmental Representative stating the reasons for not doing so, including the sections of the Code that permit it.

#### **1.5 DOCUMENTS TO BE SUBMITTED AT THE END OF THE WORK**

- .1 Submit required documents in accordance with general requirements.
- .2 Upon completion of the certification and acceptance of the report, provide the Departmental Representative with a complete copy of the revised and annotated project file to show post implementation conditions

### **PART 2 - PRODUCTS**

#### **2.1 GENERAL**

- .1 Seismic protection devices and systems shall:
  - .1 Be designed to prevent shock effects.
  - .2 Act in all directions.
- .2 Mounting brackets must be connected to the building structure.
- .3 Fasteners and connection points must be able to withstand the same maximum loads as the seismic devices and systems.
- .4 Seismic devices and systems to protect piping shall allow for compliance with the requirements for anchoring and guiding piping.
- .5 Seismic protection devices and systems consisting of cast iron elements, threaded tubes or other frangible materials will not be accepted.
- .6 Connection of seismic protection devices and systems to reinforced concrete frames
  - .1 The anchors used must be seismically approved by the manufacturer.
  - .2 No anchors should be nailed or installed in holes drilled for that purpose.
- .7 Seismic protection devices and systems shall not interfere with the operation or integrity of fire stop elements.

#### **2.2 ENTRANCE OF UTILITY LINES INTO THE BUILDING**

- .1 Provide means to ensure flexibility of piping to prevent breakage in the event of an earthquake.
-

**PART 3 - EXECUTION****3.1 INSTALLATION**

- .1 Retaining cables
  - .1 Connect the retaining cables to the suspended equipment so that their axial incidence corresponds to the center of gravity of the protected equipment.
  - .2 Use grommets, lugs and other appropriate hardware to ensure alignment of seismically-qualified devices and systems and to prevent cables from bending at connection points.
  - .3 For piping or duct systems, install transverse supports/bracing at intervals of not more than 12 m and longitudinal supports/bracing at intervals of not more than 24 m or as limited by their performance characteristics or those of the anchorage devices.
  - .4 For seismic protection purposes, small diameter pipe may be secured to larger diameter pipe; however, the reverse practice is not permitted.
  - .5 For ceiling suspended equipment, arrange the restraint cables at a 90-degree angle to each other (in plane), and attach them to the building framing at a 64 degree angle (2:1 slope).
  - .6 Tighten the cables to reduce slack. Under normal operating conditions, the cables should not support the weight of the equipment being held.
- .2 Install seismically-qualified devices and systems at least 25 mm away from any appliance or utility piping.
- .3 Coordinate connection operations with other trades.
- .4 For fire protection systems:
  - .1 Seismic protection systems must also be installed in accordance with NFPA 13.

**3.2 QUALITY CONTROL ON SITE**

- .1 Carry out quality control in accordance with general requirements.
  - .2 Inspection and certification of seismic protection devices and systems
    - .1 During construction or upon completion of installation, as applicable, the seismic protection devices and systems shall be inspected and certified by the earthquake engineering design Departmental Representative.
    - .2 Provide the Departmental Representative with a written report accompanied by
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a certificate of compliance signed by the earthquake design Departmental Representative certifying that the facilities have been installed in accordance with his specifications.

END OF SECTION 23 05 49.01

**PART 1 - GENERAL****1.1 REFERENCES**

- .1 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-1.60, Interior Alkyd Gloss Enamel Paint.
  - .2 CAN/CGSB-24.3, Identification of Pipeline Systems.

**PART 2 - PRODUCTS****2.1 MANUFACTURER'S NAMEPLATES**

- .1 Metal or laminate nameplates mechanically attached to hardware by the manufacturer.
- .2 The inscriptions (letters and numbers) must be raised or recessed.
- .3 The following information, as applicable, shall be shown on the nameplates
  - .1 Device: manufacturer's name, model, dimensions, serial number, power, flow rate.
  - .2 Motor: voltage, frequency of supply current, number of phases, power, type of service, frame size.
- .4 CSA and ULC certification plates: as required by these organizations.

**2.2 NETWORK IDENTIFICATION PLATES**

- .1 Colors
    - .1 Other materials: black lettering on white background (unless otherwise specified in the relevant code).
  - .2 Material and other manufacturing characteristics
    - .1 3 mm thick plates, in laminated plastic or white anodized aluminum, with a matte finish, square corners and precisely aligned letters machine engraved to the core.
  - .3 Formats
    - .1 As indicated in the table below:
-

Format number	Dimensions (mm)	Number of lines	Letter height (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 Maximum of 25 letters or numbers per line.
- .4 Identification of equipment and systems covered by the PWGSC Preventive Maintenance Support System (PMSS)
  - .1 Main/source/destination identification system.
  - .2 Equipment and mechanical plant rooms
    - 1. Main identification plates in number 9 format.
    - 2. Identification plates of origin and destination of format number 6.
    - 3. Identification plates for terminal elements and control panels in number 5 format.
  - .3 Other locations: appropriate formats

## 2.3 IDENTIFICATION ACCORDING TO THE EXISTING SYSTEM

- .1 Identify added or improved structures according to the existing identification system.
- .2 Where the existing identification system does not provide for the identification of newly installed structures, they shall be identified as required by this section.
- .3 Prior to commencing work, have the Departmental Representative approve the identification system in writing.

## 2.4 IDENTIFICATION OF PIPES

- .1 The fluid in the piping system shall be identified by background color markings,

pictograms (if required) and/or legends; the direction of flow shall be indicated by arrows. Unless otherwise specified, piping systems shall be identified in accordance with CAN/CGSB 24.3.

- .2 Legend: capital letters of the following dimensions:

External diameter of the pipe or insulation (mm)	Size of the letters (mm)
19 à 32	13
38 à 51	19
64 à 150	32
200 à 250	64
More than 250	89

- .3 Pictograms

- .1 Where applicable, pictograms must comply with Workplace Hazardous Materials Information System (WHMIS) requirements.

- .4 Legends

- .1 Capital letters of height and color in accordance with CAN/CGSB 24.3.

- .5 Arrows indicating the direction of flow

- .1 Outside diameter of the pipe/insulation less than 75 mm: 100 mm length x 50 mm height;
- .2 Outside diameter of the pipe/insulation of 75 mm and more: 150 mm length x 50 mm height;
- .3 Two-pointed arrows when the flow direction is reversible.

- .6 Dimensions of background color markings

- .1 Height: sufficient to cover the circumference of the pipe/ insulation.
- .2 Length: sufficient to allow the pictogram, the legend and the arrows to be affixed.

- .7 Materials used for background color markings, lettering (legends) and arrows

- .1 Tubes and pipes of 20 mm diameter or less: plastic, self-adhesive, waterproof and heat-resistant labels.
-

- .2 Other hoses: Self-adhesive, plastic coated, protective cloth labels with waterproof contact adhesive on the underside, designed to withstand 100% relative humidity, 150 degrees Celsius constant heat and 200 degrees Celsius intermittent heat.

.8 Painting:

- .1 Conforms to CAN/CGSB-1.60.

.9 Background colors and captions

- .1 Where background colors and captions are not specified, follow the Departmental Representative guidelines.
- .2 Fire protection: white on red background.
- .3 Medical gases: see Table 6 of N.Q. 5710-500.
- .4 Colors of legends and arrows: conform to the following table:

Background color	Legends, arrows
Yellow	BLACK
Green	WHITE
Red	WHITE

- .5 Background color markings and legends for pipes and valves.

Content/Fluid conveyed	Background color	Legend
Suction - refrigerant (indicate its number)	Yellow	REFRIGERANT SUCTION R-XXX
Refrigerant liquid	Yellow	REFRIGERANT R-XXX

## 2.5 IDENTIFICATION OF AIR DUCTS

- .1 50 mm high letters and arrows indicating the direction of fluid flow, 150 mm long x 50 mm high.
- .2 Color: black or a color that contrasts with the conduit.
-

**2.6 IDENTIFICATION OF VALVES AND FITTINGS**

- .1 3 mm thick plates, in laminated plastic or white anodized aluminum, with a matte finish, square corners and precisely aligned letters machine engraved to the core.
- .2 The color of the writing will be black, except for fire protection systems where it will be red.
- .3 The plate shall indicate the function of the valve and what it controls.
- .4 The plate will be held in place with a brass chain.

**2.7 IDENTIFICATION OF FAN APPLIANCES**

- .1 Same as valve

**2.8 IDENTIFICATION OF NETWORKS AND CONTROL/REGULATION DEVICES**

- .1 Identify systems, equipment, components, controllers, and sensors by means of nameplates in accordance with the requirements of this section.
- .2 Identify the function of each and (if applicable) their safety settings.
- .3 Low voltage wiring and control air tubes (instrumentation): as required by Division 25.

**2.9 UNILINGUAL/BILINGUAL LISTINGS**

- .1 System and component identification markings shall be in English and French.
- .2 English and French language markings must be marked on a single nameplate, label, etc. [separate nameplates, labels, etc.]. [separate nameplates, labels, etc.].

**PART 3 - EXECUTION****3.1 TIME OF EXECUTION**

- .1 Do not start identifying networks and devices until the prescribed work has been completed.

**3.2 INSTALLATION**

- .1 Unless otherwise specified, identify networks and devices in accordance with CAN/CGSB-24.3.
  - .2 Provide ULC and CSA certification plates as required by each respective organization.
  - .3 Place the tape or strips on clean surfaces free of grease and dust. Wrap the tape around the pipe, overlapping the ends to a length equal to the diameter of the pipe.
-

- .4 Identify networks and devices according to the PWGSC SSEP.

### **3.3 IDENTIFICATION PLATES**

#### **.1 Location**

- .1 Plaques shall clearly identify equipment and/or piping systems and shall be placed in locations where they will be clearly visible and easily readable from the work floor.

#### **.2 Spacers shims**

- .1 On hot and/or heat-insulated surfaces, provide spacers under the nameplates.

#### **.3 Protection**

- .1 Do not apply paint, heat insulation or any coating to the nameplates.

#### **.4 Equipment**

- .1 Identify chillers, coils, control panels and other central equipment.

### **3.4 LOCATION OF PIPING AND AIR DUCT IDENTIFIERS**

- .1 On long pipes and ducts in open areas of boiler rooms, equipment rooms, service tunnels and galleries: at intervals not exceeding 10 m, so that at least one can be readily seen from any point in the operating areas or aisles.
  - .2 At changes of direction.
  - .3 In each small room where the ducts or air ducts run (at least one element).
  - .4 On either side of visual obstructions or where it is difficult to follow the route of the networks.
  - .5 On both sides of the separations, such as walls, floors or partitions.
  - .6 Where piping or air ducts are concealed in a chase, ceiling void, ductwork or service gallery, or other confined space, at entry and exit points, and near access openings.
  - .7 At the start and end points of each pipe or conduit, and near each piece of equipment.
  - .8 Immediately upstream of the main valves or registers, manually or automatically operated, otherwise as close as possible, preferably on the upstream side.
  - .9 So that the designation is easily readable from the usual operating areas and from all easily accessible points.
  - .10 Perpendicular to the best possible line of sight, taking into account the usual location of operating personnel, lighting conditions, reduced visibility of colors or legends due
-

to dust and dirt accumulation, and the risk of damage or breakdown.

.11 In the case of air ducts :

.1 Place a plate near each duct access door or hatch.

.2 Stencil the plates on the final finish only.

### **3.5 LOCATION OF THE IDENTIFICATION ELEMENTS OF THE FITTINGS**

.1 Attach labels to fixtures, except those connected to plumbing fixtures or heating radiators, and except where they are in close proximity and view of the equipment to which they are connected.

### **3.6 EQUIPMENT NOT VISIBLE**

.1 Identify the location of each concealed piece of ventilation equipment with P-Touch c/a 12 mm wide pressure sensitive tape n° TC-201 with black lettering on white background on metal ceiling suspension with acoustical tiles or on drywall/gypsum ceiling access hatch.

### **3.7 ON-SITE QUALITY CONTROL**

.1 Carry out quality control in accordance with general requirements.

.2 Prior to completion of the work, verify that identification has been completed in accordance with this section.

END OF SECTION 23 05 53.01

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**PART 1 - GENERAL****1.1 REFERENCES**

- .1 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)
    - .1 ASHRAE Standard 90.1, Energy Standard for Buildings Except Low-Rise Residential Buildings (IESNA co-sponsored; ANSI approved; Continuous Maintenance Standard).
  - .2 American Society for Testing and Materials International (ASTM)
    - .1 ASTM A167, Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.
    - .2 ASTM B 209M, Standard Specification for Aluminum and Aluminum Alloy Sheet and Plate Metric.
    - .3 ASTM C 335, Standard Test Method for Steady State Heat Transfer Properties of Horizontal Pipe Insulation.
    - .4 ASTM C 411, Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.
    - .5 ASTM C 795, Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.
    - .6 ASTM C 921, Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.
  - .3 Manufacturers' associations
    - .1 Thermal Insulation Association of Canada (TIAC), National Insulation Standards.
  - .4 Underwriters' Laboratories of Canada (ULC)
    - .1 CAN/ULC-S102, Standard Test Method; Surface Burning Characteristics of Building Materials and Assemblies.
    - .2 CAN/ULC-S701, Standard for Polystyrene Thermal Insulation, Boards and Pipe Coverings.
  - .5 Department of Justice Canada (Jus)
    - .1 Canadian Environmental Assessment Act (CEAA), c.33.
    - .2 Canadian Environmental Protection Act (CEPA), c. 33.
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- .3 Transportation of Dangerous Goods Act (TDGA), c. 34.
- .6 National Fire Protection Association (NFPA)
  - .1 NFPA 90A, Installation of Air Conditioning and Ventilating Systems.
  - .2 NFPA 90B, Installation of Air Heating and Air Conditioning Systems.
  - .3 NFPA 255, Standard Method of Test of Surface Burning Characteristics of Building Materials.
- .7 Canadian General Standards Board (CGSB)
  - .1 CGSB51-.12, Thermal Insulation and Finishing -Cement.
  - .2 CGSB51-.40, Thermal -insulation, flexible, elastomeric, single cell, sheet and tubular.
  - .3 CGSB 51GP9M-, Thermal -Insulation, Mineral Fiber Jacket, for Pipes and Ducts
  - .4 CGSB 51GP11M-, Mineral Fiber Insulating- Blanket, for pipes, ducts, machinery - and boilers.
  - .5 CGSB 51-GP-52Ma, Vapor impermeable jacket and covering material for thermal insulation of pipes, ducts and equipment.
  - .6 CGSB-51.53, Polyvinyl Chloride Sheeting for Insulated Pipe Jackets, Containers and Cylindrical Conduit.
- .8 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).

## 1.2 DEFINITIONS

- .1 For the purposes of this section, the following definitions apply.
  - .1 DISSIMULATED" elements: insulated piping, ducts and mechanical equipment located above suspended ceilings or in inaccessible construction voids.
  - .2 APPARENT" elements: elements that are not concealed (as required).
- .2 ACIT Codes
  - .1 CRF : Code Rectangular Finish.
  - .2 CPF: Code Piping (Plumbing) Finish.

## 1.3 QUALITY ASSURANCE

- .1 Qualifications
-

- .1 The installer must be an expert in the field insulation

## **PART 2 - PRODUCTS**

### **2.1 FIRE RESISTANCE CHARACTERISTICS**

- .1 All materials used shall have the following characteristics according to CAN/ULC-S102:
  - .1 Flame spread index: maximum 25.
  - .2 Smoke power index: maximum 50.

### **2.2 HEATING MATERIALS - GENERAL**

- .1 The coefficient of thermal conductivity ("k" coefficient) shall not exceed the prescribed values at an average temperature of 24 degrees Celsius, as tested in accordance with ASTM C335.

### **2.3 THERMAL INSULATION WITH ACIT CODE NUMBER A-6: FLEXIBLE TUBULAR ELEMENT, MADE OF SINGLE-CELL ELASTOMER.**

- .1 Description:
  - .1 Flexible, elastomeric, single-cell, sheet and tubular thermal insulation.
  - .2 Thermal insulation: conforms to ASTM C 534.
  - .3 Vapor barrier: conforms to CGSB 51-GP-52Ma.
  - .4 Operating temperature between -40° C and 100° C
  - .5 Maximum "k" coefficient: 0.036 W/m °C.
  - .6 Insulation certified by the manufacturer to be free of agents that may cause stress corrosion cracking.

### **2.4 ACCESSORY PRODUCTS**

- .1 Contact adhesive: fast setting for A-6 insulation.
  - .2 Sealant for vapour barrier overlaps
    - .1 Water based, fire retardant, fast setting adhesive compatible with heat insulating material.
  - .3 Tying wire: stainless steel, 1.5 mm in diameter.
-

**PART 3 - - EXECUTION****3.1 PREPARATORY WORK**

- .1 Install the lagging only after the hydrostatic test of the system (piping and connected equipment) has been completed and the results certified by the competent authority who attended the test.
- .2 Ensure that the surfaces to be lagged or coated are clean, dry and free of foreign matter.

**3.2 INSTALLATION**

- .1 Carry out the work in accordance with the requirements of the relevant TIAC national standards.
- .2 Install lagging and apply coatings and finishes in accordance with manufacturers' instructions and the requirements of this section.
- .3 Install the thermal insulation material so as to achieve a smooth and uniform surface.
- .4 Supports and suspensions
  - .1 Install high compressive strength lagging, appropriate for service conditions, where no saddle or lagging shield is provided.
- .5 Preformed Insulation: Use cylindrical element insulation for pipe sizes up to DN 12, and cylindrical element or shell insulation for pipe sizes over DN 12.
- .6 For valves, fittings and equipment that require periodic inspection and maintenance of parts and subassemblies, use factory-made lagging that can be easily removed.
- .7 Gouge grooves in the lagging material to match the shape of the weld beads. Cut the lagging material at a bevel where the studs and nuts are located so that they can be removed without damaging the lagging material, and cut it accurately around protruding stirrup, hanger, bracket and clamp components.

**3.3 TABLE - PIPE INSULATION**

- .1 Unless otherwise specified, pipe lagging also includes the lagging of valves, valve bonnets, strainers, flanges and fittings.
  - .2 Fittings :
    - .1 Fabricate the required sections (in bonded segments) from the pre-formed lagging maintaining the integrity of the vapour barrier for elbows and tees.
  - .3 Sealing: VR glue to seal overlaps; VR heat insulating glue or self-adhesive tape.
-

- .4 Thermal insulation with ACIT code number A-6
- .1 Fixation:
- .1 Install the flexible lagging, making sure that it fits snugly in all shapes without leaving any air space between the pipe and the lagging.
- .2 Sealing :
- .1 Butt all joints tightly and glue with a quick-setting contact adhesive, - sealing all joints.
- .2 The assembly must produce a perfect seal between the pipe and the environment.

Piping	Temp. °C	Code ACIT	Nominal diameter (DN) of the pipe and insulation thickness (mm)				
			Up to 1	of 1 ¼ à 2	of 2 ½ à 4	of 5 à 6	8 and more
Refrigerant (Hot Gases, Liquid and Suction)	4 - 13	A-6	25	25	25	25	25
Refrigerant (Hot Gases, Liquid and Suction)	Less of 4	A-6	25	38	38	38	38

END OF THE SECTION

**PART 1 - GENERAL****1.1 SUMMARY**

- .1 This section covers the copper tube, fittings, accessories, insulation, and installation, loading and testing procedures for connecting various direct expansion units in HVAC systems.

**1.2 REFERENCES**

- .1 American Society of Mechanical Engineers (ASME)
  - .1 ASME B16.22, Wrought Copper and Copper Alloy Solder - Joint Pressure Fittings.
  - .2 ASME B16.24, Cast Copper Pipe Flanges and Flanged Fittings: Class 150, 300, 400, 600, 900, 1500 and 2500.
  - .3 ASME B16.26, Cast Copper Alloy Fittings for Flared Copper Tubes.
  - .4 ASME B31.5, Refrigeration Piping and Heat Transfer Components.
- .2 American Society for Testing and Materials International (ASTM)
  - .1 ASTM A 307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
  - .2 ASTM B 280, Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.
- .3 Canadian Standards Association (CSA)/CSA International
  - .1 CSA B52, Mechanical Refrigeration Code.
- .4 Environment Canada (EC)
  - .1 EPS 1/RA/1, 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).
- .6 C&P1/RA/1, Code of Practice for the Reduction of Chlorofluorocarbon Emissions from Refrigeration and Air Conditioning Systems

**1.3 QUALITY ASSURANCE**

- .1 Qualification of the workforce
-

- .1 Installer shall be an expert in the field refrigerant.

## **PART 2 - PRODUCTS**

### **2.1 REFRIGERANT PIPING**

- .1 In the case of halogenated fluids, the tubes used must be ACR copper tubes, seamless, cleaned and sealed at the factory.
- .2 The tubing used shall meet the requirements of ASTM B88M and ASTM B280.
- .3 Fittings
  - .1 Fittings meet the requirements of ASME B16.26 and ASME B16.29.
  - .2 Single and double elbows: large radius type.
  - .3 Forged copper or forged brass solder fittings. Flared neck fittings may be used on soft annealed copper tube.
  - .4 Brazing, materials: as required by AWS A5.8; for copper pipe assembled with copper fittings, SILFOS15 phosphorus-copper-silver alloy; for brass fittings, silver solder, 170 MPa; 955 solder for connections to fixtures or fittings
  - .5 Flexible Fittings: Flexible fittings with a nominal diameter of 10 mm or less shall be coiled soft copper. Where the diameter is greater than 10 mm, they shall consist of seamless bronze hose covered with bronze wire braid. Fittings shall be protected by a factory sealed neoprene jacket when installed in areas where freezing temperatures may occur.

### **2.2 FITTINGS**

- .1 Valves shall be in accordance with B31.5.
  - .2 Service valves
    - .1 Forged brass valves, Class 500, where the gauge pressure is equal to or less than 3.5 MPa; cast bronze valves without packing, Class 375, where the gauge pressure is equal to or less than 2.5 MPa.
    - .2 Valves installed in areas where the temperature is below freezing must be watertight and moisture proof.
    - .3 Valves shall be of the reverse operation type with ball check valve to permit inspection and replacement under pressure.
-

- .4 Compressors: removable, watertight inspection plug; pressure gauge connection for regulating capillaries.
- .5 Shut-off valves
  - .1 Shut-off valves with a nominal outside diameter of 22 mm or less shall be of the diaphragm type, without packing, with integral mounting bracket, have a forged brass body and bonnet, and be of the globe type, square, non-guided.
  - .2 Shut-off valves with a nominal outside diameter of 28 mm or greater shall have a heavy-duty spherical or angle body with a heavy-duty, self-aligning, tightly closing nylon disc.
  - .3 Traps, drain valves, charge valves, globe or angle valves with a brazed or flared outlet connection shall be provided with a socket wrench stem and a removable, leakproof inspection plug.

## **2.3 DEHYDRATORS**

- .1 Liquid line mounted dehydrators: ARI 710 compliant, UL approved and pressure tested to 3.5 MPa.
- .2 The capacity of the dehydrators must comply with the indications and be appropriate to the refrigerating capacity of the installation established by the manufacturer, taking into account the type of refrigerant used.
- .3 Dehydrators with an outside diameter equal to or greater than 16 mm shall be of the revolving cartridge type and installed as specified. Block valves and relief valves shall be provided.
- .4 For each dehydrator, provide shut-off valves, safety valves and bypass piping with shut-off valve (normally closed).

## **2.4 INDICATORS**

- .1 A double-glazed sight glass for humidity control must be installed near the outlet of the accumulator tank and according to the instructions provided. A second sight glass should be mounted upstream of the regulator.

## **2.5 HEAT INSULATION FOR PIPES**

- .1 Flexible elastomeric insulation, single cell, sheet or tubular conforming to CAN/CGSB 51.40-M80, 25 mm thick for all refrigeration piping
-

**PART 3 - EXECUTION****3.1 GENERAL**

- .1 Install piping in accordance with CSA B52, ASME B31.5, SPE document 1/RA/1 and Section 23 05 05 - Piping Installation.
- .2 Connect the piping to the equipment with union fittings and provide isolation valves.
- .3 Provide adequate clearance for maintenance, disassembly and removal of equipment and components; follow manufacturer's recommendations.
- .4 Seal the unconnected ends of the piping and any other openings in the piping to prevent the introduction of foreign matter.

**3.2 SOLDERING METHOD**

- .1 Remove internal parts of valves, solenoid coils from solenoid valves, glass and glass tubes.
- .2 Avoid applying heat near regulators and sensitive components.

**3.3 INSTALLATION**

- .1 Perform installation of systems and associated controls as indicated on verified and approved shop drawings.
  - .2 Clearances: Leave adequate clearances around the unit for maintenance and repair.
  - .3 Piping
    - .1 Clean and purge the refrigerant lines and fittings.
    - .2 In the case of a multi-pipe installation, the pipes -must be spaced at least 150 mm apart to allow for expansion and contraction.
    - .3 The pipes must be installed in line and parallel, close to walls and ceilings, and at the prescribed slope.
    - .4 Minimize the number of elbows and fittings.
    - .5 Before installation, consult with the Departmental Representative regarding the equipment supplied and suggest any necessary changes in pipe size.
    - .6 The slope of the horizontal gas piping should be 1:240 downward in the - direction of flow.
    - .7 Oil level gauges with magnifying glass should be in plain view and piping should be installed to allow easy access to the compressor for repair and maintenance.
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- .8 Tubing that may be damaged should be installed inside rigid or flexible conduit.
- .9 Gaskets: Once the system is installed, make sure that the gaskets remain sealed at all times.
- .10 Use demountable fittings only for connections that are normally unbrazed. Flared connections are acceptable only for pipe sizes up to 10 mm nominal outside diameter if assembled in the field and up to 16 mm if assembled in the factory.
- .11 Brazing of hoses for anti-vibration devices and nipples mounted on hermetic compressors: use an alloy with a melting point equal to or lower than 620° C (silver solder).
- .12 One end of the anti-vibration devices must be attached directly to the compressor; the other end must be securely anchored.
- .4 Accessory elements
  - .1 Carry out the installation work according to the indications provided and the instructions given.
  - .2 Standard elements
    - .1 Ball shut-off valves mounted near the sight glass of the accumulator tank.
    - .2 Charge valve supplying the high and low pressure sides of the filter drier, including a solenoid valve and a thermostatic expansion valve.
  - .3 Specific accessory elements
    - .1 The trap should only be installed at the top of the condenser when the unit is operating under vacuum.

### 3.4 QUALITY CONTROL ON SITE

- .1 Pressure and tightness test
    - .1 Perform the leakage test prior to evacuating the system. Comply with the - requirements of CSA Standard B52; however, the pressure gauge on the high-pressure side shall not be less than 2 MPa and the pressure gauge on the low-pressure side shall not be less than 1 MPa.
    - .2 Use a refrigerant gas as a leak indicator, and dry nitrogen to increase the pressure.
    - .3 Compressors with refrigerant standby charge must remain isolated from the mains. Protect accessory components during testing.
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- .4 Initial pressure: The initial refrigerant gauge pressure on both the high and low - pressure sides must be 35 kPa. Add dry nitrogen during the field test.
- .5 Perform leakage tests using a leak detector.
- .6 Repair any leaks found and repeat the test.

### **3.5 COMMISSIONING AND ADJUSTMENT**

- .1 Provide all instruments, measuring devices and tooling required for testing. Set up controls to meet design requirements and manufacturer's specifications.
- .2 Ensure that the insulation of the refrigerant piping and ancillary components is complete.
- .3 Test the refrigeration system and record the following characteristics: inlet and outlet air temperature, dry bulb temperature and wet bulb temperature.
- .4 Check and record the operating voltage and current and compare to the motor nameplate. Check and record the characteristics of the starter heating element and ensure that they meet the design requirements. The voltage of each phase must be accurate to within 100 VA.
- .5 In cooperation with the manufacturer's representative, adjust the automatic control system so that the sequence of the various devices is as required.

Turn on the units, test operation and replace any oil and refrigerant losses.

### **3.6 DEMONSTRATION OF THE OPERATION OF THE DEVICES**

- .1 As required by Section 21 05 00 - General Requirements for Training of Operations and Maintenance Personnel, and as required by this Section.

END OF SECTION 23 23 00

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**PART 1 - GENERAL****1.1 RELATED REQUIREMENTS**

- .1 Section 23 05 00.02 Refrigeration - General Requirements
- .2 Section 23 23 00 Refrigerant systems

**1.2 REFERENCES**

- .1 Air-Conditioning, Heating and Refrigeration Institute (AHRI).
    - .1 AHRI 410, Standards for forced air cooling and heating coils.
    - .2 AHRI 430, Standards for under cabinet ventilation units.
    - .3 AHRI 520, Performance Rating of Positive Displacement Condensing Units.
  - .2 Air Movement and Control Association (AMCA).
    - .1 AMCA 301, Noise Level Publication Test for Air Moving Equipment.
  - .3 American National Standards Institute/National Fire Prevention Association (ANSI/NFPA).
    - .1 ANSI/NFPA-90A, Standard for the Installation of Air-Conditioning and Ventilating Systems.
  - .4 American Society for Testing and Materials International (ASTM).
    - .1 ASTM-A653/A653M, Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by Hot-Dip Process.
    - .2 ASTM-B117, Standard Practice for Operating Salt Spray (Fog) Apparatus.
    - .3 ASTM-C423, Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
    - .4 ASTM-E90, Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
    - .5 ASTM-E795, Standard Practices for Mounting Test Specimens during Sound Absorption Tests.
  - .5 Canadian Standards Association (CSA)/CSA International.
  - .6 Underwriters' Laboratories of Canada (ULC).
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- .1 CAN/ULC-S102, Standard Test Method; Surface Burning Characteristics of Building Materials and Assemblies.
- .7 Canadian General Standards Board (CGSB).
  - .1 CGSB 1 GP 181M, Zinc Rich Coating, Organic and Prepared
- .8 Sheet Metal and Air-Conditioning Contractors' National Association (SMACNA).
  - .1 SMACNA, HVAC Duct Construction Standards.

**1.3 DOCUMENTS/SAMPLES TO BE SUBMITTED FOR APPROVAL/INFORMATION**

- .1 Provide required documents and samples in accordance with general requirements.

**PART 2 - PRODUCTS****2.1 GENERAL**

- .1 Units factory assembled to form an air distribution unit that meets the design criteria indicated.

**2.2 SERPENTINS**

- .1 General :
    - .1 Corrugated flat fin coils: tubes attached to fins by mechanical means.
    - .2 All tubes and manifolds made of non-ferrous metal: brazing assembly.
    - .3 Maximum tube length: 3 m (10 ft.), unless otherwise specified.
    - .4 Factory-tested coils under air pressure and in the submerged state.
  - .2 See specification on drawings.
  - .3 Refrigerant coils, direct expansion system :
    - .1 Flat coils or straight tubes arranged to prevent oil accumulation. Distributors shall provide equal distribution of refrigerant to all circuits. Refrigerant tube seals welded or silver brazed. Coil drained, then filled with nitrogen and sealed before being shipped to the job site.
    - .2 Tubes: copper.
    - .3 Fins: flat aluminum fins.
    - .4 Collectors: copper.
-

- .5 Test pressure: according to the Canadian Refrigeration Code. Dry the tubes and charge them with nitrogen.

## **2.3 DRIP PANS**

- .1 Plan to adjust the existing drain pan to accommodate the new coil.
- .2 Ensure that the existing drain pan is watertight. Provide as needed according to the following specs:
- .3 A drip tray shall be installed under the heat pipe heat recovery unit and under the cooling coils, recovery and heating coils and humidification distributors.
- .4 Type 304 stainless steel 1 mm (0.08 in.) thick double sloped drip pan with 38 mm (1½ in.) diameter low point drain copper fitting; uniform slope of at least 1%, presenting no obstruction to complete water removal.
- .5 When cooling coils are stacked, full size drip pans must be provided to individually remove each coil. Each intermediate pan must be individually drained.
- .6 Pans must extend at least 150 mm (6 in.) beyond the downstream side of the coil.

## **2.4 CONTROL WIRING**

- .1 All control wiring within the 13 mm (0.5") diameter units shall be in metal conduit (EMT). Provide all empty conduit for the Control Contractor.

# **PART 3 - EXECUTION**

## **3.1 INSTALLATION**

- .1 Construct the units (assemble the components) so that they have smooth walls for the passage of air through the components, and so that when the units are subjected to a pressure of 150% the pressure of the fan, the leakage rate does not exceed 1% of the specified flow rate of the unit.
- .2 Caulking and installation of the envelope: before installation, putty all joints.
- .3 Place the units on a base as specified on the plans.

## **3.2 CONDENSATE TRAYS**

- .1 Install a deep-clearance trap with a siphon starter on the drain lines.
  - .2 The guard height should be 1.5 times the static pressure at that location.
  - .3 Drain all drip pans (fans, mixing boxes, etc.) with 1 1/2" diameter DWV copper tubing
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of the length required to connect to the funnel left by the nearest plumber or floor drain.

- .4 Unless otherwise specified on the plans, the drain and piping shall be supplied and installed by this section. Drainage pipe shall have a minimum depth of 250 mm.

### **3.3 TESTS**

- .1 Units assembled at the job site shall be field tested in the presence of the manufacturer.

END OF SECTION 23 73 10

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**PART 1 - GENERAL****1.1 REFERENCES**

- .1 American National Standards Institute (ANSI)/The Instrumentation, Systems and Automation Society (ISA). A
- .1 ANSI/ISA 5.5, Graphic Symbols for Process Displays. Style P2
- .2 American National Standards Institute (ANSI)/ Institute of Electrical and Electronics Engineers (IEEE). A
- .1 ANSI/IEEE 260.1, American National Standard Letter Symbols Units of Measurement (SI Units, Customary Inch-Pound Units, and Certain Other Units).
- .3 American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc (ASHRAE). A
- .1 ASHRAE STD 135, BACNET - Data Communication Protocol for Building Automation and Control Network.
- .4 Canadian Standards Association (CSA)/CSA International. C
- .1 CAN/CSA-Z234.1, Canadian Metric Guide.
- .5 Consumer Electronics Association (CEA). C
- .1 CEA-709.1, Control Network Protocol Specification.
- .6 Department of Justice Canada (Jus). D
- .1 Canadian Environmental Assessment Act (CEAA), c. 37.
- .2 Canadian Environmental Protection Act (CEPA), c. 33.
- .7 Health Canada - Workplace Hazardous Materials Information System (WHMIS). H
- .1 Material Safety Data Sheets (MSDS).
- .8 Transport Canada (TC). T
- .1 Transportation of Dangerous Goods Act (TDGA), c. 34.
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## 1.2 ACRONYMS AND ABBREVIATIONS

### .1

ist of acronyms used

- .1 AEL - Average Effectiveness Level.
  - .2 EA - Analog input.
  - .3 AIT - Agreement on Foreign Trade.
  - .4 SA - Analog output.
  - .5 BACnet - Building Automation and Control Network.
  - .6 CB - Building Controller.
  - .7 CCA - Center for environmental control.
  - .8 CAD - Computer Aided Design.
  - .9 CDL - Control Description Logic.
  - .10 SC - Control diagram.
  - .11 COSV - Change of State or Value.
  - .12 CPU - Central Processing Unit.
  - .13 EN/ED - Digital/digital input.
  - .14 SN/SD - Digital/Digital Output.
  - .15 PD - Differential pressure.
  - .16 ECU - Equipment Control Unit.
  - .17 EMS - Energy Management System.
  - .18 HVAC - Heating, ventilation, air conditioning.
  - .19 DI - Interface device.
  - .20 I/O - Input/Output.
  - .21 ISA - Industry Standard Architecture (ISA).
  - .22 LAN - Local Area Network.
  - .23 UCL/PCL - Local control unit/panel.
  - .24 MCU/PCM - Master Control Unit or Master Control Panel.
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- .25 NAFTA - North American Free Trade Agreement.
  - .26 NC - Normally closed.
  - .27 NO - Normally open.
  - .28 . OS - Operating System.
  - .29 O&M - Operation and Maintenance.
  - .30 PT - Workstation.
  - .31 PC - Personal Computer.
  - .32 ICP - Interface for device control.
  - .33 PCMCIA - Personal Computer Micro-Card Interface Adapter.
  - .34 PID - Proportional, integral, derivative.
  - .35 RAM - Random Access Memory.
  - .36 PS - Static pressure.
  - .37 ROM - Read Only Memory.
  - .38 TCU/TCP - Terminal Control Unit/Panel.
  - .39 USB - Universal Serial Bus.
  - .40 UPS - Uninterruptible Power Supply.
  - .41 VAV - Variable air volume.
-

### 1.3 DEFINITIONS

.1

oint: a point can be logical or physical.

- .1 Logical points: values calculated by the system, for example totals, counts, corrections following results and/or instructions from the control logic (CDL).
- .2 Physical points: inputs or outputs of equipment connected to controllers monitoring or giving the status of contacts or relays that interact with related equipment (on, off) or with valve or damper actuators.

.2

ype of point: the points are classified according to the following objects:

- .1 EA (analog input).
- .2 SA (analog output).
- .3 EN/ED (digital input/digital output).
- .4 SN/SD (digital/digital output).
- .5 Pulsed signals.

.3

ymbols and abbreviations for engineering units used in displays: in accordance with ANSI/ISA S5.5.

- .1 Printer outputs: ANSI/IEEE 260.1 compliant.

### 1.4 SYSTEM DESCRIPTION

.1

or the system architecture, refer to the control logic diagram in the drawings.

.2

he expression of metric units shall be in accordance with CAN/CSA Z234.1.

.3

perating and display language

- .1 Provide appropriate access codes for use of the system in French.
- .2 All software and information must be presented in French.

.4

he control devices will be chosen to ensure the best possible operation without oscillation while having sufficient sensitivity.

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.5  
nly the most recent generation of products should be submitted.

.6  
he control systems will be of digital type as specified in the plans and specifications. However, some  
protections may be of electrical type.

### **1.5 DOCUMENTS/SAMPLES TO BE SUBMITTED FOR APPROVAL/INFORMATION**

.1  
rovide required documents and samples in accordance with general requirements.

.2  
uality control:

- .1 Submit proof of compliance with referenced standards, including shop drawings and data sheets. A label or approval document from the standards organization is acceptable proof of compliance.
- .2 In lieu of acceptable proof, submit a certificate issued by a testing agency approved by the Departmental Representative stating that the equipment has been tested in accordance with the agency's standards/code.
- .3 In the case of equipment that is not quality controlled by an organization that uses a certification list or mark as proof of compliance, provide a certificate stating that the equipment conforms to the relevant referenced standard or specification.
- .4 Submit to the Departmental Representative an acceptance certificate issued by the competent authority.

.3  
hese designs include, more specifically, but not limited to:

- .1 Technical information on the control systems and their components (controller, temperature sensor, transmitter, etc.).
  - .2 Electrical diagrams and schematics of each control system produced using standard drawing software.
  - .3 Electrical diagrams of starters (fan, pump, etc.) and other equipment to be controlled (humidifier, generator, etc.).
  - .4 The complete architecture of the control system including all controllers, communication modules, etc.
  - .5 Plan views showing the location of each of the control panels.
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- .6 The list of points clearly indicating the used and free points.
- .7 The list of materials.
- .8 The operation sequence.
- .9 Procedures, diagrams and troubleshooting guide.
- .10 Preventive maintenance requirements.

.4  
Obtain electrical diagrams of starters and other required controls from Divisions 22 through 26 and others.

.5  
In the list of equipment to be used in the present work, indicate the manufacturer's name, model number and details of materials of manufacture of each item.

.6  
Consult the manufacturers' data and transmit to the other sections the necessary information so that they can plan the spaces required for their installation.

#### **1.6 DOCUMENTS/ITEMS TO BE SUBMITTED UPON COMPLETION OF THE WORK**

.1  
Provide the required documents in accordance with the general requirements.

.2  
As-built drawings, including any changes that occurred during the work:

- .1 Diagrams showing all control elements, including connection terminals for each device, electrical diagrams, etc.
- .2 The architecture of the centralized management system showing the computer stations, digital controllers, communication networks including the identification of the type of cable used, protocols, active components and UPS units.
- .3 A physical plan showing the location of control panels and control units, routing of piping, wiring and pneumatic control/command lines.

.3  
Also provide three hard copies of complete diagrams of these control systems after completion of the work. These diagrams shall be wrapped in clear, rigid plastic and shall be installed adjacent to each system as specified.

.4  
Operation and maintenance manuals

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- .1 Operations and maintenance manuals shall be comprehensive in scope and written in concise language that is easily understood by operating personnel. Terminology used should be consistent for all operational and functional requirements. Do not assume that operating personnel have knowledge of computers or electronics, or a thorough theoretical knowledge of control systems.
  - .2 Manuals must contain the following information:
    1. The list of components, the name of the manufacturer, the model used and the characteristics.
    2. A list of all software, including version numbers, for each computer station in the building automation system.
    3. A copy for each controller of the implemented programming (flowchart, textual or object type programming, as the case may be).
    4. For each control panel, a list of input/output points and the indication of free points.
    5. The operating sequences.
    6. Distribution panel and circuit breaker numbers associated with normal/emergency power sources;
    7. name, address, telephone number of each subcontractor who installed equipment, local representatives of equipment suppliers, for each system
    8. Test procedures and reports, including start-up procedures, test procedures, control tests and final commissioning reports, as required.
  - .3 Information on the operation of the system shall include the following:
    1. the operating principle;
    2. the design philosophy;
    3. the specific functions of the design philosophy and the system;
    4. operation of peripherals, input/output formats;
    5. the functions of the equipment, the characteristics of the components, for each function and each operating mode of the system;
-

6. Full details of data communications, including data types and formats, data processing and linking elements, interfaces;
7. step-by-step procedures for operating the system, including the actions required at each workstation;
8. return to normal operation after an emergency, alarm or failure;
9. The list of programmed alarms.
10. The list of programmed times.
11. A printout of the implemented graphics.
12. Detailed instructions on how to start up, how to operate the backup equipment, how to perform all system functions and operating modes, including how to enter each command, so that the operator only needs to refer to these pages to know what to hit on the keyboard to view information or enter a command.
13. All system configuration documentation, including any changes required for hardware and software modifications, required during the life of the system.

.4 Software documentation should include the following:

1. necessary data regarding theory, design, interface requirements, various functions, including test and verification procedures;
2. detailed descriptions of program capabilities and conditions of use;
3. the data necessary to allow modification, relocation, and reprogramming, and for program modules to respond to changes in the functional requirements of the system, without interrupting normal operations;
4. software modules, source code with required annotations, error-free source code files ready to be loaded through the devices;
5. all cross-references between programs and links, required data exchanges, lists of necessary subprograms, data file requirements, other information necessary for loading, integrating, interfacing and running programs;
6. the software driving each controller and the description, in a single section, of the functions and parameters common to all controllers.

aintenance :

- .1 A list of maintenance tasks and the frequency with which these tasks are to be performed, for each component requiring it, including where applicable:
  1. The item to be replaced with the model and the name of the distributor (battery, fuses, etc.).
  2. Tests and verifications to be performed on critical components.
  3. Calibration methods.
  4. Methods of troubleshooting.
- .2 Programmer's Control Panel Documentation :
- .3 A copy of the drawings after execution.
- .4 Following the adjustments requested by the Departmental Representative , provide an electronic PDF copy of the technical documents at the end of the project as well as an editable electronic copy in Excel, Visio, Word, etc. format, as the case may be.
- .5 This file will also have to be implemented in the site's operating station to allow users to access this information.

## **1.7 QUALITY AND SERVICE ASSURANCE**

- .1 Q  
ualification of the workforce
- .1 Installer shall be an expert in the field regulation.
- .2 A  
t all times, the contractor shall be able to provide technical support 24 hours a day, 7 days a week.

## **1.8 EXISTING CONTROL/REGULATION EQUIPMENT**

- .1 U  
se existing wiring and control lines as directed and when in good condition.
- .2 R  
eusable control/regulatory devices in their original configuration may be reused provided they comply with applicable codes, standards and requirements.
- .1 No changes may be made to the original design of an existing unit without the written permission of the Departmental Representative .
  - .2 If there is any doubt about the reuse of existing equipment, provide new
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equipment of appropriate design for the project in such cases.

.3

existing devices intended for reuse must be inspected and tested 30 days after contract award, but prior to the installation of new devices.

- .1 Provide the test report listing each device to be reused and indicating whether it is in good condition or whether it needs to be repaired, in which case the Departmental Representative will do so.
- .2 Failure to provide a test report shall mean that the Contractor accepts the existing devices.

.4

effective elements

- .1 Provide, with the test report, specifications or functional requirements to support the results.

.5

place existing control/regulatory devices that will not be reused or are not needed in an approved storage area.

.6

all equipment that will not be reused must be returned to the Departmental Representative . The same applies to the panels.

.7

if there is any doubt about the reuse of existing equipment, provide new equipment of appropriate design for the project in such cases. Provide a list of equipment so included in the bid. Also provide unit prices for all equipment items.

## **PART 2 - PRODUCTS**

### **2.1 GENERAL**

.1

use commonly manufactured, CSA certified and ULC listed equipment and fixtures where applicable, that comply with referenced standards and meet any other prescribed requirements.

.2

where CSA certified material is not available, submit the proposed material to the inspection authority for approval prior to delivery to the job site.

.3

unless otherwise specified, use new materials and equipment.

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.4 S  
pare parts that may be required for the control devices must be readily available.

.5 C  
heck the factory-made joints and retighten them if necessary to ensure continuity of the installation.

## 2.2 FINISH

.1 C  
lean and touch up shop-painted surfaces that have been scratched or damaged during shipping and installation; use paint of the same type and color as the original paint.

.2 C  
lean and prime non-galvanized hooks, brackets, fasteners and other exposed fastening devices to protect against rust.

## PART 3 - EXECUTION

### 3.1 INSTALLATION OF INSTRUMENTS AND OTHER COMPONENTS

.1 I  
nstall in accordance with general requirements and those of this section.

.2 S  
upply and install the necessary mounting hardware for an industrial quality, reliable and easy to adjust installation.

.3 S  
upply, install and connect all instruments and other components necessary for the proper operation of the control sequences described in this specification.

.4 D  
isconnect and shut off all power sources before and during any connection work on existing equipment.

### 3.2 ON-SITE QUALITY CONTROL

.1 C  
arry out quality control in accordance with general requirements.

.2 T  
he Departmental Representative reserves the right to reject any installation deemed unsatisfactory. The contractor shall correct the installation at his own expense.

### 3.3 CONTROL AND SUPERVISION OF THE WORK

.1 T

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he contractor shall have complete control of the work and shall effectively direct and supervise the work to ensure compliance with the documents.

.2

e shall be solely responsible for the means of construction, methods, techniques, sequences and procedures and for the coordination of all parts of the work performed under the contract.

### **3.4 WARRANTY AND TESTING**

.1

heck all systems and take responsibility for any defects that may occur within one year of final acceptance of the work by the Departmental Representative , replacing any defective equipment as necessary.

.2

f for any reason a device is not functioning properly, this contractor will be required, at the request of the Departmental Representative , to make the necessary adjustments to make the system function normally even if it means changing connections, undoing installations, relocating control devices, redoing programming, etc. He will have to provide all the necessary personnel and instruments to make these adjustments.

END OF SECTION 25 05 01

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**PART 1 - GENERAL****1.1 RELATED REQUIREMENTS**

- .1 Divisions applicable to this section:

- .1 Division 26 - Electricity

**1.2 REFERENCES**

- .1 CSA Group

- .1 CSA-C22.10-18, Quebec Construction Code, Chapter V - Electricity.

- .2 CAN3-C235-83(C2010), Recommended voltages for AC systems from 0 to 50,000 V.

- .3 CSA-Z462-12, Electrical Workplace Safety.

- .2 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.

**1.3 DEFINITIONS**

- .1 Electrical and Electronic Terms: Unless otherwise noted, the terminology used in this section and on the drawings is based on that defined in the IEEE Standard.

**1.4 DOCUMENTS/SAMPLES TO BE SUBMITTED FOR APPROVAL/INFORMATION**

- .1 Submit required documents and samples.

- .2 Technical data sheets

- .1 Submit required data sheets along with manufacturers' instructions and documentation. Data sheets shall include product characteristics, performance criteria, dimensions, limitations and finish.

- .3 Workshop drawings

- .1 Wiring diagrams and appliance installation details shall show the proposed location, layout and arrangement, control panels, accessories, piping, ductwork and all other items that must be shown in order to achieve a coordinated installation.
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- .2 Wiring diagrams should show terminal blocks, internal wiring for each device, and interconnections between devices.
- .3 Drawings shall show clearances for operation, maintenance and replacement of equipment.
- .4 Submit the various drawings to the Departmental Representative for approval by email in "PDF" format.
- .5 If changes are required, notify the Departmental Representative before they are made.
- .4 Certificates
  - .1 Use CSA certified equipment and materials.
  - .2 Where CSA certified equipment and materials are not available, submit the proposed equipment and materials to the Régie du bâtiment du Québec (RBQ) for approval prior to delivery to the job site.
  - .3 Licenses and fees: according to the general conditions of the contract.
- .5 Manufacturer's Field Inspection Reports: Submit to the Departmental Representative , not later than three (3) days after completion of the inspections and tests of the installation and electrical instruments required in PART 3, ON-SITE QUALITY CONTROL, a written report from the manufacturer showing that the work complies with the required criteria.

#### **1.5 DOCUMENTS/ITEMS TO BE SUBMITTED UPON COMPLETION OF THE WORK**

- .1 Operation and Maintenance Sheets: Provide operation and maintenance instructions to be incorporated into the Operation and Maintenance Manual.
    - .1 Provide operating instructions for each major system and for each major piece of equipment specified in the appropriate sections of the specifications for use by operations and maintenance personnel.
    - .2 Operating instructions shall include the following.
      - .1 Wiring diagrams, control diagrams, control sequence for each main system and for each device.
      - .2 Start-up, adjustment, lubrication, operation and shut-down procedures.
      - .3 Security measures.
      - .4 Procedures to be followed in case of failure.
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- .5 Other instructions, as recommended by the manufacturer of each system or device.
- .3 Provide printed or engraved instructions, framed in glass or laminated in an approved manner.
- .4 Post instructions in approved locations.
- .5 Operating instructions that are exposed to the weather must be made of resistant material or be placed in a weatherproof enclosure.
- .2 Ensure that the operating instructions will not fade if exposed to sunlight

#### **1.6 TRANSPORT, STORAGE AND HANDLING**

- .1 Transport, store and handle materials and equipment in accordance with this section and the manufacturer's written instructions.
- .2 Delivery and Acceptance: Deliver materials and equipment to the job site in their original packaging, which shall be labeled with the manufacturer's name and address.
- .3 Storage and handling
  - .1 Store materials and equipment in a clean, dry, well-ventilated area according to the manufacturer's recommendations.
  - .2 Store materials and equipment in a manner that protects them from marks, scratches and scrapes.
- .4 Replace damaged materials and equipment with new materials and equipment.

#### **1.7 MATERIALS AND EQUIPMENT**

- .1 All materials and equipment must be new, of the highest quality and bear a certification seal recognized by the Régie du bâtiment du Québec (RBQ) (e.g. CSA, ULC, cETL, etc.). Obtain approval from the Departmental Representative and the RBQ if the material or equipment does not have a recognized seal.
- .2 Manufacturers' labels must remain visible and legible on materials and equipment even after installation.

#### **1.8 DEFINITIONS**

- .1 "Furnish / Supply" means to provide, install, connect, adjust, support or any other maneuver to make the assembly compliant and functional.
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- .2 "Install / Installation" also implies "supply" (see previous point), unless otherwise specified.
- .3 Remove": proceed with the complete removal of the equipment.
- .4 "Dismantle" has the same definition as "remove" (see previous point).

## **1.9 PLANS AND SPECIFICATIONS**

- .1 The plans and the specifications have the same value, whether the information is found in one, the other or both, the requirements must be met.
- .2 Provide all materials and labor required to achieve the required result, even if not shown on the plans or specifications.
- .3 Report any discrepancies in the plans and/or specifications to the Departmental Representative during the bidding period. If the contractor fails to do so, it is understood that the most expensive solution takes precedence, and therefore, no supplement can be requested by the contractor in relation to this contradiction.

## **1.10 SUBMISSION**

- .1 It is the contractor's responsibility to verify that they have the most current documents prior to bidding. All addenda issued are an integral part of the project and must be included in the contractor's proposal.

## **1.11 IDENTIFICATION**

- .1 Ensure that nameplates, identification labels, compliance logos (CSA, cUL, etc.), etc. are perfectly legible once the equipment is in place.

## **1.12 LICENCES, PERMITS AND CERTIFICATES**

- .1 Obtain all necessary permits and certificates to carry out the work, and pay for them.
- .2 The contractor must present a valid license in accordance with the Building Act. This license must be renewed in the event that it expires during the course of the work.
- .3 If the contractor cannot demonstrate the above mentioned documents, the Departmental Representative reserves the right to refuse the bid for non-conformity

# **PART 2 - PRODUCTS**

## **2.1 DESIGN REQUIREMENTS**

- .1 Operating voltages shall be in accordance with CAN3-C235.
-

- .2 Motors, electric heaters, control/control/regulation and distribution devices shall operate satisfactorily at the 60 Hz frequency and within the limits established in the above standard.
  - .1 The equipment shall be capable of operating without damage under the extreme conditions defined in this standard.
- .3 Language of operation and display: Provide bilingual nameplates for control devices for identification and display purposes.
- .4 Use a nameplate [or label] for this purpose

## **2.2 MATERIALS/MATERIALS**

- .1 Materials and equipment shall be CSA certified. Where CSA certified materials and equipment cannot be obtained, submit replacement materials and equipment to the Régie du bâtiment du Québec (RBQ), prior to delivery to the job site, in accordance with the DOCUMENTS/SAMPLES TO BE SUBMITTED FOR APPROVAL/INFORMATION section of PART 1.
- .2 Control panels and component assemblies shall be factory assembled.

## **2.3 ELECTRIC MOTORS, DEVICES AND CONTROLS**

- .1 Verify installation and coordination responsibilities for motors, devices and controls as indicated.
- .2 Electrical wiring and raceways for control/control circuits: in accordance with Section 26 05 34 - Conduit, fasteners and conduit fittings.

## **2.4 WIRING TERMINATIONS**

- .1 Ensure that the terminals, lugs and screws of the wiring terminations are suitable for both copper and aluminum conductors.

## **2.5 EQUIPMENT IDENTIFICATION**

- .1 To designate electrical equipment, use nameplates and labels that comply with the following requirements.
    - .1 Indicator plates: 3 mm thick lamicoid plastic engraving plates, with :
      - .1 black face and white writing (for equipment on normal electrical network).
    - .2 Plates shall be mechanically fastened by means of tapping screws, with properly aligned lettering, engraved to the core of the plate.
    - .3 Format according to the following table:
-

FORMAT OF THE NAMEPLATES

<u>Format 1</u>	<u>10 mm x 50 mm</u>	<u>1 line</u>	<u>Letters of 3 mm height</u>
<u>Format 2</u>	<u>12 mm x 70 mm</u>	<u>1 line</u>	<u>5 mm high letters</u>
<u>Format 3</u>	<u>12 mm x 70 mm</u>	<u>2 lines</u>	<u>Letters of 3 mm height</u>
<u>Format 4</u>	<u>20 mm x 90 mm</u>	<u>1 line</u>	<u>8 mm high letters</u>
<u>Size 5</u>	<u>20 mm x 90 mm</u>	<u>2 lines</u>	<u>5 mm high letters</u>
<u>Size 6</u>	<u>250 mm x 100 mm</u>	<u>1 line</u>	<u>12 mm high letters</u>
<u>Size 7</u>	<u>25 mm x 100 mm</u>	<u>2 lines</u>	<u>6 mm high letters</u>

- .2 Labels: unless otherwise specified, use plastic labels with 6 mm high raised letters.
- .3 Nameplate markings must be approved by the Departmental Representative prior to manufacture.
- .4 Provide a minimum of twenty-five (25) letters per plate.
- .5 The nameplates on the terminal boxes and junction boxes shall indicate the mains and/or voltage characteristics.
- .6 The nameplates of disconnectors, starters and contactors shall indicate the device being controlled and the voltage.
- .7 The nameplates on the terminal boxes and pull boxes must indicate the network and voltage.
- .8 Transformer nameplates must indicate the power and the primary and secondary voltages

**2.6 IDENTIFICATION OF THE WIRING**

- .1 Both ends of the phase conductors of each feeder and branch circuit shall be permanently and indelibly marked with colored numbered plastic tape.
- .2 Keep the phase order and the same color code for the whole installation.
- .3 Color coding shall be in accordance with CSA C22.1.
- .4 Use communication cables with uniform color-coded conductors throughout the network.

**2.7 IDENTIFICATION OF CONDUITS AND CABLES**

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- .1 Color code conduit, boxes and metal-clad cables.
- .2 Apply plastic tape or paint to cables or conduits every 15 m and at wall, ceiling and floor penetrations as a means of marking.
- .3 The bands of the basic colors must be 25 mm wide and those of the complementary colors, 20 mm wide.

Type	Base color	Complementary Color
Up to 250 V	Yellow	
Up to 600 V	Yellow	Green
Phone	Green	
Other communication networks	Green	Blue
Fire alarm	Red	
Emergency communication	Red	Blue
Other security systems	Red	Yellow

## 2.8 FINISH

- .1 Metal enclosure surfaces shall be shop finished with rust inhibiting primer, inside and out, and a minimum of two (2) coats of paint-enamel finish.
  - .1 Electrical equipment to be installed outdoors shall be painted "machine green" in accordance with AMEEC Y1-1, latest edition.
  - .2 Switchgear and distribution cabinets installed indoors shall be painted [light gray], per AMEEC Y1-1, latest edition.

## PART 3 - EXECUTION

### 3.1 INSPECTION

- .1 Verification of Conditions: Before proceeding with installation, ensure that the condition of surfaces/substrates previously installed under other sections or contracts is acceptable and allows the work to be performed in accordance with the manufacturer's written instructions.
    - .1 Perform a visual inspection of surfaces/supports.
    - .2 Immediately notify the Departmental Representative of any unacceptable conditions found.
    - .3 Begin installation work only after unacceptable conditions have been corrected.
-

**3.2 INSTALLATION**

- .1 Unless otherwise specified, perform the entire installation in accordance with **CSA C22.1**.
- .2 Unless otherwise specified, install overhead and underground systems in accordance with **CAN/CSA-C22.3** Number 1.

**3.3 DOCUMENTS FOR CONSTRUCTION**

- .1 Make sure you have the "For Construction" documents sealed before starting the work.

**3.4 HEALTH AND SAFETY**

- .1 Take all necessary measures to ensure the health and safety of workers.
- .2 Perform the work in accordance with the requirements of CSA Z462 "Electrical Safety in the Workplace".

**3.5 RESPONSIBILITIES**

- .1 During the work, the contractor is responsible for his equipment and must protect it adequately (e.g.: vandalism, water, debris, etc.).
- .2 Block off any end of the duct during the work to prevent anything from entering the duct and interfering with the future use of the duct.
- .3 Install equipment in a manner that minimizes clutter and frees up as much space as possible, while ensuring access, safety and in accordance with manufacturer's recommendations.
- .4 Temporary use of the premises does not commence the warranty period, which begins only upon final delivery.
- .5 Facilities and equipment must be cleaned and restored to proper working order before acceptance. Replace any damaged equipment.
- .6 Ensure that completed or in-progress work has adequate protection. The Contractor shall replace at his own expense any work damaged due to lack of protection.

**3.6 CLEANING**

- .1 Clean up during the course of the work: carry out the cleaning work. Leave the premises clean at the end of each work day.
  - .2 Final clean-up: remove excess materials/materials, waste, tools and equipment from the site. Clean all equipment so that it is perfectly clean.
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- .3 Apply a coat of paint to any equipment with scratches or defects. The color shall be the same as the equipment in question.
- .4 Waste management: sorting waste for reuse and recycling.
  - .1 Remove recycling bins and dumpsters from the job site and dispose of materials at the appropriate facilities.

### **3.7 WASTE MANAGEMENT AND DISPOSAL**

- .1 Sort the waste in order to direct it to the right facilities and place it in the appropriate containers, according to its nature.
- .2 Dispose of recyclable waste off-site at appropriate recycling facilities, depending on the nature of the waste.
- .3 Evacuate waste containing hazardous or toxic materials from the site to specialized facilities for neutralization or reclamation.
- .4 Send to landfill, when it is impossible to do otherwise, waste that does not fit the previous categories.

### **3.8 COORDINATION**

- .1 Become aware with all construction documents and shop drawings before beginning installation of equipment. Ensure that identified locations do not interfere with the work of other trades.
- .2 The ventilation contractor has priority for the installation of his equipment and will direct other contractors on the routes to be used. Follow the ventilation contractor's instructions.
- .3 Coordinate the dimensions of the equipment concrete bases (cleanup bases) for all equipment installed on the floor, according to the accepted equipment shop drawings. Concrete bases shall be a minimum of 100mm high and have 100mm overhang from the equipment attachment to its perimeter on all sides.

### **3.9 TEMPORARY FACILITIES**

- .1 In the event that the material is not obtained in time for possession, the contractor shall furnish and install, at its expense, temporary equipment to accommodate the Departmental Representative .
- .2 All temporary work required to perform the requested work shall be included, even if not shown on the plans and/or specifications. They include both equipment and labor.

### **3.10 DISMANTLING WORKS**

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- .1 When equipment is requested to be "removed" or "dismantled", the removal must be done for the equipment itself, as well as any related accessories (brackets, fixtures, etc.). Any sections of the electrical supply (conduit conductors, cables, etc.) or associated controls (switches, etc.) that are not reused must also be removed. For downstream equipment on the circuit, restore electrical continuity to the equipment.
- .2 For "to be relocated" equipment, the contractor shall include the extension of the electrical branch or feeder to the new location. Associated control shall also be relocated as indicated.
- .3 Perform dismantling work with minimal impact on building operations. If required, provide the necessary temporary services so as not to impact building users.
- .4 It is understood that the contractor will relocate any equipment within his discipline that interferes with the installation of other disciplines' equipment, even if not shown on the plans and/or specifications.
- .5 Carry out the dismantling work at the time agreed upon with the Departmental Representative , communicating with the latter at least 3 days in advance of the proposed date.
- .6 At the beginning of the work, ask the Departmental Representative if he wishes to keep any equipment that is requested to be removed on the plans. If so, pay close attention to the equipment in question and place it in the location identified by the Departmental Representative . For the rest of the equipment to be removed, the contractor must dispose of it outside the building.
- .7 At no time shall the contractor reuse removed equipment unless otherwise specified on the plans.
- .8 Notify the Departmental Representative of any equipment in poor condition that is to be retained or relocated, and do not dismantle it until authorized by the Departmental Representative . Otherwise, it will be assumed that the equipment removed was in good condition.

### **3.11 LABELS, NAMEPLATES AND NAMEPLATES**

- .1 Ensure that CSA labels, nameplates and data plates are visible and legible after the equipment is installed.

### **3.12 SLEEVES AND HOLES**

- .1 Where plastic sleeves are used for fire rated wall or floor penetrations, remove them prior to installing the conduit.
  - .2 Before drilling any structural member, obtain approval from the Departmental
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Representative .

- .3 Use a water-powered rotary drill to make the holes or coordinate the equipment to be used with the structural Departmental Representative . Impact or vibratory devices are prohibited.
- .4 Coordinate with the Departmental Representative the times when the drilling can be done, all with the goal of minimizing impacts on building users in areas adjacent to the work.
- .5 All penetrations shall be sealed after the service has been routed through them. Use material with the same or better characteristics as the partition being penetrated, particularly with respect to fire resistance or soundproofing. Coordinate with the Departmental Representative .
- .6 Any piercing in an existing concrete structure must be x-rayed to avoid causing damage to an existing concealed service. The contractor who causes damage by not having previously done the "scan" here requested will be responsible for the cost of repairs.
- .7 Drilling up to 150mm (6") is the responsibility of the electrical contractor.
- .8 Drillings of larger diameters will be done by the general contractor instead.

### **3.13 ACCESS HATCHES**

- .1 Provide appropriately sized access hatches for any electrical equipment concealed behind a non-accessible wall or ceiling. Hatches shall be of the same fire resistance as the partitions in which they are installed. Optimize (group) concealed electrical equipment as much as possible to minimize the amount of trapdoor required. Obtain approval from the Departmental Representative of the location of access hatches prior to installation.

### **3.14 LOCATION OF OUTPUTS AND POWER SUPPLIES**

- .1 Locate outlets and receptacles as indicated in Section 26 05 32 - Outlet, Branch and Accessory Boxes.
  - .2 Do not install outlets and receptacles back-to-back in a wall; leave at least 150 mm horizontal clearance between boxes.
  - .3 The location of outlets and receptacles may be changed at no additional cost or credit, provided the displacement does not exceed 3000 mm and notice is given prior to installation.
  - .4 Place light switches near the doors on the handle side.
-

- .1 In mechanical and elevator machinery rooms, place disconnect switches near the doors on the handle side.

### **3.15 MOUNTING HEIGHTS**

- .1 Unless otherwise specified or ordered, measure the mounting height of equipment from the surface of the paved floor to their centerline.
- .2 In cases where the mounting height is not indicated, check with the appropriate people before starting the installation.
- .3 Unless otherwise specified, install the equipment at the height shown below.
  - .1 Light switches: 1200 mm.
  - .2 Wall outlets
    - .1 In general: 300 mm.
    - .2 Over continuous baseboard heaters: 200 mm.
    - .3 Above a work surface or its backsplash: 175 mm.
    - .4 In mechanical rooms: 1200 mm.
  - .3 Distribution panels: according to the requirements of the C22.1 standard.
  - .4 Telecommunication output: 300 mm.
  - .5 Fire alarm stations: 1200 mm.
  - .6 Fire alarm horns: top at least 2300 mm from floor or 150 mm below ceiling level

### **3.16 COORDINATION OF PROTECTIVE DEVICES**

- .1 Ensure that circuit protection devices such as overcurrent releases, relays and fuses are installed, sized and set to the required values.

### **3.17 ON-SITE QUALITY CONTROL**

- .1 Perform tests on the following items:
    - .1 Electrical distribution system, including phase, voltage and grounding control, and load balancing.
    - .2 Circuits from the branch panels.
    - .3 Lighting system and control/regulation devices.
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- .4 Motors, heaters, and related control/regulation devices, including controls for sequential operation of systems where applicable.
- .5 Fire alarm system, provide a certificate of proper operation signed by a recognized authority.

- .2 Perform tests in the presence of the Departmental Representative , if requested.
- .3 Provide measuring devices, gauges, apparatus and personnel required for testing during the performance of the work and upon completion of the work.

**3.18 START-UP OF THE INSTALLATION**

- .1 Instruct operating personnel in the operation and maintenance of the facility, its equipment and components.

**3.19 BALANCING**

- .1 Measure the phase current of the distribution panels at the time of acceptance of the work. Arrange branch circuit connections for best balance of current between phases and note changes in original connections.
- .2 Measure the phase voltages at the devices and adjust the transformer taps so that the resulting voltage is within 2% of the rated voltage of the devices.
- .3 Upon completion of the measurements, as prescribed in PART 1, DOCUMENTS/SAMPLES TO BE SUBMITTED FOR APPROVAL/INFORMATION. This report shall show the normal load operating currents taken on the phases and neutrals of distribution panels, dry-type transformers and motor control centers. Specify the time and date each load was measured and the circuit voltage at the time of the measurements.

**3.20 CHANGES DURING CONSTRUCTION**

- .1 During the course of the work, changes to the plans and specifications may be required.
  - .2 No changes to the plan and specifications shall be made without first issuing a site directive.
  - .3 Field directives issued during the course of the project have only the scope indicated in them, all other conditions in the plans and specifications remain. In addition, the requirements of the plans and specifications (e.g. use of armoured cables vs. conduits) apply to the requested modifications, unless otherwise indicated.
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- .4 If the change has a cost impact, the contractor shall submit the proposal to the Departmental Representative for approval. The contractor shall submit a credit if the changes result in a lower cost than originally anticipated. Obtain acceptance of the amount from the Departmental Representative prior to commencing the requested work.
- .5 The contractor's hourly rates shall not exceed the rates recommended by the Association de la construction du Québec (ACQ).

**3.21 ACCEPTANCE OF WORK**

- .1 Notify the Departmental Representative when the work is completed so that an initial inspection visit can be made.
- .2 Following this visit, a first list of deficiencies will be issued. The contractor must correct all the points indicated and notify the Departmental Representative when completed, so that a second inspection visit can be made.
- .3 If everything is in conformity and acceptable following this second visit, a final acceptance certificate of the work will be issued.

**3.22 TRAINING**

- .1 Provide required documentation and manpower to instruct operations and maintenance personnel on the use, operation, adjustment, diagnosis, maintenance or other pertinent information related to the material and equipment.

**3.23 PLANS ANNOTATED BY THE CONTRACTOR AT THE END OF THE WORK**

- .1 Provide Contractor's annotated "as-built" end-of-job plans demonstrating in red ink field decisions that are modifications to the Departmental Representative 's final plans.
  - .2 Indications shall show changes in materials and equipment, as well as wiring and positioning.
  - .3 Identify each page of plans with a stamp indicating that they are contractor marked plans. The stamp shall also be signed and dated by the contractor
  - .4 Once completed, submit the annotated plans to the Departmental Representative for verification. Make corrections as required by the Departmental Representative 's comments.
  - .5 Finally, attach the annotated plans to the completion manuals.
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END OF SECTION 26 05 00

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**PART 1 - GENERAL****1.1 RELATED REQUIREMENTS**

- .1 Section 26 05 00 - Electrical - General Requirements.
- .2 Section 26 05 21- Wires and cables (0-1000V).

**1.2 REFERENCES**

- .1 CSA Group (CSA)
  - .1 **CAN/CSA-C22.2** Number 18-[F98(C2003)], Outlet Boxes, Conduit Boxes, Fittings and Accessories.
  - .2 **CAN/CSA-C22.2** Number 65-[F03(C2008)], Wire Connectors (Tri-national Standard with **UL 486A-486B** and NMX-J-543-ANCE-03).
- .2 Electrical and Electronic Equipment Manufacturers Association of Canada (EEAMC)
  - .1 **EEMAC 1Y-2-[1961]**, Connectors for feedthrough terminals and adapters in aluminum (current rating 1200 A).
- .3 National Electrical Manufacturers Association (NEMA)

**1.3 TRANSPORTATION, STORAGE AND HANDLING**

- .1 Transport, store and handle materials and equipment in accordance with Section 26 05 00 and the manufacturer's written instructions.

**1.4 WASTE MANAGEMENT AND DISPOSAL**

- .1 Sort waste for reuse/recycling in accordance with Section 26 05 00.

**PART 2 - PRODUCTS****2.1 MATERIALS**

- .1 Cable pressure connectors conforming to **CAN/CSA-C22.2** No. 65, with copper current carrying elements, suitable for copper conductors as required.
  - .2 Lighting fixture splicing connectors conforming to **CAN/CSA-C22.2** No. 65, with copper current carrying elements, suitable for copper conductors 10 AWG or smaller.
  - .3 Feedthrough terminal connectors conforming to applicable NEMA standards and consisting of the following
    - .1 Connector body and clamp for copper conductor.
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- .2 Clamp bolts.
- .3 Bolts for copper conductors.
- .4 Of appropriate size for the conductors.
- .4 Armoured cable clamps or connectors, as required, conforming to **CAN/CSA-C22.2** No. 18.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- .1 Verification of Conditions: Before installing cable and box connectors, ensure that the condition of surfaces/substrates previously installed under other sections or contracts is acceptable and allows the work to be performed in accordance with the manufacturer's written instructions.
  - .1 Perform a visual inspection of surfaces/supports.
  - .2 Immediately notify the Departmental Representative of any unacceptable conditions found.
  - .3 Begin installation work only after unacceptable conditions have been corrected.

#### **3.2 INSTALLATION**

- .1 Carefully strip the ends of the conductors and cables and then, as appropriate, do the following
    - .1 Apply a coat of zinc-based joint compound to the aluminum cable splices before installing the connectors.
    - .2 Install the pressure connectors and tighten the screws using a compression tool recommended by the manufacturer. Installation shall be in accordance with tightening tests performed in accordance with **CAN/CSA-C22.2** No. 65.
    - .3 Install the lighting connectors and tighten them in accordance with **CAN/CSA-C22.2** No. 65. Replace the insulation cap.
    - .4 Install feed-through terminal connectors in accordance with applicable NEMA standards.
    - .5 Install stress cones and terminations, and make splices, in accordance with the manufacturer's instructions.
    - .6 If necessary, ground and bond.
-

### **3.3 CLEANING**

- .1 Cleanup during construction: Perform cleanup in accordance with Section 26 05 00.
  - .1 Leave the premises clean at the end of each work day.
- .2 Final Cleanup: remove excess materials/materials, waste, tools and equipment from the job site in accordance with Section 26 05 00.
- .3 Waste Management: sort waste for reuse/recycling and/or recycling in accordance with Section 26 05 00.
  - .1 Remove recycling bins and dumpsters from the job site and dispose of materials at the appropriate facilities.

END OF SECTION 26 05 20

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**PART 1 - GENERAL****1.1 RELATED REQUIREMENTS**

- .1 Section 26 05 00 - Electrical - General Requirements.
- .2 Section 26 05 34 - Conduit, Fixtures and Fittings.
- .3 Section 26 05 20 - Connectors for cables and boxes (0 - 1000 V).

**1.2 REFERENCES**

- .1 N/A

**1.3 TECHNICAL DATASHEETS**

- .1 Submit the required data sheets in accordance with Section 26 05 00.

**1.4 TRANSPORTATION, STORAGE AND HANDLING**

- .1 Transport, store and handle materials and equipment in accordance with Section 26 05 00 and the manufacturer's written instructions.

**1.5 WASTE MANAGEMENT AND DISPOSAL**

- .1 Sort waste for reuse/recycling and recycling in accordance with Section 26 05 00.

**PART 2 - PRODUCTS****2.1 BUILDING INDUSTRY**

- .1 Conductors: stranded if 10 AWG and larger; minimum size 12 AWG.
- .2 The use of aluminum conductors is permitted for arteries of 60A and above.
- .3 Conductors of the size indicated, under cross-linked thermosetting polyethylene insulation,
  - .1 Inside: for 600V and type RW90 XLPE;
  - .2 For outdoor or underground use: for 1000V and type RWU90 XLPE.

**2.2 TECK 90 CABLES**

- .1 Cables: Conform to Section 26 05 00 - Electrical - General Requirements for Results of Work.
-

.2 Drivers

.1 Supply conductors: copper, of the size indicated.

.2 Complete with grounding conductor.

1. Insulation
2. Cross-linked polyethylene (XLPE).
3. Nominal voltage: 600V.

.3 Sheath: polyvinyl chloride.

.4 With metal armor.

.5 Outer shell: Thermoplastic polyvinyl chloride, meeting building code requirements.

.6 Fasteners

1. Single hole steel clamps for exposed cables up to 50 mm. Two hole steel clamps for cables over 50 mm.
2. U-shaped supports for groups of two or more cables, placed at 1.5m intervals.
3. Threaded suspension rods: 6 mm diameter, for U-shaped supports.

.7 Connectors

1. Approved waterproof models suitable for TECK cables.

### **PART 3 - EXECUTION**

#### **3.1 ON-SITE QUALITY CONTROL**

- .1 Test in accordance with Section 26 05 00.
- .2 Perform tests using methods appropriate to local conditions and approved by the Régie du bâtiment du Québec (RBQ)
- .3 Test before turning on the electrical system.

#### **3.2 CABLE INSTALLATION – GENERAL**

- .1 Terminate the cables in accordance with section 26 05 20 - Connectors for cables and boxes 0 - 1000 V.
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- .2 Use cable color coding in accordance with Section 26 05 00 - Electrical - General Requirements for Work Results.
- .3 Parallel supply arteries must be the same length.
- .4 Attach or clip feeder cables to distribution centers, pull boxes and terminations.
- .5 Concealed wiring in walls should be run downhill or in vertical loops to facilitate future work. Unless otherwise specified, avoid routing cabling up and down as well as horizontally in walls.
- .6 Use only two-wire circuits for branches to surge-protected outlets as well as for permanently connected electronic and computer equipment. Common neutral circuits are not permitted.
- .7 The control wiring shall be identified by collars with numbering corresponding to the legend on the shop drawings.

### **3.3 INSTALLATION OF THE BUILDING'S WIRING**

- .1 Laying the wire :
  - .1 In conduit in accordance with Section 26 05 34 - Conduit, Attachments and Fittings.

### **3.4 INSTALLATION OF TECK90 CABLES (0 - 1000 V)**

- .1 Whenever possible, group cables on U-shaped supports.
- .2 Lay the cables, securing them with clamps.

END OF SECTION 26 05 21

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**PART 1 - GENERAL****1.1 RELATED REQUIREMENTS**

- .1 Section 26 05 00 - Electrical - General Requirements.

**1.2 REFERENCES**

- .1 CSA Group (CSA)
  - .1 CAN/CSA C22.10-18, Quebec Construction Code, Chapter V - Electricity.

**1.3 TRANSPORTATION, STORAGE AND HANDLING**

- .1 Transport, store and handle materials and equipment in accordance with Section 26 05 00 and the manufacturer's written instructions.

**1.4 WASTE MANAGEMENT AND DISPOSAL**

- .1 Sort waste for reuse/recycling and recycling in accordance with Section 26 05 00.

**PART 2 - PRODUCTS****2.1 JUNCTION AND DRAWING BOXES**

- .1 Construction: steel boxes, welded.
- .2 Covers, for flush mounting: Covers with edge protruding at least 25 mm.
- .3 Covers, for surface mounting: flat covers, to be screwed on.

**PART 3 - EXECUTION****3.1 INSTALLATION OF JUNCTION AND PULL BOXES**

- .1 Install pull boxes in concealed but easily accessible locations.
- .2 Only main junction and pull boxes are shown. Install additional boxes as required by CSA C22.1.

**3.2 IDENTIFICATION LABELS**

- .1 Equipment identification: in accordance with section 26 05 00.
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- .2 Labels: size 2, indicating the name of the network, the admissible current, the voltage and the number of phases.

END OF SECTION 26 05 31

**PART 1 - GENERAL****1.1 RELATED REQUIREMENTS**

- .1 Section 26 05 00 - Electrical - General Requirements.
- .2 Section 26 05 34 - Conduit, Fixtures and Fittings.

**1.2 REFERENCES**

- .1 CSA Group (CSA)
  - .1 CAN/CSA C22.10-18, Quebec Construction Code, Chapter V - Electricity.

**1.3 DOCUMENTS TO BE SUBMITTED FOR APPROVAL/INFORMATION**

- .1 Submit required documents in accordance with Section 26 05 00

**1.4 TRANSPORTATION, STORAGE AND HANDLING**

- .1 Transport, store and handle materials and equipment in accordance with Section 26 05 00 and the manufacturer's written instructions.

**1.5 WASTE MANAGEMENT AND DISPOSAL**

- .1 Sort waste for reuse/recycling in accordance with Section 26 05 00.

**PART 2 - PRODUCTS****2.1 OUTLET AND JUNCTION BOXES - GENERAL**

- .1 Boxes are sized according to CSA C22.1.
- .2 Outlet boxes at least 102 mm square, as required.
- .3 Grouped boxes when several small devices are installed in the same place.
- .4 Solid lids for boxes without small equipment.
- .5 347 V output boxes for 347 V switching devices.
- .6 Combined boxes with partitions when the outlets of more than one network are grouped together.

**2.2 STEEL OUTLET BOXES**

- .1 One-piece boxes in electro-galvanized steel.
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- .2 Single or grouped boxes, minimum 76 mm x 50 mm x 38 mm or as specified, for flush mounting. Outlet boxes 102 mm square when more than one conduit enters on the same side, with extension frames and plaster frames as required.
- .3 Junction boxes of at least 102 mm x 54 mm x 48 mm, for connection to surface mounted EMT pipes.
- .4 Square outlet boxes of 102 mm side, or octagonal, for lighting fixtures.
- .5 Extension frames and plastering frames, for flush mounting in gypsum or ceramic tile walls.

### **2.3 JUNCTION BOXES (FOR CONDUITS)**

- .1 FS or FD type molded aluminum boxes, with factory tapped openings, and mounting brackets for surface mounting.

### **2.4 ACCESSORIES - GENERAL**

- .1 Fittings and connectors with nylon insulating collar.
- .2 Knockout plugs, to prevent debris from entering.
- .3 Access fittings for conduits up to 35 mm diameter, and pull boxes for larger conduits.
- .4 Double locknuts and insulated sleeves on sheet metal boxes.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- .1 Secure boxes so that they are supported independently of the conduits that are connected to them.
  - .2 Fill boxes with paper, sponge, foam or other similar material to prevent debris from entering during construction. Remove these materials when work is complete.
  - .3 For outlet boxes installed flush with the finished wall, use plaster frames to allow the edges of the wall covering to be within 6 mm of the opening.
  - .4 Box openings shall be sized to accommodate conduit, mineral insulated cable and armored cable fittings. Reducing washers shall not be used.
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- .5 Vacuum the inside of the outlet boxes before installing the small equipment.
- .6 Locate outlet boxes as needed.

END OF SECTION 26 05 32

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**PART 1 - GENERAL****1.1 RELATED REQUIREMENTS**

- .1 Section 26 05 00 - Electrical - General Requirements.
- .2 Section 26 05 21 - Wires and cables (0 - 1000 V).
- .3 Section 26 05 32 - Outlet and junction boxes and accessories.

**1.2 REFERENCES**

- .1 CSA Group (CSA)
  - .1 **CAN/CSA-C22.2** Number 18-[F98(R2003)], Outlet Boxes, Conduit Boxes, Fittings and Accessories, National Standard of Canada.
  - .2 **CSA C22.2** Number 45-[FM1981(C2003)], Rigid Metal Conduit.
  - .3 **CSA C22.2** NUMBER 56-[F04], Flexible Metal Conduit and Liquidtight Flexible Metal Conduit.
  - .4 **CSA C22.2** Number 83-[FM1985(C2003)], Electrical Metal Tubing.
  - .5 **CSA C22.2** No. 211.2-[FM1984(C2003)], Rigid Unplasticized Polyvinyl Chloride Pipe.
  - .6 **CAN/CSA-C22.2** No. 227.3-[F05], Non-Metallic Mechanical Protection Tubes (NMMPT), National Standard of Canada.

**1.3 DOCUMENTS/SAMPLES TO BE SUBMITTED FOR APPROVAL/INFORMATION**

- .1 Submit required documents and samples in accordance with Section 26 05 00.
  - .2 Data Sheets: Submit required data sheets, manufacturer's specifications and documentation for the products covered.
  - .3 Submit the manufacturer's documentation for the affected cables.
  - .4 Quality Assurance
    - .1 Test Reports: Submit test reports from recognized independent laboratories.
    - .2 Certificates: Submit documents signed by the manufacturer, certifying that the products, materials and equipment meet the physical and performance requirements.
    - .3 Instructions: Follow the installation instructions provided by the manufacturer.
-

**1.4 TRANSPORTATION, STORAGE AND HANDLING**

- .1 Transport, store and handle materials and equipment in accordance with Section 26 05 00 and the manufacturer's written instructions.

**1.5 WASTE MANAGEMENT AND DISPOSAL**

- .1 Sort waste for reuse/recycling and recycling in accordance with Section 26 05 00.
- .2 Place substances that meet the definition of toxic or hazardous waste in designated containers.
- .3 Ensure that empty containers are sealed and stored properly out of reach of children for disposal.

**PART 2 - PRODUCTS****2.1 CONDUITS**

- .1 Electrical Metallic Tubing (EMT): conforms to **CSA C22.2** No. 83, with fittings.
- .2 Rigid metal conduit: **CSA C22.2** No. 45 compliant, galvanized steel, screw-in.

**2.2 CONDUITS FASTENERS**

- .1 One-hole steel clamps for securing exposed conduits with a nominal diameter of 50 mm or less.
  - .1 2-hole flanges, made of steel, for fixing conduits with a nominal diameter greater than 50 mm.
- .2 Beam clamps for securing conduits to exposed steel structures.
- .3 U-shaped brackets to support multiple conduits, to be arranged at 1.5 m centres.
- .4 6 mm diameter threaded rods to hold the suspension brackets.

**2.3 CONDUIT FITTINGS**

- .1 Fittings: conform to **CAN/CSA C22.2** No. 18, specially manufactured for the specified conduit. Coating: Same as the one used for the conduits.
  - .2 Prefabricated L-fittings, to be installed where 90 degree elbows are required on 25mm and larger conduits.
  - .3 Watertight fittings and connecting sleeves for electrical metal pipes.
    - .1 Pressure screw joints are not permitted.
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**2.4 PULLING WIRES**

- .1 Made of polypropylene, 5 mm diameter, for a tensile strength up to 5 kN.

**PART 3 - EXECUTION****3.1 MANUFACTURER'S INSTRUCTIONS**

- .1 Compliance: Comply with the manufacturer's requirements, recommendations and written specifications, including any available technical bulletins, product handling, storage and installation instructions, and data sheet indications.

**3.2 INSTALLATION**

- .1 Install exposed ducts in a manner that does not reduce the room's headroom and uses as little space as possible.
- .2 Conceal conduits except those in mechanical and electrical rooms and in unfinished rooms.
- .3 Use electrical metal tubing (EMT) where there is no risk of damage to the conduit.
- .4 Use a minimum of 19 mm conduit for lighting and power circuits.
- .5 Cold bend the pipes.
  - .1 Replace conduit that has been reduced by more than 1/10 of its original diameter due to crushing or distortion.
- .6 Mechanically bend steel conduits over 19 mm in diameter.
- .7 Rigid conduit shall be threaded at the job site to a length sufficient to allow for tight joints.
- .8 Install a pull wire in empty conduits.
- .9 Remove and replace clogged conduit sections.
  - .1 The use of liquids to unclog the pipes is prohibited.
- .10 Dry the conduits before running the wiring through them.

**3.3 EXPOSED CONDUITS**

- .1 Install conduits parallel or perpendicular to the building site lines.
  - .2 Behind infrared or gas radiators, install the ducts leaving a clearance of 1.5 m.
  - .3 Route conduits through the flange of steel framing members where applicable.
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- .4 Wherever possible, group conduit in U-shaped or surface-mounted suspension brackets.
- .5 Unless otherwise specified, conduits shall not pass through framing members.
- .6 For ducts running parallel to steam or hot water lines, provide a minimum side clearance of 75 mm; also provide a minimum clearance of 25 mm for crossings.

### **3.4 CONCEALED CONDUITS**

- .1 Install conduit parallel or perpendicular to the building site lines.
- .2 Horizontal ducts may not be installed in masonry walls.
- .3 Conduit may not be embedded in terrazzo or concrete screeds.

### **3.5 CLEANING**

- .1 Perform cleanup work in accordance with Section 26 05 00.
- .2 Upon completion of installation and performance testing, remove excess materials, waste, tools and equipment from the site.

END OF SECTION 26 05 34

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**PART 1 - GENERAL****1.1 RELATED REQUIREMENTS**

- .1 Section 26 05 00 - Electrical - General Requirements.
- .2 Section 26 28 16.02 - Molded case circuit breakers.

**1.2 REFERENCE STANDARDS**

- .1 CSA Group (CSA)
  - .1 CSA C22.2 Number 29, Distribution Panels and Enclosed Distribution Panels.

**1.3 DOCUMENTS/SAMPLES TO BE SUBMITTED FOR APPROVAL/INFORMATION**

- .1 Submit required documents and samples in accordance with Section 26 05 00.
  - .1 Technical data sheets
- .2 Submit required data sheets and manufacturer's instructions and documentation for the distribution panels. Data sheets shall include product specifications, performance criteria, dimensions, limitations and finish.
- .3 Workshop drawings
  - .1 Indicate the following on the drawings.
- .4 The electrical characteristics of the panels, the number, type and rating of the branch circuit breakers, and the dimensions of the enclosure.

**1.4 DOCUMENTS/ITEMS TO BE SUBMITTED UPON COMPLETION OF THE WORK**

- .1 Submit the required documents/items in accordance with Section 26 05 00.
- .2 Operation and Maintenance Sheets: Provide instructions for the operation and maintenance of the distribution panels to be incorporated into the Operation and Maintenance Manual.

**1.5 TRANSPORTATION, STORAGE AND HANDLING**

- .1 Store and handle materials and equipment in accordance with Section 26 05 00 and the manufacturer's written instructions.

**1.6 WASTE MANAGEMENT AND DISPOSAL**

- .1 Sort waste for reuse/recycling in accordance with Section 26 05 00.
-

**PART 2 - PRODUCTS****2.1 DISTRIBUTION PANELS**

- .1 Distribution panels: comply with CSA C22.2 No. 29. All distribution panels shall be from a single manufacturer.
  - .1 The circuit breakers must be installed in the panels before delivery to the site.
  - .2 The manufacturer's nameplates shall indicate, in addition to the data required by CSA, the fault current that the panel and circuit breakers can carry.
- .2 250 and 600 V panels, busbars withstand fault current as indicated on the drawings, circuit breakers must have a nominal breaking capacity equal to or greater than the panel busbars withstand.
- .3 Make connections so that odd-numbered circuits are fed from the left-hand bar and even-numbered circuits from the right-hand bar. Each circuit breaker shall be permanently marked with the circuit number and phase.
- .4 Distribution panels: current ratings, branch circuit breaker numbers and ratings as indicated.
- .5 All distribution panels must have the same type of lock. Provide two (2) keys for each panel.
- .6 Copper busbars; neutral busbar with the same ampacity as the phase busbars.
- .7 Busbars that can accommodate bolt-on circuit breakers.
- .8 Panel door frame with concealed bolts and hinges.
- .9 Door and door frame coated with baked enamel paint.
- .10 Grounding bus bar, insulated.

**2.2 DISCONNECTORS**

- .1 Circuit breakers conforming to Section 26 28 16.02 - Molded case circuit breakers.
- .2 Unless otherwise specified, distribution panels shall be equipped with thermomagnetic trip circuit breakers.
- .3 Main circuit breaker installed separately at the bottom or top of the panel, depending on the location of the cable entry.

**2.3 TRANSIENT OVERVOLTAGE PROTECTION DEVICE (SPD)**

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- .1 Install, for each panel with a voltage lower than 250V, an SPD (Surge Protection Device) with a minimum capacity of 100kA with protection in all modes (L-L, L-N, L-G and N-G) and a LED indicator for each phase.

## **2.4 EQUIPMENT IDENTIFICATION**

- .1 Equipment identified in accordance with Section 26 05 00 - Electrical - General Requirements for Work Results.
- .2 Size 4 nameplates for each panel, with the name of the panel, its voltage and the number of phases.
- .3 Complete circuit list, with typewritten legend indicating location and load of each circuit, in a plastic envelope on the inside of the panel door.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- .1 Verification of Conditions: Prior to installation of distribution panels, ensure that the condition of surfaces/substrates previously installed under other sections or contracts is acceptable and allows work to be performed in accordance with the manufacturer's written instructions.
  - .1 Perform a visual inspection of the surfaces/support.
  - .2 Immediately notify the Departmental Representative of any unacceptable conditions found.
  - .3 Begin installation work only after unacceptable conditions have been corrected.

### **3.2 INSTALLATION**

- .1 Install panels where indicated, securely, plumb, square and in alignment with adjoining surfaces.
  - .2 Mount projecting distribution panels on a plywood mounting panel. Where possible, group distribution panels on a common mounting panel.
  - .3 Install distribution panels to the height specified in Section 26 05 00 - Electrical - General Requirements for Work Results.
  - .4 Connect all circuits to the load elements.
  - .5 Connect the neutral conductors to the common neutral busbar.
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- .6 Install SPDs as recommended by the manufacturer. When required, supply and install a circuit breaker of appropriate rating.

### **3.3 CLEANING**

- .1 Cleanup during construction: Perform cleanup in accordance with Section 26 05 00.
  - .1 Leave the premises clean at the end of each work day.
- .2 Final Cleanup: remove excess materials/materials, waste materials, tools and equipment from the job site in accordance with Section 26 05 00.
- .3 Waste Management: sort waste for reuse/recycling in accordance with Section 26 05 00.
  - .1 Remove recycling bins and dumpsters from the job site and dispose of materials at the appropriate facilities.

### **3.4 PROTECTION**

- .1 Protect installed equipment and components from damage during construction.
- .2 Repair damage to adjacent materials and equipment caused by the installation of distribution panels.

**END OF SECTION 26 24 16.01**

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**PART 1 - GENERAL****1.1 RELATED REQUIREMENTS**

- .1 Section 26 24 16.01 - Circuit Breaker Distribution Panels

**1.2 REFERENCE STANDARDS**

- .1 CSA Group (CSA)
  - .1 CSA C22.2 No. 5, Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures (Tri-national standard with UL 489 and NMX-J-266-ANCE-2010).

**1.3 DOCUMENTS/SAMPLES TO BE SUBMITTED FOR APPROVAL/INFORMATION**

- .1 Submit required documents and samples in accordance with Section 26 05 00.
- .2 Technical data sheets
  - .1 Submit required data sheets and manufacturer's instructions and documentation for circuit breakers. Data sheets shall include product specifications, performance criteria, dimensions, limits and finish.

**1.4 TRANSPORTATION, STORAGE AND HANDLING**

- .1 Transport, store and handle materials and equipment in accordance with Section 26 05 00 and the manufacturer's written instructions.

**1.5 WASTE MANAGEMENT AND DISPOSAL**

- .1 Sort waste for reuse/recycling and recycling in accordance with Section 26 05 00.

**PART 2 - PRODUCTS****2.1 GENERAL REQUIREMENTS**

- .1 Circuit Breakers, Ground Fault Circuit Interrupters and Accessory High Fault Current Protectors: Conform to CSA C22.2 No. 5.
  - .2 Moulded case circuit breakers for busbars: of the quick-closing and snap-action type, with manual and automatic operation.
  - .3 Moulded case circuit breakers: of the fast closing and snap-action type, with manual and automatic operation.
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- .4 Common trip circuit breakers: with a single handle on multi-pole circuits.
- .5 Moulded case circuit breakers, automatic, actuated by thermal and magnetic releases providing time delay protection inversely proportional to the overload and instantaneous protection in case of short-circuit.
- .6 The circuit breakers shall have a breaking capacity (effective symmetrical) as shown on the drawings.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- .1 Verification of Conditions: Before proceeding with installation, ensure that the condition of surfaces/substrates previously installed under other sections or contracts is acceptable and allows the work to be performed in accordance with the manufacturer's written instructions.
  - .1 Perform a visual inspection of surfaces/supports.
  - .2 Immediately notify the Departmental Representative of any unacceptable conditions found.
  - .3 Begin installation work only after unacceptable conditions have been corrected.

#### **3.2 INSTALLATION**

- .1 Install circuit breakers as indicated.

#### **3.3 CLEANING**

- .1 Cleanup during construction: perform cleanup in accordance with Section 26 05 00.
  - .1 Leave the premises clean at the end of each work day.
- .2 Final Cleanup: remove excess materials/materials, waste, tools and equipment from the job site in accordance with Section 26 05 00.
- .3 Waste Management: sort waste for reuse/recycling in accordance with Section 26 05 00.
  - .1 Remove recycling bins and dumpsters from the job site and dispose of materials at the appropriate facilities.

END OF SECTION 26 28 16.02

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**PART 1 - GENERAL****1.1 RELATED REQUIREMENTS**

- .1 Section 26 05 00 Electrical - General Requirements.
- .2 Section 26 28 13.01 - Fuses, Low Voltage

**1.2 REFERENCES**

- .1 CSA Group
  - .1 CAN/CSA-C22.2 Number 4, Enclosed and Insulated Panel Switches (Tri-National Standard with ANCE NMX-J-162-2004 and UL 98).
  - .2 CSA C22.2 Number 39, Fuse Holder.

**1.3 DOCUMENTS/SAMPLES TO BE SUBMITTED FOR APPROVAL/INFORMATION**

- .1 Submit required documents and samples in accordance with Section 26 05 00.
- .2 Technical data sheets
  - .1 Submit required data sheets and manufacturer's instructions and documentation for fused and non-fused switches. Data sheets shall include product specifications, performance criteria, dimensions, limitations and finish.

**1.4 TRANSPORTATION, STORAGE AND HANDLING**

- .1 Transport, store and handle materials and equipment in accordance with Section 26 05 00 and the manufacturer's written instructions.

**1.5 WASTE MANAGEMENT AND DISPOSAL**

- .1 Sort waste for reuse/recycling in accordance with Section 26 05 00.

**PART 2 - PRODUCTS****2.1 SWITCHES**

- .1 Fused and unfused switches, rated as shown on drawings, in NEMA 3R enclosures, per **CAN/CSA-C22.2** No. 4, rated as indicated.
  - .2 Possibility of locking in closed or open position, by three (3) padlocks.
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- .3 Mechanically interlocking door cannot be opened when the lever is in the closed position.
- .4 Fuseholders: as per CSA C22.2 No. 39 and suitable for the type and rating of fuses indicated.
- .5 Snap lock and cut-off mechanism.
- .6 Indication of "OPEN" and "CLOSED" positions on the cover of the cabinet.

## **2.2 MATERIAL DESIGNATION**

- .1 Equipment marked in accordance with Section 26 05 00 - Electrical - General Requirements for Work Results.
- .2 Size 4 nameplate with the designation of the ordered load.

## **PART 3 - EXECUTION**

### **3.1 INSPECTION**

- .1 Verification of Conditions: Before installing fused and non-fused switches, ensure that the condition of surfaces/substrates previously implemented under other sections or contracts is acceptable and allows the work to be performed in accordance with the manufacturer's written instructions.
  - .1 Perform a visual inspection of surfaces/supports.
  - .2 Immediately notify the Departmental Representative of any unacceptable conditions found.
  - .3 Begin installation work only after unacceptable conditions have been corrected.

### **3.2 INSTALLATION**

- .1 Install the switches and, if applicable, the fuses.

### **3.3 CLEANING**

- .1 Cleanup during construction: perform cleanup in accordance with Section 26 05 00.
    - .1 Leave the premises clean at the end of each work day.
  - .2 Final Cleanup: Remove excess materials/materials, waste materials, tools and equipment from the site in accordance with Section 26 05 00.
  - .3 Waste Management: sort waste for reuse/recycling in accordance with Section 26 05 00.
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- .1 Remove recycling bins and dumpsters from the job site and dispose of materials at the appropriate facilities.

END OF SECTION 26 28 23