

## SPECIFICATION



### Roofs Refection of the Main Building Lots 1, 3 and 4

PWGSC – PSPC  
Agriculture and Agri-Food Canada  
Research and Development Center  
3600, Casavant Boulevard West, St-Hyacinthe (Quebec)

**Issued for bid  
July 13th, 2018**

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**8**  
PAGEAUMOREL

**BISSENFORTIN**  
ARCHITECTURE + DESIGN



SPECIFICATION  
Issued for bid, July 13th, 2018

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Mechanical



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Electrical

END OF SECTION



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**END OF SECTION**



## **ARCHITECTURE**

### **SPECIFICATIONS :**

Specifications prepared by BISSON FORTIN ARCHITECTURE + DESIGN, issued for bid, July 13th 2018.

### **DRAWINGS :**

#### **Lot 1 :**

A00	Front page
A01	Site plan
A02	Demolition – Roof plan basin 1 – Axis 1 à 12
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#### **Lot 3 :**

A00	Front page
A01	Site plan
A02	Demolition – Roof plan basin 3
A03	Demolition – Roof plan basin 3A et 3B
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A07	Demolition – Details basin 3, 3A et 3B
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A00	Front page
A01	Site plan
A02	Demolition – Roof plan basin 4
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A04	Demolition – Details basin 4
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A08	Ceiling plan

## **MECHANICAL AND ELECTRICAL**

### **SPECIFICATIONS :**

Mechanical and electrical specifications for lots 1, 3 and 4, prepared by, PAGEAU MOREL ET ASSOCIÉS INC. issued for bid, July 13th 2018.

### **MÉCHANICAL / ÉLECTRICAL DRAWINGS :**

#### **Lot 1 :**

M01	Front page
M02	Roof plan basin 1 – sector C
M03	Roof plan basin 1 – sector D
M04	Roof plan basin 1A, 1AA, 1B, 1C, 1D

#### **Lot 3 :**

M01	Front page
M02	Roof plan basin 3

#### **Lot 4 :**

M01	Front page
M02	Roof plan basin 4

**END OF SECTION**

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## **PART 1 - GENERAL**

### **1.1 RELATED REQUIREMENTS**

- .1 Not used.

### **1.2 WORK COVERED BY CONTRACT DOCUMENTS**

- .1 Work of this Contract comprises the roof refection of the main building at 3600, boulevard Casavant West, St-Hyacinthe lot 1 including: basins 1, 1A, 1AA, 1B, 1C and 1D. Of lot 3 including : basins 3, 3.1, 3.2, 3.3, 3A and 3B. Of lot 4 including : basins 4, 4.1, 4.3, 4.3, 4.4.

### **1.3 CONTRACT METHOD**

- .1 Construct Work under stipulated price contract.

### **1.4 CONTRACTOR USE OF PREMISES**

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

### **1.5 OWNER OCCUPANCY**

- .1 Owner will occupy premises during entire construction period for execution of normal operations.
- .2 Co-operate with Owner in scheduling operations to minimize conflict and to facilitate Owner usage.

### **1.6 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING**

- .1 For the delivery of the materials and equipment, only use truck with jacking system (boom truck)

### **1.7 EXISTING SERVICES**

- .1 Notify, Departmental Representative and utility companies of intended interruption of services and obtain required permission.
-

- .2 Where Work involves breaking into or connecting to existing services, give Departmental Representative 48 hours notice for necessary interruption of mechanical or electrical service throughout the course of work. Minimize the duration of interruptions. Carry out work at times as directed by governing authorities with minimum disturbance to tenant operations.
- .3 Submit schedule to and obtain approval from Departmental Representative for any shut-down or closure of active service or facility including power and communications services. Adhere to approved schedule and provide notice to affected parties.

## **1.8 DOCUMENTS REQUIRED**

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

## **PART 2 - PRODUCTS**

### **2.1 NOT USED**

- .1 Not used.

## **PART 3 - EXECUTION**

### **3.1 NOT USED**

- .1 Not used.

## **END OF SECTION**

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## **PART 1 - GENERAL**

### **1.1 RELATED REQUIREMENTS**

- .1 Not used.

### **1.2 ACCESS AND EGRESS**

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

### **1.3 USE OF SITE AND FACILITIES**

- .1 Execute work with least possible interference or disturbance to normal use of premises. Make arrangements with Departmental Representative to facilitate work as stated.
- .2 Maintain existing services to building and provide for personnel and vehicle access.
- .3 Where security is reduced by work provide temporary means to maintain security.
- .4 Use only elevators existing in building for moving workers and material for interior work only. The contractor must build for the workers an exterior access to the roof top for the workers.
  - .1 Protect walls of passenger elevators, to approval of Departmental Representative prior to use.
  - .2 Accept liability for damage, safety of equipment and overloading of existing equipment.
- .5 Closures: protect work temporarily until permanent enclosures are completed.

### **1.4 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING**

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

### **1.5 EXISTING SERVICES**

- .1 Notify, Departmental Representative and utility companies of intended interruption of services and obtain required permission.
- .2 Where Work involves breaking into or connecting to existing services, give Departmental Representative 48 hours of notice for necessary interruption of mechanical or electrical service throughout course of work. Keep duration of interruptions minimum. Carry out interruptions after normal working hours of occupants, preferably on weekends.
- .3 Provide for pedestrian and vehicular traffic.
- .4 Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

### **1.6 SPECIAL REQUIREMENTS**

- .1 Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.
  - .2 Keep within limits of work and avenues of ingress and egress.
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.3 Exterior work must be executed between 7h00 and 18h00.

.4 Interior work must be executed between 7h00 and 15h00.

## **1.7 SECURITY**

.1 Where security has been reduced by Work of Contract, provide temporary means to maintain security.

.2 Security clearances:

.1 All the interior work must be executed in presence of a commissioner (security agent). No worker will be permitted to circulate in the alone in the building. Notify the Departmental Representative 48 hours in advance

## **1.8 BUILDING SMOKING ENVIRONMENT**

.1 Comply with smoking restrictions.

## **PART 2 - PRODUCTS**

### **2.1 NOT USED**

.1 Not Used.

## **PART 3 - EXECUTION**

### **3.1 NOT USED**

.1 Not Used.

## **END OF SECTION**

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## **PART 1 - GENERAL**

### **1.1 RELATED REQUIREMENTS**

- .1 Not used.

### **1.2 DEFINITIONS**

- .1 Activity: element of Work performed during course of Project. Activity normally has expected duration, and expected cost and expected resource requirements. Activities can be subdivided into tasks.
- .2 Bar Chart (GANTT Chart): graphic display of schedule-related information. In typical bar chart, activities or other Project elements are listed down left side of chart, dates are shown across top, and activity durations are shown as date-placed horizontal bars. Generally Bar Chart should be derived from commercially available computerized project management system.
- .3 Baseline: original approved plan (for project, work package, or activity), plus or minus approved scope changes.
- .4 Construction Work Week: Monday to Friday, inclusive, will provide five day work week and define schedule calendar working days as part of Bar (GANTT) Chart submission.
- .5 Duration: number of work periods (not including holidays or other nonworking periods) required to complete activity or other project element. Usually expressed as workdays or workweeks.
- .6 Master Plan: summary-level schedule that identifies major activities and key milestones.
- .7 Milestone: significant event in project, usually completion of major deliverable.
- .8 Project Schedule: planned dates for performing activities and the planned dates for meeting milestones. Dynamic, detailed record of tasks or activities that must be accomplished to satisfy Project objectives. Monitoring and control process involves using Project Schedule in executing and controlling activities and is used as basis for decision making throughout project life cycle.
- .9 Project Planning, Monitoring and Control System: overall system operated by Departmental Representative to enable monitoring of project work in relation to established milestones.

### **1.3 REQUIREMENTS**

- .1 Ensure Master Plan and Detail Schedules are practical and remain within specified Contract duration.
- .2 Plan to complete Work in accordance with prescribed milestones and time frame.
- .3 Limit activity durations to maximum of approximately (10) working days, to allow for progress reporting.
- .4 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Interim Certificate and Final Certificate as defined times of completion are of essence of this contract.

### **1.4 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
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- .2 Submit to Departmental Representative within 5 working days of Award of Contract Bar (GANTT) Chart as Master Plan for planning, monitoring and reporting of project progress.
- .3 Submit Project Schedule to Departmental Representative within (5) working days of receipt of acceptance of Master Plan.

#### **1.5 MASTER PLAN**

- .1 Structure schedule to allow orderly planning, organizing and execution of Work as Bar Chart (GANTT).
- .2 Departmental Representative will review and return revised schedules within 5 working days.
- .3 Revise impractical schedule and resubmit within 5 working days.
- .4 Accepted revised schedule will become Master Plan and be used as baseline for updates.

#### **1.6 PROJECT SCHEDULE**

- .1 Develop detailed Project Schedule derived from Master Plan.
- .2 Ensure detailed Project Schedule includes as minimum milestone and activity types as follows:
  - .1 Award.
  - .2 Shop Drawings, Samples.
  - .3 Mobilization.
  - .4 Demolition
  - .5 Metal work
  - .6 Reconstruction of waterproofing basins.
  - .7 Interior Architecture (Walls, Floors and Ceiling).
  - .8 Plumbing.
  - .9 Electrical.
  - .10 Millwork.
  - .11 Fire Systems.
  - .12 Engineer supplied equipment required dates.

#### **1.7 PROJECT SCHEDULE REPORTING**

- .1 Update Project Schedule on weekly basis reflecting activity changes and completions, as well as activities in progress.
- .2 Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation.

#### **1.8 PROJECT MEETINGS**

- .1 Discuss Project Schedule at regular site meetings, identify activities that are behind schedule and provide measures to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current approved dates shown on baseline schedule.
  - .2 Weather related delays with their remedial measures will be discussed and negotiated.
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## **PART 2 - PRODUCTS**

### **2.1 NOT USED**

.1 Not used.

## **PART 3 - EXECUTION**

### **3.1 NOT USED**

.1 Not used.

**END OF SECTION**

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## **PART 1 - GENERAL**

### **1.1 RELATED REQUIREMENTS**

- .1 Not Used.

### **1.2 REFERENCE STANDARDS**

- .1 Not Used.

### **1.3 ADMINISTRATIVE**

- .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 are 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 time of submission, 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 one reviewed copy of each submission on site.

### **1.4 SHOP DRAWINGS AND PRODUCT DATA**

- .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 of a portion of Work.
  - .2 Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Quebec.
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- .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 days working days for Departmental Representative's review of each submission.
  - .5 Adjustments made on shop drawings 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.
  - .6 Make changes in shop drawings as Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing 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:
      - .1 Subcontractor.
      - .2 Supplier.
      - .3 Manufacturer.
    - .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
    - .5 Details of appropriate portions of Work as applicable:
      - .1 Fabrication.
      - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
      - .3 Setting or erection details.
      - .4 Capacities.
      - .5 Performance characteristics.
      - .6 Standards.
      - .7 Operating weight.
      - .8 Wiring diagrams.
      - .9 Single line and schematic diagrams.
      - .10 Relationship to adjacent work.
  - .9 After Departmental Representative's review, distribute copies.
  - .10 Submit (1) electronic copy of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.
  - .11 Submit (1) electronic copy of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.
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- .12 Submit (1) electronic copy of test reports for requirements requested in specification Sections and as requested by Departmental Representative.
  - .1 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.
  - .2 Testing must have been within 3 years of date of contract award for project.
- .13 Submit (1) electronic copy of certificates for requirements requested in specification Sections and as requested by Departmental Representative.
  - .1 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.
  - .2 Certificates must be dated after award of project contract complete with project name.
- .14 Submit (1) electronic copy of manufacturers instructions for requirements requested in specification Sections and as requested by Departmental Representative.
  - .1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.
- .15 Submit (1) electronic copy of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Departmental Representative.
- .16 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- .17 Submit (1) electronic copy of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.
- .18 Delete information not applicable to project.
- .19 Supplement standard information to provide details applicable to project.
- .20 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, the electronic file 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.
- .21 The review of shop drawings by Departmental Representative is for sole purpose of ascertaining conformance with general concept.
  - .1 This review shall not mean that Departmental Representative approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.
  - .2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of sub-trades.

## 1.5 SAMPLES

- .1 Submit for review samples in duplicate as requested in respective specification Sections. Label samples with origin and intended use.

- .2 Deliver samples prepaid to Departmental Representative's business address.
- .3 Notify Departmental Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents.
- .4 Where colour, pattern or texture is criterion, submit full range of samples.
- .5 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.
- .6 Make changes in samples which Departmental Representative may require, consistent with Contract Documents.
- .7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

## **1.6 PHOTOGRAPHIC DOCUMENTATION**

- .1 Submit (1) electronic copy of colour digital photography in jpg format, standard resolution monthly with progress statement and as directed by Departmental Representative.
- .2 Project identification: name and number of project and date of exposure indicated.
- .3 Number of viewpoints: 20 photos per day
- .4 Frequency of photographic documentation: as needed and every month as directed by Departmental Representative.

## **PART 2 - PRODUCTS**

### **2.1 NOT USED**

- .1 Not Used.

## **PART 3 - EXECUTION**

### **3.1 NOT USED**

- .1 Not Used.

## **END OF SECTION**

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## **PARTIE 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 RELATED REQUIREMENTS**

- .1 Section 02 41 00.08 – Demolition – Minor works.
- .2 Section 06 20 00 – Finish carpentry.
- .3 Section 07 52 00 – Modified bituminous membrane roofing.
- .4 Section 07 52 01 – Protected modified bituminous membrane roofing.
- .5 Section 07 55 63 – Vegetated protected membrane roofing.
- .6 Section 70 62 00 – Sheet metal flashing and trim.
- .7 Section 07 92 00 – Joint sealants.
- .8 Section 09 21 99 – Partitions for minor works.
- .9 Section 09 91 99 – Painting for minor works.

### **1.2 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).

### **1.3 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 the article “GENERAL REQUIREMENTS”, 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.
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- .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 - Submittals and Section 02 81 01 - Hazardous Materials. 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 work likely to release asbestos dust (mandatory for all work where asbestos is present);
    - .3 work in confined spaces (mandatory for all work in confined spaces);
    - .4 lockout-tagout procedures (mandatory for all work requiring lockout);
    - .5 safely operating forklift trucks (mandatory for all forklift usage);
    - .6 safely operating elevating work platforms (mandatory for the use of all elevating platforms);
    - .7 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.



#### **1.4 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.

#### **1.5 HAZARD ASSESSMENT**

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

#### **1.6 MEETINGS**

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

#### **1.7 REGULATORY REQUIREMENTS**

- .1 Comply with all legislation, regulations and standards applicable to the construction site and its related activities.
- .2 Comply with specified standards and regulations to ensure safe operations on a site containing hazardous or toxic materials.
- .3 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*.

#### **1.8 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.
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## 1.9 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.

## 1.10 GENERAL REQUIREMENTS

- .1 Before undertaking the work, prepare a site-specific prevention program based on the hazards identified according to the article "HAZARD ASSESSMENT" and the article "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 "RISKS INHERENT TO THE WORKSITE";
- .8 identification of preventive measures for health and safety of employees and / or public works site as indicated in the article "SPECIFIC REQUIREMENTS FOR THE HEALTH AND SAFETY OF OCCUPANTS AND PUBLIC";
- .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 laboratories;
  - .2 nuclear disposition

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. He must include in its prevention program all risks that have been identified.

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## **1.12 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.

## **1.13 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.

## **1.14 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 "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.

### 1.15 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.

### 1.16 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 the 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.

### 1.17 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:
  - .5 description of work to carry out;
  - .6 identification, description and location of the circuit and/or ~~piece of~~ piece of equipment to lockout-tagout;
  - .7 identification of energy sources that feeds the ~~piece of~~ piece of equipment;
  - .8 identification of each cutout point;
  - .9 sequence of lockout-tagout and the release of residual energy as well as the sequence of unlocking;
  - .10 list of material needed for the lockout-tagout;
  - .11 method of verification of zero energy implementation;

- .12 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.

- .13 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/~~piece of~~ equipment to lockout-tagout puts his name on the data sheet and signs it.

## 1.18 ELECTRICAL WORK

- .1 Contractor shall ensure that all electrical work is executed by qualified employees in accordance with the provincial regulation respecting vocational training and qualification.
- .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.
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### 1.19 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.

### 1.20 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.

### 1.21 EXPOSURE TO ANIMAL'S FECAL DROPPINGS

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 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 "*Des fientes de pigeons dans votre lieu de travail: méfiez-vous*" (Pigeon droppings in your workplace: Beware" published by the CNESST ([http://www.csst.qc.ca/publications/100/Documents/DC100\\_1331\\_1web2.pdf](http://www.csst.qc.ca/publications/100/Documents/DC100_1331_1web2.pdf))
- .2 Demonstrate that he has all the material and equipment required on hand to respect the procedure and for safely conducting the work.

### 1.22 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. Submit the certificates of the fit testings to the Departmental representative on demand.

### 1.23 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.
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- .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.

## 1.24 SCAFFOLDINGS

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 scaffoldings must respect the following requirements:

- .1 Foundation
  - .1 Scaffoldings shall be installed on a solid foundation so that it does not slip or rock.
  - .2 Contractors wishing to install scaffoldings 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.
- .2 Assembly, bracing and mooring
  - .1 All scaffoldings 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 scaffoldings (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 scaffoldings 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.
- .3 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.
- .4 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 Scaffoldings 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.
- .5 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 scaffoldings 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.
- .6 Access
  - .1 The Contractor shall ensure that access to the scaffoldings does not compromise worker safety.
  - .2 Where the platforms of the scaffoldings 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 scaffoldings that have six or more rows of uprights or is six sections (or nine metres) high or higher.
- .7 Protection of the public and occupants
  - .1 When scaffoldings 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.
- .8 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 scaffoldings.
  - .2 A plan signed and sealed by an engineer is required for all scaffoldings that will be covered with a canvas, a tarpaulin or any other material that has wind resistance.
  - .3 A certificate of conformity signed by an engineer is required in all cases where an engineering plan is required for the installation and this, before anybody uses the facility. A copy of these documents must be available on the construction site at all times.

## 1.25 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:
  - .1 All other lifting operation, according to 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 MINIMUM CONTENT OF HOISTING PLAN
  - .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

## 1.26 HOT WORK

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.

- .1 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.
- .2 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.
- .3 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.
- .4 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.

- .5 Welding and cutting  
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.
  - .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.

## 1.27 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.

## **1.28 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).

## **1.29 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.

### 1.30 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

**END OF SECTION**

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## **PART 1 - GENERAL**

### **1.1 SUMMARY**

- .1 This Section references to laws, by laws, ordinances, rules, regulations, codes, orders of Authority Having Jurisdiction, and other legally enforceable requirements applicable to Work and that are; or become, in force during performance of Work.

### **1.2 RELATED REQUIREMENTS**

- .1 Section 02 41 00.08 – Demolition – Minor work

### **1.3 REFERENCES TO REGULATORY REQUIREMENTS**

- .1 Perform Work in accordance with 2015 National Building Code of Canada (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 Specific design and performance requirements listed in specifications or indicated on Drawings may exceed minimum requirements established by referenced Building Code; these requirements will govern over the minimum requirements listed in Building Code
  - .1 Meet or exceed requirements of:
    - .1 Contract documents.
    - .2 Specified standards, codes and referenced documents.

### **1.4 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. Notify Departmental Representative.
- .2 PCB: Polychlorinated Biphenyl: stop work immediately when material resembling Polychlorinated Biphenyl is encountered during demolition work. Notify Departmental Representative.
- .3 Mould: stop work immediately when material resembling mould is encountered during demolition work. Notify Departmental Representative.

### **1.5 BUILDING SMOKING ENVIRONMENT**

- .1 Comply with smoking restrictions and municipal by-laws.

### **1.6 QUALITY ASSURANCE**

- .1 Regulatory Requirements: Except as otherwise specified, Departmental Representative shall apply for, obtain, and pay fees associated with, permits, licenses, certificates, and approvals required by regulatory requirements and Contract Documents, based on General Conditions of Contract and the following:
  - .1 Regulatory requirements and fees in force on date of Bid submission, and
  - .2 A change in regulatory requirements or fees scheduled to become effective after date of tender submission and of which public notice has been given before date of tender submission

## **PART 2 - PRODUCTS**

### **2.1 NOT USED**

.1 Not Used.

## **PART 3 - EXECUTION**

### **3.1 NOT USED**

.1 Not Used.

## **END OF SECTION**

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## **PART 1 - GENERAL**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 02 41 00.08 – Demolition – Minor work
- .2 Section 07 52 00 – Modified bituminous membrane roofing
- .3 Section 07 52 01 – Protected modified bituminous membrane roofing
- .4 Section 07 55 63 – Vegetated protected membrane roofing

### **1.2 INSPECTION**

- .1 Allow Departmental Representative access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.
- .2 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Departmental Representative instructions, or law of Place of Work.
- .3 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.
- .4 Departmental Representative will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction.

### **1.3 INDEPENDENT INSPECTION AGENCIES**

- .1 Independent Inspection/Testing Agencies will be engaged by Departmental Representative for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by Departmental Representative.
- .2 Provide equipment required for executing inspection and testing by appointed agencies.
- .3 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
- .4 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Departmental Representative at no cost to Departmental Representative. Pay costs for retesting and reinspection.

### **1.4 ACCESS TO WORK**

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

## **1.5 PROCEDURES**

- .1 Notify appropriate agency and Departmental Representative in advance of requirement for tests, in order that attendance arrangements can be made.
- .2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in Work.
- .3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

## **1.6 REJECTED WORK**

- .1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.
- .2 Make good other Contractor's work damaged by such removals or replacements promptly.
- .3 If in opinion of Departmental Representative it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Owner will deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by Departmental Representative.

## **1.7 REPORTS**

- .1 Submit (4) copies of inspection and test reports to Departmental Representative.
- .2 Provide copies to subcontractor of work being inspected or tested and/or manufacturer or fabricator of material being inspected or tested.

## **1.8 TESTS AND MIX DESIGNS**

- .1 Furnish test results and mix designs as requested.
- .2 Cost of tests and mix designs beyond those called for in Contract Documents or beyond those required by law of Place of Work will be appraised by Departmental Representative and may be authorized as recoverable.

## **1.9 MOCK-UPS**

- .1 Prepare mock-ups for Work specifically requested in specifications. Include for Work of Sections required to provide mock-ups.
  - .2 Construct in locations acceptable to Departmental Representative as specified in specific Section.
  - .3 Prepare mock-ups for Departmental Representative review with reasonable promptness and in orderly sequence, to not cause delays in Work.
  - .4 Failure to prepare mock-ups 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.
  - .5 Mock-ups may remain as part of Work.
-

**1.10 MILL TESTS**

- .1 When required, submit mill test certificates required of specification Sections.

**1.11 EQUIPMENT AND SYSTEMS**

- .1 When required, submit adjustment and balancing reports for mechanical, electrical and building equipment systems.

**PART 2 - PRODUCTS**

**2.1 NOT USED**

- .1 Not Used.

**PART 3 - EXECUTION**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

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## **PART 1 - GENERAL**

### **1.1 RELATED REQUIREMENTS**

- .1 Not Used.

### **1.2 REFERENCE STANDARDS**

- .1 U.S. Environmental Protection Agency (EPA) / Office of Water
  - .1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

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

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

### **1.4 INSTALLATION AND REMOVAL**

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

### **1.5 WATER SUPPLY**

- .1 Departmental Representative will provide continuous supply of potable water for construction use.
- .2 Arrange for connection with appropriate utility company and pay costs for installation, maintenance and removal.
- .3 Departmental Representative will pay for utility charges at prevailing rates.

### **1.6 TEMPORARY HEATING AND VENTILATION**

- .1 Provide temporary heating required during construction period, including attendance, maintenance and fuel.
- .2 Maintain temperatures of minimum 4 degrees C in areas where construction is in progress.
- .3 Ventilating:
  - .1 Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.
- .4 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.

### **1.7 TEMPORARY POWER AND LIGHT**

- .1 Departmental Representative will pay for temporary power during construction for temporary lighting and operating of power tools, to a maximum supply of 230 volts 30 amps.
-

**PART 2 - PRODUCTS**

**2.1 NOT USED**

.1 Not Used.

**PART 3 - EXECUTION**

**3.1 NOT USED**

.1 Not Used.

**END OF SECTION**

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## **PART 1 - GENERAL**

### **1.1 RELATED REQUIREMENTS**

- .1 Not Used.

### **1.2 REFERENCE STANDARDS**

- .1 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB 1.189-00, Exterior Alkyd Primer for Wood.
  - .2 CGSB 1.59-97, Alkyd Exterior Gloss Enamel.
- .2 CSA Group (CSA)
  - .1 CSA-A23.1/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
  - .2 CSA-0121-M1978(R2003), Douglas Fir Plywood.
  - .3 CAN/CSA-S269.2-M1987(R2003), Access Scaffolding for Construction Purposes.
  - .4 CAN/CSA-Z321-96(R2001), Signs and Symbols for the Occupational Environment.
- .3 Public Works Government Services Canada (PSPC) Standard Acquisition Clauses and Conditions (SACC)-ID: R0202D, Title: General Conditions 'C', In Effect as of: May 14, 2004.
- .4 U.S. Environmental Protection Agency (EPA) / Office of Water
  - .1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

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

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

### **1.4 INSTALLATION AND REMOVAL**

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

### **1.5 SCAFFOLDING**

- .1 Scaffolding in accordance with CAN/CSA-S269.2.
- .2 Provide and maintain scaffolding swing staging platforms.

### **1.6 HOISTING**

- .1 Provide, operate and maintain hoists cranes required for moving of workers, materials and equipment. Make financial arrangements with Subcontractors for their use of hoists.

- .2 Hoists [cranes] to be operated by qualified operator.

## **1.7 ELEVATORS**

- .1 The use of indoor elevators is permitted only for interior work. The contractor will have to build an exterior access for workers access to the roof.
- .2 Provide protective coverings for finish surfaces of cars and entrances.

## **1.8 SITE STORAGE/LOADING**

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

## **1.9 CONSTRUCTION PARKING**

- .1 Parking will be permitted on site provided it does not disrupt performance of Work.
- .2 Provide and maintain adequate access to project site.

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

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

## **1.11 SANITARY FACILITIES**

- .1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.
- .2 Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.

## **1.12 CONSTRUCTION SIGNAGE**

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

## **1.13 PROTECTION AND MAINTENANCE OF TRAFFIC**

- .1 Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by Departmental Representative.
  - .2 Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.
-



**1.14 CLEAN-UP**

- .1 Remove construction debris, waste materials, packaging material from work site daily.
- .2 Clean dirt or mud tracked onto paved or surfaced roadways.
- .3 Store materials resulting from demolition activities that are salvageable.
- .4 Stack stored new or salvaged material not in construction facilities.

**PART 2 - PRODUCTS**

**2.1 NOT USED**

- .1 Not Used.

**PART 3 - EXECUTION**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

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## **PART 1 - GENERAL**

### **1.1 RELATED REQUIREMENTS**

- .1 Not Used

### **1.2 REFERENCE STANDARDS**

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

### **1.3 INSTALLATION AND REMOVAL**

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

### **1.4 HOARDING**

- .1 Erect a fence location where required as to protect the public and the workers of any injury and prevent any damage to the public and private property.
- .2 The contractor must decide on the exact limit of the work fence for his need to protect the work and the occupants, in accordance with the limits and the right-of-way indicated in the drawings
- .3 Provide and install signage indicating to the users the directions to temporary access to the building.
- .4 Erect temporary site enclosure using new 1,8 m high snow fence wired to rolled steel "T" bar fence posts. Provide one lockable double door truck gate. Maintain fence in good repair.
- .5 Provide sheltered passageway (roof and sides) for pedestrians at all building's entrances and exits with relevant signage and electric lightning required by law and ensure its maintenance. Use arc frame scaffolding of equivalent width to exterior doors and close surfaces (roof and sides) of the sheltered passageway with 13mm thick exterior plywood.

### **1.5 GUARD RAILS AND BARRICADES**

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

### **1.6 WEATHER ENCLOSURES**

- .1 Provide weather tight closures to unfinished door and window openings, tops of shafts and other openings in floors and roofs.

- .2 Close off floor areas where walls are not finished; seal off other openings; enclose building interior work for temporary heat.
- .3 Design enclosures to withstand wind pressure [and snow loading].

#### **1.7 DUST TIGHT SCREENS**

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

#### **1.8 ACCESS TO SITE**

- .1 Provide and maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access to Work.

#### **1.9 FIRE ROUTES**

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

#### **1.10 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY**

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

#### **1.11 PROTECTION OF BUILDING FINISHES**

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

#### **1.12 USE OF SITE**

- .1 The contractor must restrict the use of the site to a bare minimum. To this end, the contractor will have to agree with the owner the extent of the use of the space and restore the damaged surfaces as existing and the end of the work (dirt, lawn, plantations, borders, etc.).
- .2 The contractor must provide, if required the snow and ice removal, evacuate the surface water, dry-up the work areas, level the surfaces and protect the remaining existing structure.

### **PART 2 - PRODUCTS**

#### **2.1 NOT USED**

- .1 Not Used.
-

**PART 3 - EXECUTION**

**3.1 NOT USED**

.1 Not Used.

**END OF SECTION**

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## **PART 1 - GENERAL**

### **1.1 RELATED REQUIREMENTS**

- .1 Not Used

### **1.2 REFERENCE STANDARDS**

- .1 Within text of each specifications section, reference may be made to reference standards
- .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 Procurement policy is to acquire, in cost effective manner, items containing highest percentage of recycled and recovered materials practicable consistent with maintaining satisfactory levels of competition. Make reasonable efforts to use recycled and recovered materials and in otherwise utilizing recycled and recovered materials in execution of work.
- .3 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.
- .4 Should disputes arise as to quality or fitness of products, decision rests strictly with Departmental Representative based upon requirements of Contract Documents.
- .5 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.
- .6 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.

### **1.4 AVAILABILITY**

- .1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify Departmental Representative of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.
-

- .2 In event of failure to notify Departmental Representative at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Departmental Representative reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

## **1.5 STORAGE, HANDLING AND PROTECTION**

- .1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.
- .2 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 Store sheet materials, lumber on flat, solid supports and keep clear of ground. Slope to shed moisture.
- .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 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.
- .9 Touch-up damaged factory finished surfaces to Departmental Representative's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

## **1.6 TRANSPORTATION**

- .1 Pay costs of transportation of products required in performance of Work.
- .2 Transportation cost of products supplied by Owner will be paid for by Departmental Representative. Unload, handle and store such products.

## **1.7 MANUFACTURER'S INSTRUCTIONS**

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



## **1.8 QUALITY OF WORK**

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

## **1.9 CO-ORDINATION**

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

## **1.10 CONCEALMENT**

- .1 In finished areas conceal pipes, ducts and wiring in floors, walls and ceilings, except where indicated otherwise.
- .2 Before installation inform Departmental Representative if there is interference. Install as directed by Departmental Representative.

## **1.11 REMEDIAL WORK**

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

## **1.12 LOCATION OF FIXTURES**

- .1 Consider location of fixtures, outlets, and mechanical and electrical items indicated as approximate.
- .2 Inform Departmental Representative of conflicting installation. Install as directed.

## **1.13 FASTENINGS**

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

- .6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

#### **1.14 FASTENINGS - EQUIPMENT**

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

#### **1.15 PROTECTION OF WORK IN PROGRESS**

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

#### **1.16 EXISTING UTILITIES**

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

### **PART 2 - PRODUCTS**

#### **2.1 NOT USED**

- .1 Not Used.

### **PART 3 - EXECUTION**

#### **3.1 NOT USED**

- .1 Not Used.

### **END OF SECTION**

---

## **PART 1 - GENERAL**

### **1.1 RELATED REQUIREMENTS**

- .1 Not Used

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

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit written request in advance of cutting or alteration which affects:
  - .1 Structural integrity of elements of project.
  - .2 Integrity of weather-exposed or moisture-resistant elements.
  - .3 Efficiency, maintenance, or safety of operational elements.
  - .4 Visual qualities of sight-exposed elements.
  - .5 Work of Owner or separate contractor.
- .3 Include in request:
  - .1 Identification of project.
  - .2 Location and description of affected Work.
  - .3 Statement on necessity for cutting or alteration.
  - .4 Description of proposed Work, and products to be used.
  - .5 Alternatives to cutting and patching.
  - .6 Effect on Work of Owner or separate contractor.
  - .7 Written permission of affected separate contractor.
  - .8 Date and time work will be executed.

### **1.3 MATERIALS**

- .1 Required for original installation.
- .2 Change in Materials: Submit request for substitution in accordance with Section 01 33 00 - Submittal Procedures.

### **1.4 PREPARATION**

- .1 Inspect existing conditions, including elements subject to damage or movement during cutting and patching.
- .2 After uncovering, inspect conditions affecting performance of Work.
- .3 Beginning of cutting or patching means acceptance of existing conditions.
- .4 Provide supports to assure structural integrity of surroundings; provide devices and methods to protect other portions of project from damage.
- .5 Provide protection from elements for areas which are to be exposed by uncovering work; maintain excavations free of water.

### **1.5 EXECUTION**

- .1 Execute cutting, fitting, and patching [including excavation and fill,] to complete Work.
-

- .2 Fit several parts together, to integrate with other Work.
- .3 Uncover Work to install ill-timed Work.
- .4 Remove and replace defective and non-conforming Work.
- .5 Provide openings in non-structural elements of Work for penetrations of mechanical and electrical Work.
- .6 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.
- .7 Employ original installer to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.
- .8 Cut rigid materials using masonry saw or core drill. Pneumatic or impact tools not allowed on masonry work without prior approval.
- .9 Restore work with new products in accordance with requirements of Contract Documents.
- .10 Fit Work [airtight] to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- .11 Refinish surfaces to match adjacent finishes: Refinish continuous surfaces to nearest intersection. Refinish assemblies by refinishing entire unit.
- .12 Conceal pipes, ducts and wiring in floor, wall and ceiling construction of finished areas except where indicated otherwise.

## **1.6 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate waste materials for [reuse] [and] [recycling] in accordance with Section 01 74 19 - Waste Management and Disposal.

## **PART 2 - PRODUCTS**

### **2.1 NOT USED**

- .1 Not Used.

## **PART 3 - EXECUTION**

### **3.1 NOT USED**

- .1 Not Used.

## **END OF SECTION**

---

## **PART 1 - GENERAL**

### **1.1 EXIGENCES CONNEXES**

- .1 Sans objet.

### **1.2 PROJECT CLEANLINESS**

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

### **1.3 FINAL CLEANING**

- .1 When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
  - .2 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.
  - .3 Prior to final review remove surplus products, tools, construction machinery and equipment.
  - .4 Remove waste products and debris including that caused by Owner or other Contractors.
  - .5 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site, unless approved by Departmental Representative.
-

- .6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .7 Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, and mechanical and electrical fixtures. Replace broken, scratched or disfigured glass.
- .8 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, walls, and floors.
- .9 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.
- .10 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.
- .11 Remove dirt and other disfiguration from exterior surfaces.
- .12 Clean and sweep roofs, gutters, areaways, and sunken wells.
- .13 Sweep and wash clean paved areas.
- .14 Clean equipment and fixtures to sanitary condition; clean or replace filters of mechanical equipment.
- .15 Clean roofs, downspouts, and drainage systems.
- .16 Remove snow and ice from access to building.

#### **1.4 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal (CDR).

### **PART 2 - PRODUCTS**

#### **2.1 NOT USED**

- .1 Not Used.

### **PART 3 - EXECUTION**

#### **3.1 NOT USED**

- .1 Not Used.

### **END OF SECTION**

---

## **PART 1 - GENERAL**

### **1.1 SUM OBJECTIVES IN WASTE MANAGEMENT**

- .1 Prior to commencement of work, meet with Departmental Representative to review PWGSC's plan and objectives for waste management.
- .2 PWGSC's waste management objective is to reduce by 75 percent the total flow of construction / demolition waste to landfills. Provide the Departmental Representative with documentation certifying that comprehensive measures and procedures for waste management, recycling, reuse / reuse of recyclable and reusable materials have been implemented.
- .3 Exercise maximum control of solid construction waste.
- .4 Protect the environment and prevent pollution and environmental impacts.

### **1.2 RELATED REQUIREMENTS**

- .1 Not Used.

### **1.3 DEFINITIONS**

- .1 Class III non-hazardous materials: Construction, renovation and demolition waste.
  - .2 Discharge - inert waste: bituminous materials and concrete only.
  - .3 Recyclability: The character of a product or material that can be recovered at the end of its life cycle and transformed into a new product for reuse or re-use.
  - .4 Recycle: Process of collection or transformation of waste and used materials, intended to allow their reintroduction in a cycle of consumption in quality of new products.
  - .5 Recycling: Operations involving the sorting, cleaning, processing and reconstitution of solid waste and other discarded materials or materials, intended to promote the use of these in a form different from their original state. Recycling does not include combustion, incineration or thermal destruction of waste.
  - .6 Recovery: Removal of load bearing and non-load bearing components and construction materials during deconstruction or disassembly of industrial, commercial or institutional structures for reuse / recycling or recycling.
  - .7 Reuse / Reemployment: Repeated use of a product or material in its original form, for different use in the event of reuse and similar use in the case of re-use. Reuse / reuse includes the following:
    - .1 The recovery of products and materials that can be reused / reused, generated by the modernization of a structure or structure, before their demolition, for resale, reuse, re-use within the same structure. project or storage for later use.
    - .2 Return to suppliers of products and materials that can be reused / reused, such as pallets and unused products.
  - .8 Sorted waste: Waste already classified by type.
-

- .9 Sorting at source: Separation of different types of products and waste materials from the moment they become waste.

#### 1.4 SUBMITTALS

- .1 Submit, before final payment, a summary of the waste recovered for reuse / reuse, recycling or disposal, supported by a decommissioning / dismantling audit.
  - .1 Provide receipts, weigh tickets, waybills, and quantities and types of waste materials reused / re-used, collected pell-mell and sorted off site or disposed of.
  - .2 For each waste material generated by the project and landfilled or incinerated, indicate the quantity, in tonnes, and the name of the landfill, incinerator or transfer station.
  - .3 A detailed monthly summary of the amount of materials reused, recycled and disposed of as well as a brief status of recovery activities.
- .2 Before the final payment, submit:
  - .1 For each waste material generated by the project and reused / reused, sold or recycled, indicate the quantity in tonnes and the destination.
  - .2 Provide receipts, weigh tickets, waybills, and quantities and types of waste materials reused / reused, collected pell-mell and sorted off site or disposed of.

#### 1.5 DELIVERY, STORAGE AND HANDLING

- .1 Store, materials to be reused, recycled and salvaged in locations as directed by the Departmental Representative.
- .2 Unless specified otherwise, materials for removal become the Contractor's property.
- .3 Stockpile waste in a container as indicated in section 01 52 00 – Construction Facilities.
- .4 Separate waste from salvaged items. Transport and deliver waste to licensed disposal facility specialized in waste sorting.
- .5 Protect structural components not removed for demolition from movement or damage.
- .6 Support affected structures. If safety of building is endangered, cease operations and immediately notify the Departmental Representative.
- .7 Protect surface drainage, mechanical and electrical facilities from damage and blockage.
- .8 Separate and store materials produced during dismantling of structures in designated areas.
- .9 Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated facilities.
  - .1 On-site source separation is recommended.
  - .2 Provide waybills for sorted materials.



## **1.6 DISPOSAL OF WASTES**

- .1 Do not bury rubbish or waste materials.
- .2 It is prohibited to dispose of volatile oil wastes of the paint thinner in a watercourse or storm or sanitary sewer.
- .3 Keep a register of construction waste, indicating the following.
  - .1 Number of bins and their size.
  - .2 The type of waste placed in each bin.
  - .3 The total tonnage of waste generated.
  - .4 Total tonnage of waste reused / reused or recycled.
  - .5 The destination of the waste that will be reused / reused or recycled.
- .4 Recover waste materials as demolition / dismantling work progresses.
- .5 Prepare a project summary to control the destination and quantities of each type of waste material identified in the pre-decommissioning audit.
- .6 For the entire length of Work transport containers to waste sorting facility. Provide a report for each trip.
- .7 The container will be at the Departmental Representative's disposition and may use it for other projects.

## **1.7 USE OF SITE AND FACILITIES**

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

## **1.8 SCHEDULING**

- .1 Co-ordinate Work with other activities at site to ensure timely and orderly progress of Work.

## **1.9 CLEANING**

- .1 Separate at source residual materials to be reused or recycled and put them in the locations indicated.
- .2 Clean-up work area as work progresses.
- .3 Remove tools and residual and waste materials on completion of Work, and leave work area in a clean and orderly condition.

## **1.10 WASTE RECOVERY**

- .1 Complete the form "FINAL WASTE DISPOSAL REPORT Form for Construction, Renovation and Demolition Projects" and provide it to the Departmental Representative.
-

**1.11 JOB SITE WASTE STATEMENT schedule for construction, renovation and demolition projects(JSWS)**

.1 Schedule A – Job Site Waste Statement (JSWS) for construction, renovation and demolition projects.

Materials	Rerouted actual weight (tons)		Destination and final use of rerouted materials	Total buried weight (tons)	TOTAL WEIGHT (tons)	Rerouted rate
	Reused	Recycled				
Masonry and pavement						
Walls and ceilings						
Metals						
Mechanics						
HVAC						
Plumbing						
Sanitary equipment						
Others						
Doors and windows						
Wood						
Woodwork and millwork						
Floor covering						
Electricity						
Wiring						
Lighting						
Others						
Roofing						
Specialties and miscellaneous items						
Cardboard						
Other packaging						
Mixed recycling						
General Waste						
Others						
<b>TOTAL</b>						

## **PART 2 - PRODUCTS**

### **2.1 NOT USED**

.1 Not Used.

## **PART 3 - EXECUTION**

### **3.1 NOT USED**

.1 Not Used.

## **END OF SECTION**

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## **PART 1 - GENERAL**

### **1.1 RELATED REQUIREMENTS**

- .1 Not Used.

### **1.2 REFERENCE STANDARDS**

- .1 Not Used.

### **1.3 ADMINISTRATIVE REQUIREMENTS**

- .1 Acceptance of Work Procedures:
  - .1 Contractor's Inspection: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
    - .1 Notify Departmental Representative in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.
    - .2 Request Departmental Representative inspection.
  - .2 Departmental Representative Inspection:
    - .1 Departmental Representative and Contractor to inspect Work and identify defects and deficiencies.
    - .2 Contractor to correct Work as directed.
  - .3 Completion Tasks: submit written certificates in French that tasks have been performed as follows:
    - .1 Work: completed and inspected for compliance with Contract Documents.
    - .2 Defects: corrected and deficiencies completed.
    - .3 Equipment and systems: tested, adjusted and balanced and fully operational.
    - .4 Work: complete and ready for final inspection.
  - .4 Final Inspection:
    - .1 When completion tasks are done, request final inspection of Work by Departmental Representative, and Contractor.
    - .2 When Work are judged incomplete according to Departmental Representative, complete outstanding items and request re-inspection.

### **1.4 FINAL CLEANING**

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.
- .2 Waste Management: separate waste materials for recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

## **PART 2 - PRODUCTS**

### **2.1 NOT USED**

- .1 Not Used.
-

**PART 3 - EXECUTION**

**3.1 NOT USED**

.1 Not Used.

**END OF SECTION**

## **PART 1 - GENERAL**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 06 20 00 – Finish carpentry.
- .2 Section 07 52 00 – Modified bituminous membrane roofing.
- .3 Section 07 52 01 – Protected modified bituminous membrane roofing.
- .4 Section 07 55 63 – Vegetated protected membrane roofing.
- .5 Section 70 62 00 – Sheet metal flashing and trim.
- .6 Section 07 92 00 – Joint sealants.
- .7 Section 09 21 99 – Partitions for minor works.
- .8 Section 09 91 99 – Painting for minor works.

### **1.2 REFERENCE STANDARDS**

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

### **1.3 ADMINISTRATIVE REQUIREMENTS**

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

### **1.4 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 one week prior to Substantial Performance of the Work, submit to the Departmental Representative, 1 final copie of operating and maintenance manuals in French.
  - .3 Provide spare parts, maintenance materials and special tools of same quality and manufacture as products provided in Work.
  - .4 Provide evidence, if requested, for type, source and quality of products supplied.
-

## 1.5 FORMAT

- .1 Organize data as instructional manual.
- .2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.
- .3 When multiple binders are used correlate data into related consistent groupings.
  - .1 Identify contents of each binder on spine.
- .4 Cover: identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.
- .5 Arrange content by systems, under Section numbers and sequence of Table of Contents.
- .6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
- .7 Text: manufacturer's printed data, or typewritten data.
- .8 Drawings: provide with reinforced punched binder tab.
  - .1 Bind in with text; fold larger drawings to size of text pages.
- .9 Provide scaled CAD files in dwg format on CD or DVD.

## 1.6 CONTENTS - PROJECT RECORD DOCUMENTS

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

## 1.7 AS -BUILT DOCUMENTS AND SAMPLES

- .1 Maintain, in addition to requirements in General Conditions, at site for Departmental Representative one record copy of:
  - .1 Contract Drawings.
  - .2 Specifications.
  - .3 Addenda.
  - .4 Change Orders and other modifications to Contract.
  - .5 Reviewed shop drawings, product data, and samples.
  - .6 Field test records.



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

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

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

## **1.9 MATERIALS AND FINISHES**

- .1 Building products, applied materials, and finishes: include product data, with catalogue number, size, composition, and colour and texture designations.
  - .2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
-

- .3 Moisture-protection and weather-exposed products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- .4 Additional requirements: as specified in individual specifications sections.

#### **1.10 DELIVERY, STORAGE AND HANDLING**

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

#### **1.11 WARRANTIES AND BONDS**

- .1 Develop warranty management plan to contain information relevant to Warranties.
- .2 Submit warranty management plan, 10 days before planned pre-warranty conference, to Departmental Representative approval.
- .3 Warranty management plan to include required actions and documents to assure that Departmental Representative receives warranties to which it is entitled.
- .4 Provide plan in narrative form and contain sufficient detail to make it suitable for use by future maintenance and repair personnel.
- .5 Submit, warranty information made available during construction phase, to Departmental Representative for approval prior to each monthly pay estimate.
- .6 Assemble approved information in binder, submit upon acceptance of work and organize binder as follows:
  - .1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.
  - .2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.
  - .3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within [ten] days after completion of applicable item of work.
  - .4 Verify that documents are in proper form, contain full information, and are notarized.
  - .5 Co-execute submittals when required.
  - .6 Retain warranties and bonds until time specified for submittal.
- .7 Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.
- .8 Include information contained in warranty management plan as follows:
  - .1 Roles and responsibilities of personnel associated with warranty process, including points of contact and telephone numbers within the organizations of Contractors, subcontractors, manufacturers or suppliers involved.
  - .2 Listing and status of delivery of Certificates of Warranty for extended warranty items.

- .3 Provide list for each warranted equipment, item, feature of construction or system indicating:
  - .1 Name of item.
  - .2 Model and serial numbers.
  - .3 Location where installed.
  - .4 Name and phone numbers of manufacturers or suppliers.
  - .5 Names, addresses and telephone numbers of sources of spare parts.
  - .6 Warranties and terms of warranty: include one-year overall warranty of construction. Indicate items that have extended warranties and show separate warranty expiration dates.
  - .7 Cross-reference to warranty certificates as applicable.
  - .8 Starting point and duration of warranty period.
  - .9 Summary of maintenance procedures required to continue warranty in force.
  - .10 Cross-Reference to specific pertinent Operation and Maintenance manuals.
  - .11 Organization, names and phone numbers of persons to call for warranty service.
  - .12 Typical response time and repair time expected for various warranted equipment.
- .9 Respond in timely manner to oral or written notification of required construction warranty repair work.
- .10 Written verification to follow oral instructions.
  - .1 Failure to respond will be cause for the Departmental Representative to proceed with action against Contractor.

## 1.12 WARRANTY TAGS

- .1 Tag, at time of installation, each warranted item. Provide durable, oil and water resistant tag approved by Departmental Representative.
- .2 Attach tags with copper wire and spray with waterproof silicone coating.
- .3 Leave date of acceptance until project is accepted for occupancy.
- .4 Indicate following information on tag:
  - .1 Type of product/material.
  - .2 Model number.
  - .3 Serial number.
  - .4 Contract number.
  - .5 Warranty period.
  - .6 Inspector's signature.
  - .7 Construction Contractor.

## PART 2 - PRODUCTS

### 2.1 NOT USED

- .1 Not Used.
-

**PART 3 - EXECUTION**

**3.1 NOT USED**

.1 Not Used.

**END OF SECTION**

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## **PART 1 - GENERAL**

### **1.1 SUMMARY**

- .1 Not Used.

### **1.2 RELATED REQUIREMENTS**

- .1 Section 02 81 00 – Hazardous materials
- .2 Section 06 20 00 – Finish carpentry.
- .3 Section 07 52 00 – Modified bituminous membrane roofing.
- .4 Section 07 52 01 – Protected modified bituminous membrane roofing.
- .5 Section 07 55 63 – Vegetated protected membrane roofing.
- .6 Section 70 62 00 – Sheet metal flashing and trim.
- .7 Section 07 92 00 – Joint sealants.
- .8 Section 09 21 99 – Partitions for minor works.
- .9 Section 09 91 99 – Painting for minor works.

### **1.3 REFERENCE STANDARDS**

- .1 CSA Group (CSA)
    - .1 CSA S350-M1980(R2003), Code of Practice for Safety in Demolition of Structures.
  - .2 Department of Justice Canada (Jus)
    - .1 Canadian Environmental Assessment Act (CEAA), 2012
    - .2 Canadian Environmental Protection Act (CEPA), 2012
      - .1 SOR/2003-2, On-Road Vehicle and Engine Emission Regulations.
      - .2 SOR/2006-268, Regulations Amending the On-Road Vehicle and Engine Emission Regulations
      - .3 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34
      - .4 Motor Vehicle Safety Act (MVSA), 1995
      - .5 Hazardous Materials Information Review Act, 1985
  - .3 National Fire Protection Association (NFPA)
    - .1 NFPA 241 - 96, Standard for Safeguarding Construction, Alteration, and Demolition Operations
  - .4 National Research Council Canada (NRC)
    - .1 National Building Code of Canada 2015 (NBC).
    - .2 National Fire Code of Canada 2015 (NFC).
  - .5 Underwriters' Laboratories of Canada (ULC)
    - .1 CAN/ULC-S660-08, Standard for Nonmetallic Underground Piping for Flammable and Combustible Liquids
    - .2 ULC/ORD-C58.15-1992, Overfill Protection Devices for Flammable Liquid Storage Tanks
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- .3 ULC/ORD-C58.19-1992, Spill Containment Devices for Underground Flammable Liquid Storage Tanks
- .6 U.S. Environmental Protection Agency (EPA)/Office of Water
  - .1 EPA CFR 86.098-10, Emission standards for 1998 and later model year Otto-cycle heavy-duty engines and vehicles
  - .2 EPA CFR 86.098-11, Emission standards for 1998 and later model year diesel heavy-duty engines and vehicles
  - .3 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

#### **1.4 DEFINITIONS**

- .1 Demolition: rapid destruction of building following removal of hazardous materials.
- .2 Hazardous Materials: dangerous substances, dangerous goods, hazardous commodities and hazardous products, may include but not limited to: asbestos PCB's, CFC's, HCFC's poisons, corrosive agents, flammable substances, ammunition, explosives, radioactive substances, or other material that can endanger human health or wellbeing or environment if handled improperly.
- .3 Waste Management Coordinator (WMC): Contractor representative responsible for supervising waste management activities as well as coordinating related, required submittal and reporting requirements.
- .4 Construction Waste Management Plan (CWM Plan): Written plan addressing opportunities for reduction, reuse, or recycling of materials prepared in accordance with Section 01 74 19 - Waste Management and Disposal.
- .5 Construction Waste Management Report (CWM Report): Written report identifying actual materials that formed CWM Plan for reduction, reuse, or recycling of materials prepared in accordance with Section 01 74 19 - Waste Management and Disposal

#### **1.5 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures and 01 74 19 - Waste Management Disposal.
- .2 Before commencing work on site, submit detailed plan for waste reduction in accordance with section 01 74 19 - Waste Management Disposal where the following information is included:
  - .1 Nature and anticipated quantities of material to recuperated, to be reused, to be recycled and to be landfilled, indicated in percentage.
  - .2 Schedule of selective demolition work.
  - .3 Anticipated frequency of waste pick-up.
  - .4 Name and addresses of trucking companies for sorting and waste disposal.

#### **1.6 QUALITY ASSURANCE**

- .1 Comply with hauling and disposal regulations of Authority Having Jurisdiction.
- .2 Standards: Comply with ANSI A10.6 and NFPA 241.

#### **1.7 SITE CONDITIONS**

- .1 Review "Designated Substance Report" and take precautions to protect environment.
-

- .2 If material resembling spray or trowel-applied asbestos or other designated substance listed as hazardous be encountered, stop work, take preventative measures, and notify Departmental Representative immediately.
  - .1 Proceed only after receipt of written instructions have been received from Departmental Representative.
- .3 Notify Departmental Representative before disrupting [building] access or services.

## **1.8 EXISTING CONDITIONS**

- .1 Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
  - .1 Hazardous materials will be as defined in the Hazardous Materials Act.
  - .2 Hazardous materials will be removed by Departmental representative before start of the Work.

## **PART 2 - PRODUCTS**

### **2.1 NOT USED**

- .1 Not Used.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- .1 Survey existing conditions and correlate with requirements indicated to determine extent of demolition required.
  - .2 Review Project Record Documents of existing construction provided by Departmental representative.
  - .3 Departmental representative does not guaranty that existing conditions are the same as those indicated in Project Record Documents.
  - .4 Inventory and record the condition of items being removed and salvaged.
  - .5 When unanticipated mechanical, electrical, or structural elements are encountered, investigate and measure the nature and extent of the element.
  - .6 Promptly submit a written report to Departmental representative.
  - .7 Perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during demolition operations.
  - .8 Verify that hazardous materials have been remediated before proceeding with demolition operations.
-

### **3.2 PREPARATION**

- .1 Protection of In-Place Conditions:
  - .1 Prevent movement, settlement, or damage to adjacent structures, and landscaping features and parts of building to remain in place. Provide bracing and shoring required.
  - .2 Keep noise, dust, and inconvenience to occupants to minimum.
  - .3 Protect building systems, services and equipment.
  - .4 Provide temporary dust screens, covers, railings, supports and other protection as required.
  - .5 Do Work in accordance with Section 01 35 29.06 - Health and Safety Requirements.
- .2 Demolition/Removal:
  - .1 At end of each day's work, leave Work in safe and stable condition.
  - .2 Protect interiors of parts not to be demolished from exterior elements at all times.
  - .3 Demolish to minimize dusting.

### **3.3 SITE RESTORATION & REPAIRS**

- .1 Provide a smooth transition between adjacent existing grades and new grades.
- .2 General: Promptly repair damage to adjacent construction caused by demolition operations.
- .3 Where repairs to existing surfaces are required, patch to produce surfaces suitable for new materials.
- .4 Restore exposed finishes of patched areas and extend restoration into adjoining construction in a manner that eliminates evidence of patching and refinishing.
- .5 At the end of the work or at the appropriate time, restore de site, Use topsoil, level and install rolled turf. If necessary, prepare such as existing all areas damaged by the work

### **3.4 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
- .3 Refer to demolition drawings and specifications for items to be salvaged for reuse.
- .4 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal (CDR).
  - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

**END OF SECTION**

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## **PART 1 - GENERAL**

### **1.1 RELATED REQUIREMENTS**

- .1 Not Used.

### **1.2 REFERENCE STANDARDS**

- .1 Canadian Environmental Protection Act, 1999 (CEPA 1999)
  - .1 Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations (SOR/2005-149).
- .2 Department of Justice Canada (Jus)
  - .1 Transportation of Dangerous Goods Act, 1992 (TDG Act) [1992], (c. 34).
  - .2 Transportation of Dangerous Goods Regulations (T-19.01-SOR/2001-286).
- .3 Green Seal Environmental Standards (GS)
  - .1 GS-11-2008, 2nd Edition, Paints and Coatings.
  - .2 GS-36-00, Commercial Adhesives.
- .4 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .5 National Research Council Canada (NRC)
  - .1 National Fire Code of Canada 2015 (NFC).
- .6 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
  - .1 SCAQMD Rule 1113-A2007, Architectural Coatings.
  - .2 SCAQMD Rule 1168-A2005, Adhesive and Sealant Applications.

### **1.3 DEFINITIONS**

- .1 Dangerous Goods: product, substance, or organism specifically listed or meets hazard criteria established in Transportation of Dangerous Goods Regulations.
- .2 Hazardous Material: product, substance, or organism used for its original purpose; and is either dangerous goods or material that will cause adverse impact to environment or adversely affect health of persons, animals, or plant life when released into environment.
- .3 Hazardous Waste: hazardous material no longer used for its original purpose and that is intended for recycling, treatment or disposal.

### **1.4 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for hazardous materials and include product characteristics, performance criteria, physical size, finish and limitations.

- .2 Submit two copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements to Departmental Representative for each hazardous material required prior to bringing hazardous material on site.
- .3 Submit hazardous materials management plan to Departmental Representative that identifies hazardous materials, usage, location, personal protective equipment requirements, and disposal arrangements.
- .4 Hazardous waste classification: identify waste codes applicable to each hazardous waste material based on applicable federal and provincial acts, regulations, and guidelines. Waste profiles, analyses, and classification submitted to contract offices for review and approval.

## 1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Transport hazardous materials and wastes in accordance with Transportation of Dangerous Goods Act, Transportation of Dangerous Goods Regulations, and applicable provincial regulations.
  - .1 When exporting hazardous waste to another country, ensure compliance with Export and Import of Hazardous Waste and Hazardous Recyclable Materials Regulations.
- .4 Storage and Handling Requirements:
  - .1 Co-ordinate storage of hazardous materials with Departmental Representative and abide by internal requirements for labelling and storage of materials and wastes.
  - .2 Store and handle hazardous materials and wastes in accordance with applicable federal and provincial laws, regulations, codes, and guidelines.
  - .3 Store and handle flammable and combustible materials in accordance with National Fire Code of Canada (NFC) requirements.
  - .4 Keep no more than 45 litres of flammable and combustible liquids such as gasoline, kerosene and naphtha for ready use.
    - .1 Store flammable and combustible liquids in approved safety cans bearing the Underwriters' Laboratory of Canada or Factory Mutual seal of approval.
    - .2 Storage of quantities of flammable and combustible liquids exceeding 45 litres for work purposes requires the written approval of the Departmental Representative.
  - .5 Transfer of flammable and combustible liquids is prohibited within buildings.
  - .6 Transfer flammable and combustible liquids away from open flames or heat-producing devices.
  - .7 Solvents or cleaning agents: non-flammable or have flash point above 38 degrees C.
  - .8 Store flammable and combustible waste liquids for disposal in approved containers located in safe, ventilated area. Keep quantities to minimum.
  - .9 Observe smoking regulations, smoking is prohibited in areas where hazardous materials are stored, used, or handled.
  - .10 Storage requirements for quantities of hazardous materials and wastes in excess of 5 kg for solids, and 5 litres for liquids:
    - .1 Store hazardous materials and wastes in closed and sealed containers.
    - .2 Label containers of hazardous materials and wastes in accordance with WHMIS.
    - .3 Store hazardous materials and wastes in containers compatible with that material or waste.
    - .4 Segregate incompatible materials and wastes.

- .5 Ensure that different hazardous materials or hazardous wastes are stored in separate containers.
- .6 Store hazardous materials and wastes in secure storage area with controlled access.
- .7 Maintain clear egress from storage area.
- .8 Store hazardous materials and wastes in location that will prevent them from spilling into environment.
- .9 Have appropriate emergency spill response equipment available near storage area, including personal protective equipment.
- .10 Maintain inventory of hazardous materials and wastes, including product name, quantity, and date when storage began.
- .11 When hazardous waste is generated on site:
  - .1 Co-ordinate transportation and disposal with Departmental Representative.
  - .2 Comply with applicable federal, provincial and municipal laws and regulations for generators of hazardous waste.
  - .3 Use licensed carrier authorized by provincial authorities to accept subject material.
  - .4 Before shipping material obtain written notice from intended hazardous waste treatment or disposal facility it will accept material and it is licensed to accept this material.
  - .5 Label container[s] with legible, visible safety marks as prescribed by federal and provincial regulations.
  - .6 Only trained personnel handle, offer for transport, or transport dangerous goods.
  - .7 Provide photocopy of shipping documents and waste manifests to Departmental Representative.
  - .8 Track receipt of completed manifest from consignee after shipping dangerous goods. Provide photocopy of completed manifest to Departmental Representative.
  - .9 Report discharge, emission, or escape of hazardous materials immediately to Departmental Representative and appropriate provincial authority. Take reasonable measures to control release.
- .12 Ensure personnel have been trained in accordance with Workplace Hazardous Materials Information System (WHMIS) requirements.
- .13 Report spills or accidents immediately to Departmental Representative. Submit a written spill report to Departmental Representative within 24 hours of incident.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- .1 Description:
  - .1 Bring on site only quantities hazardous material required to perform Work.
  - .2 Maintain MSDS in proximity to where materials are being used. Communicate this location to personnel who may have contact with hazardous materials.
  - .3 Spill Response Materials: provide spill response materials which can be used for absorbing/shoveling and containing hazardous materials.
  - .4 Provide personal protective equipment.

## **PART 3 - EXECUTION**

### **3.1 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
  - .1 Dispose of hazardous waste materials in accordance with applicable federal and provincial acts, regulations, and guidelines.
  - .2 Recycle hazardous wastes for which there is approved, cost effective recycling process available.
  - .3 Send hazardous wastes to authorized hazardous waste disposal or treatment facilities.
  - .4 Burning, diluting, or mixing hazardous wastes for purpose of disposal is prohibited.
  - .5 Disposal of hazardous materials in waterways, storm or sanitary sewers, or in municipal solid waste landfills is prohibited.
  - .6 Dispose of hazardous wastes in timely fashion in accordance with applicable provincial regulations.
  - .7 Minimize generation of hazardous waste to maximum extent practicable. Take necessary precautions to avoid mixing clean and contaminated wastes.
  - .8 As applicable, identify and evaluate recycling and reclamation options as alternatives to land disposal, such as:
    - .1 Hazardous wastes recycled in manner constituting disposal.
    - .2 Hazardous waste burned for energy recovery.
    - .3 Lead-acid battery recycling.
    - .4 Hazardous wastes with economically recoverable precious metals.

**END OF SECTION**

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## **PART 1 - GENERAL**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 07 52 00 – Modified bituminous membrane roofing.
- .2 Section 07 52 01 – Protected modified bituminous membrane roofing.
- .3 Section 07 55 63 – Vegetated protected membrane roofing.
- .4 Section 70 62 00 – Sheet metal flashing and trim.
- .5 Section 07 92 00 – Joint sealants.

### **1.2 REFERENCE STANDARDS**

- .1 American National Standards Institute (ANSI)
    - .1 ANSI A208.1-09, Particleboard.
    - .2 ANSI A208.2-09, Medium Density Fibreboard (MDF) for Interior Applications.
    - .3 ANSI/HPVA HP-1-10, American National Standard for Hardwood and Decorative Plywood.
    - .4 ANSI/BHMA A156.16 Auxiliary Hardware.
    - .5 ANSI/ASME 18.6.1 1981 (R2012) Wood Screws (Inch Series).
  - .2 Architectural Woodwork Manufacturers Association of Canada (AWMAC) and Architectural Woodwork Institute (AWI)
    - .1 Architectural Woodwork Quality Standards, 2nd edition, 2014.
  - .3 ASTM International
    - .1 ASTM A 153/A 153M-16, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
    - .2 ASTM E 1333-14 Standard Test Method for Determining Formaldehyde Concentrations in Air and Emission Rates from Wood Products Using a Large Chamber.
    - .3 ASTM F 1667-13 Standard Specification for Driven Fasteners: Nails, Spikes and Staples.
  - .4 Canadian General Standards Board (CGSB)
    - .1 CAN/CGSB-11.3-M87, Hardboard.
  - .5 CSA International
    - .1 CSA O121-08(R2013), Douglas Fir Plywood.
    - .2 CSA O151-09(R2014), Canadian Softwood Plywood.
    - .3 CSA O153-M13, Poplar Plywood.
    - .4 CAN/CSA-Z809-08(R2013), Sustainable Forest Management.
  - .6 Forest Stewardship Council (FSC)
    - .1 FSC-STD-01-001-2004, FSC Principle and Criteria for Forest Stewardship.
  - .7 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
    - .1 Material Safety Data Sheets (MSDS).
  - .8 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
    - .1 SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.
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- .9 Sustainable Forestry Initiative (SFI)
  - .1 SFI-2015-2019 Standard.
- .10 Underwriters Laboratories of Canada (ULC)
  - .1 CAN/ULC-S104-10, Standard Method for Fire Tests of Door Assemblies.
  - .2 CAN/ULC-S105-09, Standard Specification for Fire Door Frames.
- .11 Roofing masters association of Quebec's Specification Manuel (AMCQ)

### 1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature, data sheets and catalogue pages for specified products. Include product characteristics, performance criteria, dimensions and profiles, finish and limitations on use.
  - .2 Submit 1 copie of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.
- .3 Shop Drawings:
  - .1 Prepare and submit shop drawings in general accordance with AWMAC AWS manual.
  - .2 Indicate profiles and dimensions, assembly techniques, jointing, methods of fastening, terminations and other related details.
  - .3 Indicate materials, thicknesses, finishes and hardware.
  - .4 Include schedule or key plan.
  - .5 Show profiles, elevations and details at scales recommended by AWMAC AWS.
  - .6 Where necessary, show location and type of blocking and backing required within supporting assemblies.
- .4 Samples:
  - .1 Submit triplicate 300 mm long representative samples of each typical item of finish carpentry.
    - .1 Standing and running trim: 300 mm long.
    - .2 Panel materials: 300 mm x 300 mm.
- .5 Certifications: submit certificates signed by manufacturer certifying materials comply with specified performance characteristics, physical properties and requirements of referenced standards.
- .6 Test and Evaluation Reports: submit certified test reports from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.

### 1.4 QUALITY ASSURANCE

- .1 Wood stamping : classification stamp from an organization recognized by the Canadian Lumber Standards Commission (CLSAB) Accreditation Board
- .2 Wood panels stamping: according to relevant CSA and ANSI standards.

### 1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with AWS recommendations and as follows.

- .2 Deliver finish carpentry materials only when area of work is enclosed, plaster and concrete work is dry, area is broom clean and site environmental conditions are acceptable for installation.
- .3 Storage and Handling Requirements:
  - .1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store products on site as specified for minimum 72 hours prior to installation.
  - .3 Store and protect finish carpentry products from moisture, nicks, scratches, and blemishes.
  - .4 Replace defective or damaged materials with new.
- .4 Waste Management and Disposal:
  - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Waste Management and Disposal.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- .1 Softwood and hardwood lumber: Sound lumber to specified AWS grade requirements, kiln-dried to moisture content recommended for location of the Work.
  - .1 Machine stress-rated lumber is acceptable for all purposes.
- .2 Douglas fir plywood (DFP): to CSA O121, standard construction.
- .3 Canadian softwood plywood (CSP): to CSA O151, standard construction.
- .4 Hardwood plywood: to ANSI/HPVA HP-1.
- .5 Poplar plywood (PP): to CSA O153, standard construction.
- .6 Exterior type plywood, classification "square-cut construction"
- .7 Wood treatment product:
  - .1 Surface-applied preservative: colorless water-repellent preservative, or 5% pentachlorophenol solution.
  - .2 The use of pentachlorophenol is limited to wood components that are in contact with the soil and are subject to decay or attack by insects. Where appropriate, pentachlorophenol treated wood shall be coated with two coats of a suitable printing product.
  - .3 Structures built with pentachlorophenol and inorganic arsenic treated wood must not be used for food storage, and the wood must not come into contact with drinking water

### **2.2 INSULATION**

- .1 Thermal batt insulation : rock fiber for use in parapets, control joint, expansion joint, frame, equipment base or where required as indicated in drawings, of thickness required to fill the empty space.

### **2.3 AIR AND VAPOR BARRIER MEMBRANE**

- .1 Self-adhesive membrane made from SBS polymer modified bitumen in accordance with CAN / CGSC-37.56-M, for use under frames, parapets and where required to provide continuity with roof vapor-barrier, with following properties:
  - .1 Thickness : 3,0mm

- .2 Reinforcement : composite (glass and polyester grid)
- .3 Surface : granulated
- .4 Sous-face : self-adhesive, covered by a detachable protective sheet
- .5 Resistance to deformation : 7,8 / 7,2kN/m.
- .6 Tear resistance : 60 / 65%.
- .7 Static ball penetration hardness : 560N.
- .8 Acceptable product : SOPRALÈNE STICK HR 20 by SOPREMA.

## 2.4 FASTENINGS

- .1 Provide screws, bolts, expansion shields and other fastening devices required for satisfactory installation.
- .2 Exposed fasteners to match finish of hardware.
- .3 Nails and staples: to ASTM F 1677, galvanized to ASTM A 153/A 153M for exterior work, interior humid areas; plain finish elsewhere.
- .4 Wood screws: to ANSI/ASME 18.6.1, countersunk flush type unless indicated otherwise, in sizes to suit application, galvanized to ASTM A 153/A 153M for exterior work, interior humid areas.
- .5 In concrete, use dowel hammer down with a nailer gun

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for wood products installation in accordance with AWS tolerances and requirements of Contract Documents.
  - .1 Visually inspect substrate in presence of Departmental Representative.
  - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  - .3 Proceed with installation only after unacceptable conditions have been remedied [and after receipt of written approval to proceed from Departmental Representative.

### 3.2 INSTALLATION

- .1 Install items of finish carpentry in accordance with AWMAC AWS grade specified for respective items.
  - .2 In case of conflict between Contract Documents and AWS grade requirements, Contract Documents govern.
  - .3 Install items of finish carpentry at locations shown on drawings.
    - .1 Position accurately, level, plumb straight.
    - .2 Fasten and anchor securely.
  - .4 Scribe and cut as required, fit to abutting walls, and surfaces, fit properly into recesses and to accommodate piping, columns, fixtures, outlets, or other projecting, intersecting or penetrating objects.
  - .5 Form joints to conceal shrinkage.
-



### **3.3 CONSTRUCTION**

- .1 Fastening:
  - .1 Position items of finished carpentry work accurately, level, plumb, true and fasten or anchor securely.
  - .2 Design and select fasteners to suit size and nature of components being joined. Use proprietary devices as recommended by manufacturer.
  - .3 Set finishing nails to receive filler. Where screws are used to secure members, countersink screw in round smooth cut hole and plug with wood plug to match material being secured.
  - .4 Replace items of finish carpentry with damage to wood surfaces including hammer and other bruises.

### **3.4 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
- .3 Waste Management and Disposal:
  - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Waste Management and Disposal.

### **3.5 TOUCHUP AND PROTECTION**

- .1 Fill and retouch all nicks, chips and scratches in factory finishes and substrate materials to AWS standards. Replace damaged items that cannot be repaired to AWS standards.
- .2 Protect installed products and components from damage during construction.
- .3 Repair damage to adjacent materials caused by finish carpentry installation.
- .4 Leave work to be site finished ready for finishing by Section 09 91 23 - Interior Painting.

**END OF SECTION**

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## **PART 1 - GENERAL**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 07 52 00 – Modified bituminous membrane roofing.
- .2 Section 07 62 00 – Sheet metal flashing and trim.

### **1.2 REFERENCE STANDARDS**

- .1 Canadian Urethane Foam Contractors Association Inc. (CUFCA)
- .2 Green Seal (GS)
  - .1 GS-11-2013, Standard for Paints and Coatings.
- .3 South Coast Air Quality Management District (SCAQMD)
  - .1 SCAQMD Rule 1113-13, Architectural Coatings.
- .4 Underwriters Laboratories of Canada (ULC)
  - .1 CAN/ULC-S101 07, Standard Methods of Fire Tests of Building Construction and Materials.
  - .2 CAN/ULC-S102-10, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
  - .3 CAN/ULC-S705.1-01, Standard for Thermal Insulation - Spray Applied Rigid Polyurethane Foam, Medium Density, Material Specification. Includes Amendment 1.2.
  - .4 CAN/ULC-S705.2-05, Standard for Thermal Insulation - Spray Applied Rigid Polyurethane Foam, Medium Density, Application.

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

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for polyurethane foam sprayed insulation and include product characteristics, performance criteria, physical size, finish and limitations.
  - .2 Submit (1) copie of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.
- .3 Quality assurance submittals: submit following in accordance with Section [01 45 00 - Quality Control].
  - .1 Test reports: submit certified test reports for insulation from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.
  - .2 Submit test reports in accordance with CAN/ULC-S101 for fire endurance and CAN/ULC-S102 for surface burning characteristics.
  - .3 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures.

## **1.4 QUALITY ASSURANCE**

- .1 Applicators to conform to CUFCA Quality Assurance Program.
- .2 Qualifications:
  - .1 Installer: person specializing in sprayed insulation installations with (5) years documented experience approved by manufacturer.
  - .2 Manufacturer: company with minimum (5) years experience in producing of material used for work required for this project, with sufficient production capacity to produce and deliver required units without causing delay in work.
- .3 Mock-up:
  - .1 Construct mock-up in accordance with Section 01 45 00 - Quality Control.
  - .2 Construct mock-up 10 m<sup>2</sup> minimum, of sprayed insulation including one inside corner and one outside corner, door, window, openings.
  - .3 Mock-up may be part of finished work.
  - .4 Allow 24 hours for inspection of mock-up by Departmental Representative before proceeding with sprayed insulation work.
- .4 Health and Safety Requirements: worker protection:
  - .1 Protect workers as recommended by CAN/ULC-S705.2 and manufacturer's recommendations:
  - .2 Workers must wear gloves, dust masks, long sleeved clothing, eye protection, protective clothing when applying foam insulation.
  - .3 Workers must not eat, drink or smoke while applying foam insulation.

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

- .1 Packing, shipping, handling and unloading:
  - .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
  - .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Waste Management and Disposal:
  - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Waste Management and Disposal.

## **1.6 SITE CONDITIONS**

- .1 Provide temporary enclosures to prevent spray and noxious vapours from contaminating air beyond application area.
- .2 Protect adjacent surfaces and equipment from damage by overspray, fall-out, and dusting of insulation materials.
- .3 Apply insulation only when surfaces and ambient temperatures are within manufacturers' prescribed limits.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- .1 Insulation : Urethane foam sprayed according to CAN/ULC S705.1-01 standard.
-

.1	Density :	ASTM-D-1622, 28 kg/m <sup>3</sup>
.2	Compression resistance:	ASTM-D-1621, 174 kPa
.3	Tension resistance:	ASTM-D-1623, 212 kPa
.4	Water absorption (%) :	ASTM-D-2842, 0,62 %
.5	water vapor permeance :	ASTM-E-96, 86.6 ng/Pa s m <sup>2</sup>
.6	closes cells (%) :	ASTM-D-2856, 94 %
.7	Flame transfer:	CAN/ULC S102, 335
.8	Thermal resistance:	ASTM-C-518, 1,22/25mm RSI (90 jours/23°C)
.9	Dimensional stability:	ASTM-D-2126, % variation vol. (28 days)
		-20°C min. 0,47 %
		70°C max. 2,58 %
		100°C max. 5,89 %

## 2.2 EQUIPMENT

- .1 Spray equipment must meet the requirements of CAN / ULC S705.2 and the manufacturer's recommendations.

## PART 3 - EXECUTION

### 3.1 MANUFACTURER'S INSTRUCTIONS

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

### 3.2 VERIFICATION

- .1 Verify that the work already executed is in good condition to receive the works described in this section. Report any anomaly or discrepancies. Do not begin work until the adjustments have been made.
- .2 In accordance with the requirements of CAN / ULC S705.2 and the following requirements, verify these conditions
  - .1 Surfaces to be covered with thermal foam insulation must be free from excess moisture, frost, oil, rust and other foreign matter that may adversely affect product adhesion. If in doubt apply a primer.
  - .2 Ensure complete curing of substrates: concrete, mortar, coatings, membranes, primers or any other potential surfaces, before applying sprayed foam.
  - .3 Ensure adhesion of membranes and coatings to different substrates is adequate taking into account climatic conditions of application of membranes, coatings, and sprayed insulation.
  - .4 If the application thickness of the foam is greater than 50 mm, provide continuous mechanical fastenings for the self-adhesive membranes at the perimeters of the openings (foundation wall junction according to detail, etc.).
    - .1 32 mm x 32 mm x 0.42 mm thick galvanized steel corner (gypsum board).  
Fastened at 600 mm o.c. Alternative wood nailer.
  - .5 Z-bars must be primed at all times as described in CAN / ULC S705.2-98 art: A 1.7.
  - .6 Respect moisture content acceptable for different materials
  - .7 In the case of special conditions follow manufacturer's recommendations
- .3 Ensure that all works that need to be executed before the application of the projected insulation are completed. These works include but are not limited to :
  - .1 Masonry fasteners

- .2 Fur, blockages, sub-frames, fasteners, recessed elements.
- .3 Coating, membrane, flashing, mechanical fastening.
- .4 Mechanical and electrical works.
- .5 Firewall.
- .6 Primer.

### **3.3 APPLICATION**

- .1 Follow manufacturer's recommendations and CAN / ULC S705.2-98 for the use of a primer
- .2 Apply insulation to clean surfaces in accordance with CAN/ULC-S705.2 and manufacturer's printed instructions.
- .3 Apply the insulation in successive layers of at least 15 mm and not more than 50 mm thick each to obtain a total thickness specified in the plans.
- .4 Do not project insulation within 75 mm of chimneys, steam ducts, recessed fixtures and other sources of heat.

### **3.4 FIELD QUALITY CONTROL**

- .1 Manufacturer's Field Services:
  - .1 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

### **3.5 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
  - .1 Remove insulation material spilled during installation and leave work area ready for application of wall board.
- .3 Waste Management and Disposal:
  - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Waste Management and Disposal.

**END OF SECTION**

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## **PART 1 - GENERAL**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 02 41 00.08 – Demolition – Minor works
- .2 Section 07 52 01 – Protected modified bituminous membrane roofing.
- .3 Section 07 55 63 – Vegetated protected membrane roofing.
- .4 Section 70 62 00 – Sheet metal flashing and trim.
- .5 Section 07 92 00 – Joint sealants.

### **1.2 REFERENCE STANDARDS**

- .1 ASTM International Inc.
  - .1 ASTM C 726-05, Standard Specification for Mineral Fiber Roof Insulation Board.
  - .2 ASTM C 728-05, Standard Specification for Perlite Thermal Insulation Board.
  - .3 ASTM C 1177/C 1177M-06, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
  - .4 ASTM C 1396/C 1396M-06a, Standard Specification for Gypsum Board.
  - .5 ASTM D 41-05, Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing.
  - .6 ASTM D 312-00(2006), Standard Specification for Asphalt Used in Roofing.
  - .7 ASTM D 448-03a, Standard Classification for Sizes of Aggregate for Road and Bridge Construction.
  - .8 ASTM D 2178-04, Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing.
  - .9 ASTM D 6162-00a, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fibre Reinforcements.
  - .10 ASTM D 6163-00e1, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fibre Reinforcements.
  - .11 ASTM D 6164-05, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements.
  - .12 ASTM D 6222-02e1, Standard Specification for Atactic Polypropylene (APP) Modified Bituminous Sheet Materials Using Polyester Reinforcement.
  - .13 ASTM D 6223-02e1, Standard Specification for Atactic Polypropylene (APP) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcement.
  - .14 ASTM D 6509-00, Standard Specification for Atactic Polypropylene (APP) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcement.
- .2 Canadian General Standards Board (CGSB)
  - .1 CGSB 37-GP-9Ma-83, Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing.
  - .2 CGSB 37-GP-56M-80b(A1985), Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing.
  - .3 CAN/CGSB-51.33-M89, Vapour Barrier Sheet, Excluding Polyethylene, for Use in Building Construction.

- .3 Canadian Roofing Contractors Association (CRCA)
  - .1 CRCA Roofing Specifications Manual-1997 .
- .4 Roofing masters association of Quebec (AMCQ)
  - .1 Specification Manuel, roofing, latest edition
- .5 CSA Group (CSA)
  - .1 CSA A123.21-04, Standard Test Method for the Dynamic Wind Uplift Resistance of Mechanically Attached Membrane-Roofing Systems
  - .2 CSA-A123.3-05, Asphalt Saturated Organic Roofing Felt.
  - .3 CSA-A123.4-04, Asphalt for Constructing Built-Up Roof Coverings and Waterproofing Systems.
  - .4 CSA A231.1-06, Precast Concrete Paving Slabs.
  - .5 CSA O121-08, Douglas Fir Plywood.
  - .6 CSA O151-04, Canadian Softwood Plywood.
- .6 Factory Mutual (FM Global)
  - .1 FM Approvals - Roofing Products.
- .7 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .8 Underwriters Laboratories' of Canada (ULC)
  - .1 CAN/ULC-S701-05, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.
  - .2 CAN/ULC-S702.2-03, Standard for Mineral Fibre Thermal Insulation for Buildings.
  - .3 CAN/ULC-S704-03, Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.
  - .4 CAN/ULC-S706-02, Standard for Wood Fibre Thermal Insulation for Buildings.

### 1.3 ADMINISTRATIVE REQUIREMENTS

- .1 Convene pre-installation meeting one week prior to beginning waterproofing Work, with roofing contractor's representative and Departmental :
  - .1 Verify project requirements.
  - .2 Review installation and substrate conditions.
  - .3 Co-ordination with other building subtrades.
  - .4 Review manufacturer's installation instructions and warranty requirements.

### 1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Provide copies of most recent technical roofing components data sheets describing materials' physical properties and include product characteristics, performance criteria, physical size, finish and limitations.
  - .2 Provide copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements, and indicate VOC content for:
    - .1 Primers.
    - .2 Asphalt.
    - .3 Sealers.
    - .4 Filter fabric.



- .3 Provide shop drawings:
  - .1 Indicate flashing, control joints, tapered insulation details.
- .4 Samples: submit two (2) sample of insulation.
- .5 Manufacturer's Certificate: certify that products meet or exceed specified requirements.
- .6 Test and Evaluation Reports: submit laboratory test reports certifying compliance of bitumens and roofing felts and membrane with specification requirements.
- .7 Manufacturer's Installation Instructions: indicate special precautions required for seaming the membrane.
- .8 Manufacturer's field report: in accordance with Section 01 45 00 - Quality Control.
- .9 Reports: indicate procedures followed, ambient temperatures and wind velocity during application.

## **1.5 QUALITY ASSURANCE**

- .1 The roofing contractor must ensure perfect continuity in the execution of roofing work so that the materials that are incorporated in such work, are not damaged by any cause whatsoever.

## **1.6 QUALITY CONTROL OF WORKS**

- .1 The roofing work inspection described in this section and the relevant tests will be carried out by an independent inspection firm (control office), specialized in the roofing field, accredited by the Roofing masters association of Quebec, mandated and paid by the Departmental Representative.
- .2 The control office shall carry out a preliminary inspection to verify the support that will receive the roofing materials, slopes, strength, cleanliness, preparation and approval of related works such as: walls, parapets, front roofs, downspouts, plumbing vents, and any other required works.
- .3 In addition, the control office must, before the work starts, verify the conformity between the specifications and the Roofing masters association of Quebec minimum requirements, in order to ensure the issuance of its guarantee.
- .4 The presence of the control office's inspector will be continuous and no interruption will be allowed for the full duration of the roofing materials installation.
- .5 However the presence of the inspector is not required when executing cleaning work of the supports, whether it is to remove surplus materials, accumulations of snow and / or ice or the drying of the surfaces. If the roofing contractor mistakenly calls the inspector for periods when his presence is not required, he shall assume the costs of such presence.
- .6 After the installation of the metal, the control office's inspector shall ensure that the execution of sheet metal work is in accordance with plans and specifications and meets the applicable installation requirements. The continued presence of the inspector is not required during the installation of the metal.
- .7 The roofing work inspection will ensure compliance with plans and specifications and will include, among other things, the following verifications:
  - .1 The nature, thickness, weight, and number of impermeable membranes.
  - .2 Overlap and sealing joints of the membranes.
  - .3 Construction of membrane and metal flashings on walls or control or expansion joints.
  - .4 Tightness of mechanical, electrical or other equipment bases present on the roofs.

- .5 The flow of rainwater to each drains.
- .8 After work acceptance by the inspector, the inspector will provide the roofing contractor with a certificate attesting to the quality of the work and compliance with the installation instructions.
- .9 The control office has full authority to stop and suspend the work if required until indicated rework are executed in accordance with the written instructions.

## 1.7 FIRE PROTECTION

- .1 Prior to the start of work, conduct an audit to ensure site safety to minimize fire hazards and hazards.
- .2 Comply with safety instructions recommended by the concerned local authorities.
- .3 At the end of each working day, use a heat detector gun to discover any possible hidden fires and wall fires.
- .4 The site organization must allow the presence of the workers at least one (1) hours after the end of any welding work. An inspection must be carried out at the end of the work by a roofing contractor's employee who is specialized in this type of work and, if necessary, with the collaboration of a member of the municipality fire protection department.
- .5 Never weld directly on combustible materials
- .6 Portable fire extinguishers: keep on the roof, for each torch, a ULC approved auxiliary cylinder fire extinguisher class A, B and C, fully loaded and in perfect working condition. The extinguisher must be placed within 6 meters (20 feet) of any torch. Apply the safety instructions that accompany the roofing material data sheets. Make sure the torch is not placed near flammable or combustible products. The flame of the torch must never enter a place where it is not visible or can not be easily controlled.

## 1.8 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions and Section 01 61 00 - Common Product Requirements.
- .2 Storage and Handling Requirements:
  - .1 Safety: comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of asphalt, sealing compounds, primers and caulking materials.
  - .2 Provide and maintain dry, off-ground weatherproof storage.
  - .3 Store rolls of felt and membrane in upright position. Store membrane rolls with salvage edge up.
  - .4 Remove only in quantities required for same day use.
  - .5 Place plywood runways over completed Work to enable movement of material and other traffic.
  - .6 Store sealants at +5 degrees C minimum.
  - .7 Store insulation protected from daylight and weather and deleterious materials.
- .3 Waste Management and Disposal:
  - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Waste Management and Disposal.

## **1.9 SITE CONDITIONS**

- .1 Follow manufacturers recommendations
- .2 Do not install roofing when temperature remains below -5 degrees C for torch application.
- .3 Minimum temperature for solvent-based adhesive is -5 degrees C.
- .4 Install roofing on dry deck, free of snow and ice, use only dry materials and apply only during weather that will not introduce moisture into roofing system.

## **1.10 WARRANTY**

- .1 With reference to this section, the manufacturer for waterproofing membranes will provide a written document, issued in the name of the owner, the warranty period prescribed in the general conditions is extended to 10 years, the warranty includes repair work for any leakage in the membrane to restore the roof system to a dry, watertight state, in the event of any manufacturing or installation defects resulting in water infiltration. The warranty will cover the total repair expenses during the entire warranty period. The guarantee certificate must reflect these requirements.
- .2 With reference to this section, the roofing contractor shall provide a written and signed document, issued on behalf of the owner, certifying that the completed work will remain in place and free from any leakage, the warranty period prescribed in the general conditions is extended to five (5) years

## **1.11 SITE PROTECTION**

- .1 When transporting roof materials and performing roofing work, protect exposed surfaces of any finished walls with tarps to prevent any damage. Build traffic paths on the roofs with rigid board, over the newly installed materials, to allow the passage of people and equipment. Assume full responsibility for any damage.

## **1.12 MANUFACTURER'S REPRESENTATIVE**

- .1 At the beginning and during the tightness work, a manufacturer's representative for the waterproofing materials must be present on the site
- .2 The Contractor shall allow and facilitate access to the site and roof at all times to any manufacturer's representative mentioned above.

## **PART 2 - PRODUCTS**

### **2.1 PERFORMANCE CRITERIA**

- .1 Compatibility between components of roofing system is essential. Provide written declaration to Departmental Representative stating that materials and components, as assembled in system, meet this requirement.
  - .2 Roofing System: to CSA A123.21 for wind uplift resistance.
  - .3 Roofing materials and systems must comply with the requirements of the NBC, AMCQ and ACEC.
-

## 2.2 VAPOUR RETARDER

- .1 heat-sealable elastophene membranes composed of a glass mat reinforcement and SBS modified bitumen in compliance with CAN/CGSB-37.56M standards and to the following specifications:
  - .1 Thickness: 3,5 mm
  - .2 Reinforcement: Glass mat
  - .3 Underface: Detachable film
  - .4 Top face: Sand
  - .5 Breaking strenght (MD/XD): 11 / 8,5 Kn/m
  - .6 Ultimate elongation (MD/XD): 4 / 4%
  - .7 Cold bending : -30%
  - .8 Plastic flow : 115°C
  - .9 Dimensional stability (MD/XD): 0 / 0
  - .10 Static puncture : 160 N
  - .11 Tear resistance : 30 N

## 2.3 INSULATION ADHESIVE

- .1 Low-expansion, two-component, polyurethane adhesive, type recommended by the manufacturer.

## 2.4 FLAT INSULATION

- .1 Polyisocyanurate thermal insulation board in compliance to ASTM C 1289 standard, type II, classe 1, grade 2 (20psi) or grade 3 (25 psi), and to the following specifications, to be used as first row:
  - .1 Thermal resistance: RSI 1.00 (R-5.7) for 25.4 mm thick
  - .2 Compression Strength: 138 kPa (20 psi) according to ASTM D1621 standard
  - .3 Density: 32.04 kg/m<sup>3</sup> (2.0 lb/pi<sup>3</sup>) according to ASTM D1622 standard
  - .4 Linear Dimensional Stability: <2.0% according to ASTM D 2126 standard
  - .5 Dimension : 1.2 m x 1.2 m
  - .6 Installation : with adhesive
- .2 Rock wool board insulation with a rigid upper surface and saturated layer of bitumen, in compliance with CAN/ULC-S107-30 and CAN/ULC-S126-06 standards and to the following specifications, to be used as second row:
  - .1 Thermal resistance: RSI 0.68 (R3.8) for 25.4 mm thick
  - .2 Compression Strength : Top layer at 10% : 140 kPa (20 psi) Top layer at 25% : 250 kPa (37 psi) according to ASTM C 165 standard
  - .3 Density : top layer 220 kg/m<sup>3</sup> and bottom layer 160 kg/m<sup>3</sup> according to ASTM C612-09 standard
  - .4 Dimensional Stability, Linear Shrinkage 24 hours: 0.71% according to ASTN C 356
  - .5 Water Absorption: < 1.0 % according to ASTM C 209
  - .6 Water Vapor Sorption: 0.15% according to ASTM C 1104
  - .7 Installation : with adhesive
- .3 Rigid thermal insulation board made of extruded polystyrene with shi lap or square edges on all four sides in compliance to CAN/ULC S701.1 type 4 standards and to the following specifications:

.1	Total Thickness :	Indicated in drawings
.2	Board dimensions:	2438 x 610
.3	Edges :	Rabbet
.4	Thermal resistance (ASTM C518) :	RSI 0,88 for 25,4 mm thick
.5	Water absorption % max. per volume (ASTM D2842) :	0,4%
.6	Compression Strength (ASTM D1621) :	241 kPa (35 psi)

## 2.5 SLOPE AND REVERSE SLOPE INSULATION

- .1 Sloped polyisocyanurate thermal insulation board, in compliance with ASTM C 1289 standard, type II, classe 1, grade 2 (20psi) ou grade 3 (25 psi), designed to provide roof system with a slope index of 1%, 2% and 4% when used as a back slope and having the following specifications:
  - .1 Thermal resistance: RSI 1.00 (R-5.7) for 25.40 mm thick
  - .2 Compression Strength : 138 kPa (20 psi) according to ASTM D1621 standard
  - .3 Density : 32.04 kg/m<sup>3</sup> (2.0 lb/pi<sup>3</sup>) according to ASTM D1622 standard
  - .4 Linear Dimensional Stability: <2.0% ASTM D 2126
  - .5 Dimension : 1.2 m x 1.2 m
  - .6 Minimum thickness: 13mm
- .2 Reverse slope Non-combustible rock fiber insulating with a top layer saturated with a layer of bitumen, minimum thickness 13 mm.

## 2.6 MEMBRANE

- .1 Thermosealed high performance base sheet membrane for running surfaces composed of SBS modified bitumen and a composite reinforcement in compliance to ONGC 37.56-M (9<sup>th</sup> edition) standard and having the following specifications:
  - .1 Thickness: 2,5 mm
  - .2 Reinforcement : composite
  - .3 Underface: Thermosealed plastic film
  - .4 Top face: Thermosealed plastic film
  - .5 Strain energy: 7,8 / 7,2 kN/m
  - .5 Breaking strenght : 15 / 13,5 kN/m
  - .6 Ultimate elongation : 60 / 65%
  - .8 Tear resistance: 125N
  - .9 Static puncture resistance: 560N
  - .10 Dimensional stability: 0,2 / 0
  - .11 Lap joint strength: pass > 4 kN/m
- .2 Thermosealed high performance base sheet membrane, for the vertical portions and parapets composed of wood paneling, composed of SBS modified bitumen and a composite reinforcement in compliance to ONGC 37.56-M (9<sup>th</sup> edition) and ASTM D6162 standards and having the following specifications:

- |    |                       |   |
|----|-----------------------|---|
| .1 | Thickness:            | 3 mm  |
| .2 | Reinforcement :       | composite   |
| .3 | Underface:            | Self-adhesive wrapped with detachable protective film |
| .4 | Top face:             | Thermosealed plastic film                             |
| .5 | Strain energy:        | 7,8 / 7,2 kN/m  |
| .6 | Ultimate elongation : | 60 / 65%  |
| .7 | Tear resistance:      | 125N  |
- .3 Thermosealed high performance white cap sheet membrane for running surfaces and parapets composed of SBS modified bitumen with flame retardant agent and a composite reinforcement in compliance to ONGC 37.56-M (9<sup>th</sup> edition) standard and having the following specifications:
- |     |                             |                                  |
|-----|-----------------------------|----------------------------------|
| .1  | Thickness:                  | 4,0 mm                           |
| .2  | Reinforcement :             | composite                        |
| .3  | Underface:                  | Thermosealed plastic film        |
| .4  | Top face:                   | highly reflective white granules |
| .5  | Strain energy:              | 11,9 / 9,5 kN/m                  |
| .6  | Ultimate elongation :       | 60 / 75%                         |
| .7  | Tear resistance:            | 70N                              |
| .8  | Static puncture resistance: | 470N                             |
| .9  | Dimensional stability:      | 0,2 / 0,1%                       |
| .10 | Lap joint strength:         | pass > 4 kN/m                    |
| .11 | Colour :                    | white                            |
- .4 Thermosealed high performance gray cap sheet membrane for running surfaces and parapets composed of SBS modified bitumen to be applied where indicated in drawings and in lot 3 roof basins, in compliance to CAN/CGSB 37.56-M) standard and having the following specifications:
- |     |                                 |                           |
|-----|---------------------------------|---------------------------|
| .1  | Thickness:                      | 4,0 mm                    |
| .2  | Reinforcement :                 | composite                 |
| .3  | Underface:                      | Thermosealed plastic film |
| .4  | Top face:                       | gray granular             |
| .5  | Strain energy:                  | 7,8 / 7,2 kN/m            |
| .6  | Ultimate elongation :           | 60 / 65%                  |
| .7  | Tear resistance:                | 125N                      |
| .8  | Static puncture resistance:     | 560N                      |
| .9  | Dimensional stability max L/T : | 0,2 / 0%                  |
| .10 | Lap joint strength:             | pass > 4 kN/m             |
| .11 | Colour :                        | gray                      |

## 2.7 PRIMER FOR SELF-ADHESIVE

- .1 Primer for self-adhesive membrane, composed of SBS synthetic rubbers, resins recognized for their adhesion and VOC-free solvents. Used as a primer to improve the adhesion of self-adhesive membranes, having the following properties:
- |    |                               |  |
|----|-------------------------------|--|
| .1 | Density:                      | 0,79 Kg/L  |
| .2 | Colour:                       | red  |
| .3 | Solid contents :              | 24%  |
| .4 | Viscosity, Brookfield at 25°C | 200cP  |
| .5 | Drying time                   | De 15 à 60minutes, selon la température et la quantité appliquée |

## 2.8 WATERPROOFING MASTIC

- .1 Multipurpose elastomeric mastic based on SBS modified bitumen, fiber, mineral and solvents.

## 2.9 WALKWAYS

- .1 Traffic path made with additional layer of cap sheet membrane, colour contrasting and having the following characteristics:
  - .1 Thickness: 4,0 mm
  - .2 Reinforcement : composite
  - .3 Underface: Thermosealed plastic film
  - .4 Top face: granulated
  - .5 Strain energy: 7,8 / 7,2 kN/m
  - .6 Ultimate elongation : 60 / 65%
  - .7 Tear resistance: 125N
  - .8 Static puncture resistance: 560N
  - .9 Colour : Gray when the cap sheet is white and brown when the cap sheet is gray

## 2.10 FASTENERS

- .1 Covering to steel deck: No. 10 flat head, self tapping, Type A or AB, cadmium plated screws. Recommend FM Approved screw and plate assemblies.
- .2 Roofing nails: in compliance with ACNOR B111-1974, type "ARDOX", galvanized steel, sufficiently long to penetrate at least 20 mm into the wooden support, without however measuring less than 25 mm. mm long. Quantities according to the associations mentioned above. Use twisted nails with a 25 mm diameter steel washer head and a 3 mm thick rod of 25 or 38 mm length, type recommended by the waterproofing membrane manufacturer.

## 2.11 COPPER DRAINS

- .1 Copper roof drain:
  - .1 Copper apron measuring 560 mm in diameter x 1.066 mm thick (32 oz).
  - .2 0.55 mm (16 oz.) X diameter copper downspout required as per existing conditions.
  - .3 Connect apron to the downpipe with a watertight seal.
  - .4 Poured aluminum strainers, DOME shaped, mechanically adjustable by means of screws for tight contact with downpipe, opening cover.
- .2 Coper and welding comply with following standards:
  - .1 Comply to ASTM B32-87, Specification for Solder Metal.
  - .2 Comply to ASTM B370-88, Specification for Copper Sheet and Strip for Building Construction.
- .3 Flexible sleeve or donut seal according to site conditions

## 2.12 ROOF VENT SLEEVE

- .1 Insulated, pre-molded, one-piece aluminum insulated vent pipe, insulated with minimum 13 mm cylindrical thermal insulation, with mildew and water vapor resistance, sleeve walls of 1.62 mm, with regular cap, with vandal resistant aluminum vent cap option, with side openings 1.62 m thick not required.
- .2 Fixing sealant; recommended by the manufacturer.
- .3 Bituminous cement recommended by the manufacturer.
- .4 Extended sleeve: When required, recommended by the manufacturer.

## 2.13 PRECAST MASTIC BLOCKS

- .1 Interlocking precast blocks system, polyurethane based filled with quick dry waterproofing mastic.
- .2 Manufacturer recommended type primer.
- .3 Sealant and structural adhesive recommended by the manufacturer.

## 2.14 MASTIC RESIN

- .1 Cold bitumen mono-component bitumen and waterproofing sealant with the following characteristics:
  - .1 Physical state: thick brown liquid.
  - .2 Solids content: 80%.
  - .3 Ultimate elongation : (ASTM D412): 500%.
  - .4 Strain energy: (ASTM D412): 1.35 MPa.
  - .5 Drying: overlayable after 2 hours dry: 12 hours (remains sticky to the touch).
- .2 Reinforcement mat recommended by the manufacturer.
- .3 Aluminum colour mastic coating

## 2.15 OTHER MATERIALS

- .1 Flame barrier: organic felts in compliance with CSA A123.3, no.15, saturated with asphal
- .2 Self-adhesive, flame retardant membrane consisting of a glass mat reinforcement and SBS modified bitumen. The membrane is designed to prevent flame penetration into voids, spaces and openings. It is applied before the installation of a thermosealed membrane.
- .3 Filler panel: Perlite panel, 25 mm thick. Apply when correcting existing roof slopes when required or prescribed by the Departmental Representative.
- .4 Reinforcement fasteners, recommended by the membrane manufacturer.

## 2.16 VAPOR RETARDER SUPPORT PANEL

- .1 Gypsum-core, water-repellent (type x) gypsum roof panel, to be used when required to replace existing panels, high performance in compliance with ASTM D3273 and ASTM C1177, fiberglass-reinforced, paperless board and mildew and moisture resistant, coated with glass mat, 16 mm thick or as existing.
- .2 Vapor retarder primer, based on volatile solvent bitumen and adhesion promoter additives, for use with new support panels, having the following properties:
  - .1 Density at 20°C : 0,91 Kg/L
  - .2 Colour : noire
  - .3 Solid content: 35%
  - .4 drying period: 1 à 12 heures

## 2.17 BLOWN THERMAL INSULATION

- .1 Fiberglass insulation designed to be blown, without phenol-formaldehyde-based binders, perlite or vermiculite, in compliance with CAN / ULC S702 and CAN / ULC S102.2 to apply under mechanical unit. (hood), having the following characteristics:



.1	Density:	8,0 kg/m <sup>3</sup>
.2	Resistance to superficial combustion :	Flame spread: 0 Smoke spread: 10
.3	Thermal resistance:	18,7 m <sup>2</sup> °K/W per meter thick

## **PART 3 - EXECUTION**

### **3.1 QUALITY OF WORK**

- .1 Do examination, preparation and roofing Work in accordance with Roofing Manufacturer's Specification Manual and AMCQ Roofing Specification Manual, particularly for fire safety precautions and according to ULC specifications.
- .2 At wall and roof junctions, interpose an interface made of a durable rigid material, ie steel metal sheet, intended to ensure the continuity of the airtightness system
- .3 Make the connection of the assembly of components and materials taking onto account the loads of the considered elements.
- .4 Compliance: Comply with manufacturer's written requirements and recommendations, including any available technical bulletins, instructions for handling, storing and operating products, and data sheet instructions.
- .5 Realize entirely all the Work of a basin prior to starting a new basin.
- .6 Roofing must run on a continuous basis as when the surfaces are ready and weather the conditions permit. Mot to undertake demolition if the weather forecast during working hours or other conditions prevent from completing Work.
- .7 Seal all joints of the sub-layers that are not covered with a coat membrane the same day. In no event shall there be any moisture trapped in the joints before laying a second membrane.

### **3.2 DEMOLITION**

- .1 Demolish identified existing roofing complexes, completely up to existing waterproofing membrane, and report to the Departmental Representative the state of the membrane and its substrate.
- .2 Obtain a smooth support, free of material or asperity that may affect the installation of the new roofing complex. Heat the surface of the existing polyethylene.

### **3.3 EXAMINATION OF ROOF DECKS**

- .1 Review the support, perform the preparatory work and lay the roof in accordance with the specifications of the roofing manufacturer, particularly with regard to fire safety.
  - .2 The examination and preparation of surfaces must be made according to the instructions included in the technical documentation of the roof membrane manufacturer.
-

- .3 Prior to the beginning of the work, the owner's representative and the roofing superintendent will be responsible to inspect and approve the condition of support (slopes and wood blocking, where applicable) as well as vertical surfaces at parapets, roof drains, plumbing vents and others, ventilation exhausts and others and construction joints. When applicable, a non-conformity notice will be given to the contractor in order for him to proceed to the corrections. The beginning of the work will be considered as an acceptance of the conditions related to the achievement of the work.
- .4 Do not start any of the work until surfaces are clean, smooth, dry and free of ice, snow and waste materials. The use of calcium salts and is forbidden to remove ice or snow.

### **3.4 PROTECTION OF IN-PLACE CONDITIONS**

- .1 Cover walls, walks, slopped roofs and adjacent work where materials hoisted or used.
- .2 Use warning signs and barriers. Maintain in good order until completion of Work.
- .3 Clean off drips and smears of bituminous material immediately.
- .4 Dispose of rain water off roof and away from face of building until roof drains or hoppers installed and connected.
- .5 Protect roof from traffic and damage. Comply with precautions deemed necessary by Departmental Representative.
- .6 At end of each day's work or when stoppage occurs due to inclement weather, provide protection for completed Work and materials out of storage.
- .7 Metal connectors and decking will be treated with rust proofing or galvanization.

### **3.5 VAPOUR RETARDER (ON EXISTING VAPOUR RETARDER)**

- .1 The installation of the new vapor retarder is required on all existing or new surfaces.
- .2 Starting from the bottom of the slope, unroll the membrane on the surface without adhering it in order to align it.
- .3 Align roller parallel to steel decking splines. Provide continuous support for all membrane overlaps.
- .4 Overlap adjacent 75 mm (3 in) and 100 mm (4 in) rollers. All cross joints will be 150 mm (6 in). Space cross joints at least 300 mm (12 in.).
- .5 The roof vapor retarder shall join and overlap the air / vapor barrier (new and existing) of the walls to ensure a perfect continuity between the two.

### **3.6 THERMOSEALED VAPOUR RETARDER (NEW GYPSUM BOARD)**

- .1 The installation of the new vapor retarder is required on all existing or new surfaces.
  - .2 Apply primer to new roof support panel.
  - .3 Starting from the bottom of the slope, unroll the membrane on the surface without adhering it in order to align it.
-

- .4 Align roller parallel to steel decking splines. Provide continuous support for all membrane overlaps.
- .5 Overlap adjacent 75 mm (3 in) and 100 mm (4 in) rollers. All cross joints will be 150 mm (6 in). Space cross joints at least 300 mm (12 in.).
- .6 The roof vapor retarder shall join and overlap the air / vapor barrier (new and existing) of the walls to ensure a perfect continuity between the two.

### **3.7 INSULATION PANELS APPLICATION**

- .1 Adhere insulating panels with specified adhesive and applied according to manufacturer's recommendations.

### **3.8 THERMOSEALED BASE SHEET APPLICATION ON ROCK FIBRE INSULATION**

- .1 Unroll the dry base sheet on the support taking care to align the edge of the first row with the center of the drain (parallel to the edge of the roof).
- .2 At cross-laps, cut at an angle the corner of the area that will be covered by the next membrane roll.
- .3 Weld base sheet with a torch directly over rock fiber insulation.
- .4 Each edge will overlap the previous one laterally along the appropriate line and will overlap 150 mm (6 in) at the ends. Space cross joints at least 300 mm (12 in.).
- .5 Application to be free of blisters, wrinkles and fishmouths.

### **3.9 SELF-ADHESIVE BASE SHEET APPLICATION ON VERTICAL SURFACES AND PARAPETS**

- .1 The primer must be dry when applying the base sheet.
  - .2 Before applying membranes, when there is overlap (inside and outside corners and running surface) always burn the plastic film for the portion to be covered. In the case of a sandblasted underlay, at the foot of the parapets apply self-adhesive membrane primer to the area to be covered.
  - .3 At transverse laps, cut at an angle the corner of the area to be covered by the next membrane roll.
  - .4 Each edge will overlap the previous one laterally in the appropriate line, and 150 mm (6 in.) At the ends.
  - .5 Position the previously cut membrane. Detach the silicone paper up to 150 mm (6 in.) from the top of the parapet to hold the membrane in place.
  - .6 Gradually remove the rest of the silicone paper while pressing the membrane with an aluminum applicator to promote adhesion. Use this same applicator to obtain a perfect transition between the vertical surfaces and the current surface. Roll a roller over the entire membrane to obtain a complete adhesion.
  - .7 Install a reinforcement fasteners on all inside and outside corners
  - .8 Always seal overlaps before the end of the work day.
-

- .9 Application to be free of blisters, wrinkles and fishmouths.

### **3.10 REINFORCEMENT FASTENERS APPLICATION**

- .1 Install reinforcement fasteners on all inside and outside corners.
- .2 Complete installation of the base sheet before installing and thermosetting the fasteners.

### **3.11 THERMOSEALED CAP SHEET APPLICATION FOR RUNNING SURFACES**

- .1 Use double-sided starting rollers for the first row. If a starting roll is not used, the longitudinal overlap covered with granules should be degranulated by sinking the pellets into the flame-heated bitumen over a 75 mm (3 in.) Width.
- .2 From the drain, Unroll the dry waterproofing membrane over the underlay taking care to align the edge of the first edge with the edge of the roof.
- .3 At transverse laps, cut at an angle the corner of the area to be covered by the next membrane roll.
- .4 Each edge will overlap the previous one laterally along the appropriate line and will overlap 150 mm (6 in) at the ends. Space cross joints at least 300 mm (12 in.).
- .5 Weld topcoat with torch over underlayment to create a slight bitumen overhang (3 to 6 mm) (1/8 "to 1/4").
- .6 Make sure to proceed without overheating the membranes and their reinforcement.
- .7 Application to be free of blisters, wrinkles and fishmouths.
- .8 Avoid circulating on finished surfaces; use rigid protective panels as needed.

### **3.12 THERMOSEALED CAP SHEET APPLICATION FOR VERTICAL SURFACES AND PARAPETS**

- .1 This cap sheet shall be arranged in 1m (3.25 ') wide sections.
  - .2 Each edge will overlap the previous one laterally along the appropriate line and will overlap the current surface by 150 mm (6 in.). The cap sheet membranes applied on vertical surfaces should be at least 100 mm (4 in.) Away from the running surface cap sheet as to avoid any extra thickness.
  - .3 At transverse laps, cut at an angle the corner of the area to be covered by the next membrane roll.
  - .4 With a chalk line, draw a straight line on the running surface, 150 mm (6 in) from the vertical and parapets.
  - .5 Using a blowtorch and a round-tip trowel, drive the surface granules into the hot bitumen layer starting from the drawn chalk line on the running surface up to the edge of the vertical surface or parapet, and vertical granulated overlap surfaces.
  - .6 The cap sheet will be torch welded directly to the base sheet from bottom to top.
  - .7 Application to be free of blisters, wrinkles and fishmouths.
  - .8 Make sure to proceed without overheating the membranes and their reinforcement
-

### **3.13 ROOF DRAIN INSTALLATION**

- .1 Copper drains must be installed in compliance AMCQ details. Do not put flame in direct contact with the apron. Heat only the membrane, then apply it to the metal surface. Install the strainer. Connect the flange to the downspout, the assembly must be watertight and backflow proof.

### **3.14 ROOF VENT SLEEVE INSTALLATION**

- .1 Install sleeves as recommended by AMCQ and drawings.
- .2 Follow the manufacturer's recommendations.

### **3.15 PRECAST MASTIC BLOCKS INSTALLATION**

- .1 Install precast mastic blocks according to the manufacturer's recommendations.

### **3.16 MASTIC RESIN APPLICATION**

- .1 Installation of liquid waterproofing resins according to manufacturer's written recommendations.
- .2 Use a reinforcing mat
- .3 Apply a final coat of aluminum-colored sealant.
- .4 Use a putty tape to make straight line while before applying the mastic resin, remove at the end of the application.

### **3.17 WALKWAYS**

- .1 Install walkway membrane, degranulate membrane section, prime and weld a contrasting membrane layer over the cap sheet membrane.
  - .1 Apply primer to cap sheet membrane and torch apply, ensuring selvage edge is removed.

### **3.18 EXECUTION OF WEATHERPROFFING WORKS AND OTHER DETAILS**

- .1 Install waterproofing membranes to various roof details as indicated in typical details as shown in manufacturer's technical documentation.

### **3.19 BLOWN INSULATION INSTALLATION**

- .1 Use adequate personal protection.
  - .2 Follow manufacturer's written recommendations.
  - .3 Blow insulation with commercial grade pneumatic equipment.
  - .4 Fill entire cavity under designated mechanical unit.
-

### **3.20 CLEANING**

- .1 Remove bituminous markings from finished surfaces.
- .2 In areas where finished surfaces are soiled caused by work of this section, consult manufacturer of surfaces for cleaning advice and complying with their documented instructions.
- .3 Repair or replace defaced or disfigured finishes caused by work of this section.
- .4 Waste Management and Disposal:
  - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Waste Management and Disposal.

**END OF SECTION**

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## **PART 1 - GENERAL**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 02 41 00.08 – Demolition – Minor works
- .2 Section 07 52 00 – Modified bituminous membrane roofing.
- .3 Section 07 55 63 – Vegetated protected membrane roofing.
- .4 Section 70 62 00 – Sheet metal flashing and trim.
- .5 Section 07 92 00 – Joint sealants.

### **1.2 REFERENCE STANDARDS**

- .1 ASTM International Inc.
    - .1 ASTM C 726-05, Standard Specification for Mineral Fiber Roof Insulation Board.
    - .2 ASTM C 728-05, Standard Specification for Perlite Thermal Insulation Board.
    - .3 ASTM C 1177/C 1177M-06, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
    - .4 ASTM C 1396/C 1396M-06a, Standard Specification for Gypsum Board.
    - .5 ASTM D 41-05, Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing.
    - .6 ASTM D 312-00(2006), Standard Specification for Asphalt Used in Roofing.
    - .7 ASTM D 448-03a, Standard Classification for Sizes of Aggregate for Road and Bridge Construction.
    - .8 ASTM D 2178-04, Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing.
    - .9 ASTM D 6162-00a, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fibre Reinforcements.
    - .10 ASTM D 6163-00e1, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fibre Reinforcements.
    - .11 ASTM D 6164-05, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements.
    - .12 ASTM D 6222-02e1, Standard Specification for Atactic Polypropylene (APP) Modified Bituminous Sheet Materials Using Polyester Reinforcement.
    - .13 ASTM D 6223-02e1, Standard Specification for Atactic Polypropylene (APP) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcement.
    - .14 ASTM D 6509-00, Standard Specification for Atactic Polypropylene (APP) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcement.
  - .2 Canadian General Standards Board (CGSB)
    - .1 CGSB 37-GP-9Ma-83, Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing.
    - .2 CGSB 37-GP-56M-80b(A1985), Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing.
    - .3 CAN/CGSB-51.33-M89, Vapour Barrier Sheet, Excluding Polyethylene, for Use in Building Construction.
  - .3 Canadian Roofing Contractors Association (CRCA)
-

- .1 CRCA Roofing Specifications Manual-1997 .
- .4 Roofing masters association of Quebec (AMCQ)
  - .1 Specification Manuel, roofing, latest edition
- .5 CSA Group (CSA)
  - .1 CSA A123.21-04, Standard Test Method for the Dynamic Wind Uplift Resistance of Mechanically Attached Membrane-Roofing Systems
  - .2 CSA-A123.3-05, Asphalt Saturated Organic Roofing Felt.
  - .3 CSA-A123.4-04, Asphalt for Constructing Built-Up Roof Coverings and Waterproofing Systems.
  - .4 CSA A231.1-06, Precast Concrete Paving Slabs.
  - .5 CSA O121-08, Douglas Fir Plywood.
  - .6 CSA O151-04, Canadian Softwood Plywood.
- .6 Factory Mutual (FM Global)
  - .1 FM Approvals - Roofing Products.
- .7 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .8 Underwriters Laboratories' of Canada (ULC)
  - .1 CAN/ULC-S701-05, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.
  - .2 CAN/ULC-S702.2-03, Standard for Mineral Fibre Thermal Insulation for Buildings.
  - .3 CAN/ULC-S704-03, Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.
  - .4 CAN/ULC-S706-02, Standard for Wood Fibre Thermal Insulation for Buildings.

### 1.3 ADMINISTRATIVE REQUIREMENTS

- .1 Convene pre-installation meeting one week prior to beginning waterproofing Work, with roofing contractor's representative and Departmental :
  - .1 Verify project requirements.
  - .2 Review installation and substrate conditions.
  - .3 Co-ordination with other building subtrades.
  - .4 Review manufacturer's installation instructions and warranty requirements.

### 1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Provide copies of most recent technical roofing components data sheets describing materials' physical properties and include product characteristics, performance criteria, physical size, finish and limitations.
  - .2 Provide copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements, and indicate VOC content for:
    - .1 Primers.
    - .2 Asphalt.
    - .3 Sealers.
    - .4 Filter fabric.
- .3 Provide shop drawings:
  - .1 Indicate flashing, control joints, tapered insulation details.



- .4 Samples: submit two (2) sample of insulation.
- .5 Manufacturer's Certificate: certify that products meet or exceed specified requirements.
- .6 Test and Evaluation Reports: submit laboratory test reports certifying compliance of bitumens and roofing felts and membrane with specification requirements.
- .7 Manufacturer's Installation Instructions: indicate special precautions required for seaming the membrane.
- .8 Manufacturer's field report: in accordance with Section 01 45 00 - Quality Control.
- .9 Reports: indicate procedures followed, ambient temperatures and wind velocity during application.

## **1.5 QUALITY ASSURANCE**

- .1 The roofing contractor must ensure perfect continuity in the execution of roofing work so that the materials that are incorporated in such work, are not damaged by any cause whatsoever.

## **1.6 QUALITY CONTROL OF WORKS**

- .1 The roofing work inspection described in this section and the relevant tests will be carried out by an independent inspection firm (control office), specialized in the roofing field, accredited by the Roofing masters association of Quebec, mandated and paid by the Departmental Representative.
- .2 The control office shall carry out a preliminary inspection to verify the support that will receive the roofing materials, slopes, strength, cleanliness, preparation and approval of related works such as: walls, parapets, front roofs, downspouts, plumbing vents, and any other required works.
- .3 In addition, the control office must, before the work starts, verify the conformity between the specifications and the Roofing masters association of Quebec minimum requirements, in order to ensure the issuance of its guarantee.
- .4 The presence of the control office's inspector will be continuous and no interruption will be allowed for the full duration of the roofing materials installation.
- .5 However the presence of the inspector is not required when executing cleaning work of the supports, whether it is to remove surplus materials, accumulations of snow and / or ice or the drying of the surfaces. If the roofing contractor mistakenly calls the inspector for periods when his presence is not required, he shall assume the costs of such presence.
- .6 After the installation of the metal, the control office's inspector shall ensure that the execution of sheet metal work is in accordance with plans and specifications and meets the applicable installation requirements. The continued presence of the inspector is not required during the installation of the metal.
- .7 The roofing work inspection will ensure compliance with plans and specifications and will include, among other things, the following verifications:
  - .1 The nature, thickness, weight, and number of impermeable membranes.
  - .2 Overlap and sealing joints of the membranes.
  - .3 Construction of membrane and metal flashings on walls or control or expansion joints.
  - .4 Tightness of mechanical, electrical or other equipment bases present on the roofs.
  - .5 The flow of rainwater to each drains.

- .8 After work acceptance by the inspector, the inspector will provide the roofing contractor with a certificate attesting to the quality of the work and compliance with the installation instructions.
- .9 The control office has full authority to stop and suspend the work if required until indicated rework are executed in accordance with the written instructions.

## 1.7 FIRE PROTECTION

- .1 Prior to the start of work, conduct an audit to ensure site safety to minimize fire hazards and hazards.
- .2 Comply with safety instructions recommended by the concerned local authorities.
- .3 At the end of each working day, use a heat detector gun to discover any possible hidden fires and wall fires.
- .4 The site organization must allow the presence of the workers at least one (1) hours after the end of any welding work. An inspection must be carried out at the end of the work by a roofing contractor's employee who is specialized in this type of work and, if necessary, with the collaboration of a member of the municipality fire protection department.
- .5 Never weld directly on combustible materials
- .6 Portable fire extinguishers: keep on the roof, for each torch, a ULC approved auxiliary cylinder fire extinguisher class A, B and C, fully loaded and in perfect working condition. The extinguisher must be placed within 6 meters (20 feet) of any torch. Apply the safety instructions that accompany the roofing material data sheets. Make sure the torch is not placed near flammable or combustible products. The flame of the torch must never enter a place where it is not visible or can not be easily controlled.

## 1.8 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions and Section 01 61 00 - Common Product Requirements.
- .2 Storage and Handling Requirements:
  - .1 Safety: comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of asphalt, sealing compounds, primers and caulking materials.
  - .2 Provide and maintain dry, off-ground weatherproof storage.
  - .3 Store rolls of felt and membrane in upright position. Store membrane rolls with salvage edge up.
  - .4 Remove only in quantities required for same day use.
  - .5 Place plywood runways over completed Work to enable movement of material and other traffic.
  - .6 Store sealants at +5 degrees C minimum.
  - .7 Store insulation protected from daylight and weather and deleterious materials.
- .3 Waste Management and Disposal:
  - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Waste Management and Disposal.

## **1.9 SITE CONDITIONS**

- .1 Follow manufacturers recommendations
- .2 Do not install roofing when temperature remains below -5 degrees C for torch application.
- .3 Minimum temperature for solvent-based adhesive is -5 degrees C.
- .4 Install roofing on dry deck, free of snow and ice, use only dry materials and apply only during weather that will not introduce moisture into roofing system.

## **1.10 WARRANTY**

- .1 With reference to this section, the manufacturer for waterproofing membranes will provide a written document, issued in the name of the owner, the warranty period prescribed in the general conditions is extended to 10 years, the warranty includes repair work for any leakage in the membrane to restore the roof system to a dry, watertight state, in the event of any manufacturing or installation defects resulting in water infiltration. The warranty will cover the total repair expenses during the entire warranty period. The guarantee certificate must reflect these requirements.
- .2 With reference to this section, the roofing contractor shall provide a written and signed document, issued on behalf of the owner, certifying that the completed work will remain in place and free from any leakage, the warranty period prescribed in the general conditions is extended to five (5) years

## **1.11 SITE PROTECTION**

- .1 When transporting roof materials and performing roofing work, protect exposed surfaces of any finished walls with tarps to prevent any damage. Build traffic paths on the roofs with rigid board, over the newly installed materials, to allow the passage of people and equipment. Assume full responsibility for any damage.

## **1.12 MANUFACTURER'S REPRESENTATIVE**

- .1 At the beginning and during the tightness work, a manufacturer's representative for the waterproofing materials must be present on the site
- .2 The Contractor shall allow and facilitate access to the site and roof at all times to any manufacturer's representative mentioned above.

## **PART 2 - PRODUCTS**

### **2.1 PERFORMANCE CRITERIA**

- .1 Compatibility between components of roofing system is essential. Provide written declaration to Departmental Representative stating that materials and components, as assembled in system, meet this requirement.
  - .2 Roofing System: to CSA A123.21 for wind uplift resistance.
  - .3 Roofing materials and systems must comply with the requirements of the NBC, AMCQ and ACEC.
-

## 2.2 PRIMER FOR SELF-ADHESIVE MEMBRANE

- .1 Primer for self-adhesive membrane, composed of SBS synthetic rubbers, resins recognized for their adhesion and VOC-free solvents. Used as a primer to improve the adhesion of self-adhesive membranes, having the following properties:
- |    |                               |  |
|----|-------------------------------|--|
| .1 | Density:                      | 0,79 Kg/L  |
| .2 | Colour:                       | red  |
| .3 | Solid contents :              | 24%  |
| .4 | Viscosity, Brookfield at 25°C | 200cP  |
| .5 | Drying time                   | De 15 à 60minutes, selon la température et la quantité appliquée |

## 2.3 MEMBRANE

- .1 Thermosealed sheet membrane for running surfaces and parapets composed of SBS modified bitumen and non-woven polyester reinforcement having the following specifications:
- |    |                             |                               |
|----|-----------------------------|-------------------------------|
| .1 | Thickness:                  | 3,0 mm                        |
| .2 | Reinforcement :             | non-woven polyester           |
| .3 | Underface:                  | Thermosealed plastic film     |
| .4 | Top face:                   | Film                          |
| .5 | Strain energy:              | 9.0 / 7.0 kN/m                |
| .5 | Breaking strenght :         | 17 / 12.5 kN/m                |
| .6 | Tear resistance:            | 60 N                          |
| .8 | Static puncture resistance: | 400 N                         |
| .9 | Water Vapour Transmission   | 0.21 ng / Pa.s.m <sup>2</sup> |

## 2.4 DRAINAGE PANEL

- .1 High-density drainage board composed of a polypropylene core on which a geotextile is factory laminated having the following specifications:
- |    |   |                           |
|----|---|---------------------------|
| .1 | Thickness :   | 10 mm                     |
| .2 | Roll dimensions                                     | 1,83 x 15,25 m            |
|    | Noyau   |                           |
| .3 | Compressive Strength (ASTM D1621) :                 | 550 kPa                   |
| .4 | Maximum In-Plane Flow Rate (l/min m) (ASTM D4716) : | 223 l/min.m               |
|    | Tissus  |                           |
| .5 | Apparent Opening Size (ASTM D4751) :                | 0,21 mm                   |
| .6 | Water Flow Rate (ASTM D4491)                        | 5690 l/min.m <sup>2</sup> |
| .7 | Grab Tensile (ASTM D4632)                           | 450N                      |
| .8 | Grab Elongation (ASTM D4632)                        | 50%                       |

## 2.5 FLAT INSULATION

- .1 Rigid thermal insulation board made of extruded polystyrene with shi lap or square edges on all four sides in compliance to CAN/ULC S701.1 type 4 standards and to the following specifications:
  - .1 Total Thickness : Indicated in drawings
  - .2 Board dimensions: 2438 x 610
  - .3 Edges : Rabbet
  - .4 Thermal resistance (ASTM C518) : RSI 0,88 for 25,4 mm thick
  - .5 Water absorption % max. per volume (ASTM D2842) : 0,4%
  - .6 Compression Strength (ASTM D1621) : 241 kPa (35 psi)

## 2.6 GEOTEXTILE

- .1 geotextile made of non-woven needle punched polypropylene and polyester fibres, having the following specifications:
  - .1 Thickness : 1 mm
  - .2 Dimensions : 150 x 3,5 m
  - .3 Colour : gris
  - .4 Total weight (ASTM D5291) : 80g/m<sup>2</sup>
  - .5 Ultimat Elongation à la rupture (CAN/ONGC-148.1 : 40-100%
  - .6 Permeability (CAN/ONGC-148.1) : 1,4 x 10cm/sec
  - .7 Filtration opening size FOS (CAN/ONGC-148.1): 90-120microns

## 2.7 BALLAST

- .1 Crushed white marble gravel, hard, clean and non-friable, complies with BNQ-2560-040 and has a solar reflectance index (IRS) of 72 according to ASTM E 1980.
- .2 Particle size analysis shall be performed in accordance with LC-21-040, ASTM C 1549 and ASTM C 1371 and meet units of 40-20 mm Group 2 aggregate, with a maximum loss of 0.2%. to the MgSO<sub>4</sub> degradation test according to the CAN / CSA A23.2-9A method
- .3 Quantity: cover new roof composition with a minimum weight of 73kg / m<sup>2</sup> in general and 98 kg / m<sup>2</sup> on a perimeter band of 1.2m wide at each basin.

## 2.8 WATERPROOFING MASTIC

- .1 Multipurpose elastomeric mastic based on SBS modified bitumen, fiber, mineral and solvents.

## 2.9 FASTENERS

- .1 Covering to steel deck: No. 10 flat head, self tapping, Type A or AB, cadmium plated screws. Recommend FM Approved screw and plate assemblies.
- .2 Roofing nails: in compliance with ACNOR B111-1974, type "ARDOX", galvanized steel, sufficiently long to penetrate at least 20 mm into the wooden support, without however measuring less than 25 mm. mm long. Quantities according to the associations mentioned above. Use twisted nails with a 25 mm diameter steel washer head and a 3 mm thick rod of 25 or 38 mm length, type recommended by the waterproofing membrane manufacturer.

## 2.10 ROOF DRAINS

- .1 Copper roof drain, for protected roof:
  - .1 1.066mm (32oz) x 560mm diameter copper deck to meet existing conditions.

- .2 Copper downpipe 0.55 mm (16 oz) thick x diameter.
- .3 Connect the deck to the downspout with a perfectly sealed weld.
- .4 32oz strainers and copper lid.
- .5 Adjustable stone guard and copper lid.
- .2 Copper and welding complying with the following standards:
  - .1 Complies with: ASTM B32-87, Specification for Solder Metal.
  - .2 Complies with: ASTM B370-88, Specification for Copper Sheet and Strip for Building Construction.
- .3 Flexible coupling or donut seal according to field conditions.
- .4 Epoxy painted steel wall-mounted drain with straight grating, 90 ° degree outlet, duct diameter ± 100 mm according to existing conditions, "MJ" type connection.

## 2.11 ROOF VENT SLEEVE

- .1 Insulated, pre-molded, one-piece aluminum insulated vent pipe, insulated with minimum 13 mm cylindrical thermal insulation, with mildew and water vapor resistance, sleeve walls of 1.62 mm, with regular cap, with vandal resistant aluminum vent cap option, with side openings 1.62 m thick not required.
- .2 Fixing sealant; recommended by the manufacturer.
- .3 Bituminous cement recommended by the manufacturer.
- .4 Extended sleeve: When required, recommended by the manufacturer.

## 2.12 PRECAST MASTIC BLOCKS

- .1 Interlocking precast blocks system, polyurethane based filled with quick dry waterproofing mastic.
- .2 Manufacturer recommended type primer.
- .3 Sealant and structural adhesive recommended by the manufacturer.

## 2.13 MASTIC RESIN

- .1 Cold bitumen mono-component bitumen and waterproofing sealant with the following characteristics:
  - .1 Physical state: thick brown liquid.
  - .2 Solids content: 80%.
  - .3 Ultimate elongation : (ASTM D412): 500%.
  - .4 Strain energy: (ASTM D412): 1.35 MPa.
  - .5 Drying: overlayable after 2 hours dry: 12 hours (remains sticky to the touch).
- .2 Reinforcement mat recommended by the manufacturer.
- .3 Aluminum colour mastic coating

## 2.14 OTHER MATERIALS

- .1 Flame barrier: organic felts in compliance with CSA A123.3, no.15, saturated with asphalt
-

- .2 Self-adhesive, flame retardant membrane consisting of a glass mat reinforcement and SBS modified bitumen. The membrane is designed to prevent flame penetration into voids, spaces and openings. It is applied before the installation of a thermosealed membrane.
- .3 Filler panel: Perlite panel, 25 mm thick. Apply when correcting existing roof slopes when required or prescribed by the Departmental Representative.

## **2.15 VAPOR RETARDER SUPPORT PANEL**

- .1 Gypsum-core, water-repellent (type x) gypsum roof panel, to be used when required to replace existing panels, high performance in compliance with ASTM D3273 and ASTM C1177, fiberglass-reinforced, paperless board and mildew and moisture resistant, coated with glass mat, 16 mm thick or as existing.
- .2 Vapor retarder primer, based on volatile solvent bitumen and adhesion promoter additives, for use with new support panels, having the following properties:
  - .1 Density at 20°C : 0,91 Kg/L
  - .2 Colour : black
  - .3 Solid content: 35%
  - .4 drying period: 1 à 12 hours

## **PART 3 - EXECUTION**

### **3.1 QUALITY OF WORK**

- .1 Do examination, preparation and roofing Work in accordance with Roofing Manufacturer's Specification Manual and AMCQ Roofing Specification Manual, particularly for fire safety precautions and according to ULC specifications.
  - .2 At wall and roof junctions, interpose an interface made of a durable rigid material, ie steel metal sheet, intended to ensure the continuity of the airtightness system
  - .3 Make the connection of the assembly of components and materials taking onto account the loads of the considered elements.
  - .4 Compliance: Comply with manufacturer's written requirements and recommendations, including any available technical bulletins, instructions for handling, storing and operating products, and data sheet instructions.
  - .5 Realize entirely all the Work of a basin prior to starting a new basin.
  - .6 Roofing must run on a continuous basis as when the surfaces are ready and weather the conditions permit. Mot to undertake demolition if the weather forecast during working hours or other conditions prevent from completing Work.
  - .7 Seal all joints of the sub-layers that are not covered with a coat membrane the same day. In no event shall there be any moisture trapped in the joints before laying a second membrane.
-

### **3.2 DEMOLITION**

- .1 Demolish identified existing roofing complexes, completely up to existing waterproofing membrane, and report to the Departmental Representative the state of the membrane and its substrate.
- .2 Obtain a smooth support, free of material or asperity that may affect the installation of the new roofing complex. Heat the surface of the existing polyethylene.

### **3.3 EXAMINATION OF ROOF DECKS**

- .1 Review the support, perform the preparatory work and lay the roof in accordance with the specifications of the roofing manufacturer, particularly with regard to fire safety.
- .2 The examination and preparation of surfaces must be made according to the instructions included in the technical documentation of the roof membrane manufacturer.
- .3 Prior to the beginning of the work, the owner's representative and the roofing superintendent will be responsible to inspect and approve the condition of support (slopes and wood blocking, where applicable) as well as vertical surfaces at parapets, roof drains, plumbing vents and others, ventilation exhausts and others and construction joints. When applicable, a non-conformity notice will be given to the contractor in order for him to proceed to the corrections. The beginning of the work will be considered as an acceptance of the conditions related to the achievement of the work.
- .4 Do not start any of the work until surfaces are clean, smooth, dry and free of ice, snow and waste materials. The use of calcium salts and is forbidden to remove ice or snow.

### **3.4 PRE-INSTALLATION PROTECTION**

- .1 Cover walls, walks, slopped roofs and adjacent work where materials hoisted or used.
- .2 Use warning signs and barriers. Maintain in good order until completion of Work.
- .3 Clean off drips and smears of bituminous material immediately.
- .4 Dispose of rain water off roof and away from face of building until roof drains or hoppers installed and connected.
- .5 Protect roof from traffic and damage. Comply with precautions deemed necessary by Departmental Representative.
- .6 At end of each day's work or when stoppage occurs due to inclement weather, provide protection for completed Work and materials out of storage.
- .7 Metal connectors and decking will be treated with rust proofing or galvanization.

### **3.5 THERMOSEALED BASE SHEET APPLICATION**

- .1 Unroll the dry base sheet on the support taking care to align the edge of the first row with the center of the drain (parallel to the edge of the roof).
  - .2 At cross-laps, cut at an angle the corner of the area that will be covered by the next membrane roll.
  - .3 Weld base sheet with a torch directly over rock fiber insulation.
-



- .4 Each edge will overlap the previous one laterally along the appropriate line and will overlap 150 mm (6 in) at the ends. Space cross joints at least 300 mm (12 in.).

- .5 Application to be free of blisters, wrinkles and fishmouths.

### **3.6 DRAINAGE PANEL APPLICATION**

- .1 Install the drainage panels on the waterproofing membrane.
- .2 Follow the manufacturer's recommendations.

### **3.7 INSULATION PANEL APPLICATION**

- .1 Install the insulation panel according to the manufacturer's recommendations.

### **3.8 GEOTEXTILE APPLICATION**

- .1 Unroll membrane over insulation, overlap joints.
- .2 Follow the manufacturer's recommendations.

### **3.9 REINFORCEMENT FASTENERS APPLICATION**

- .1 Install reinforcement fasteners on all inside and outside corners.
- .2 Complete installation of the base sheet before installing and thermosetting the fasteners.

### **3.10 ROOF DRAIN INSTALLATION**

- .1 Copper drains must be installed in compliance AMCQ details. Do not put flame in direct contact with the apron. Heat only the membrane, then apply it to the metal surface. Install the strainer. Connect the flange to the downspout, the assembly must be watertight and backflow proof.

### **3.11 ROOF VENT SLEEVE INSTALLATION**

- .1 Install sleeves as recommended by AMCQ and drawings.
- .2 Follow the manufacturer's recommendations.

### **3.12 PRECAST MASTIC BLOCKS INSTALLATION**

- .1 Install precast mastic blocks according to the manufacturer's recommendations.

### **3.13 MASTIC RESIN APPLICATION**

- .1 Installation of liquid waterproofing resins according to manufacturer's written recommendations.
  - .2 Use a reinforcing mat
  - .3 Apply a final coat of aluminum-colored sealant.
  - .4 Use a putty tape to make straight line while before applying the mastic resin, remove at the end of the application.
-

### **3.14 BALLAST INSTALLATION**

- .1 Apply aggregate ballast, dry and in uniform fashion at minimum rate of 73 kg/m<sup>2</sup>, following insulation manufacturer's, ULC's and AMCQ's recommendations.
- .2 Spread additional stone ballast around perimeter of roof for width of 1200 mm to increase ballast weight to 100 kg/m<sup>2</sup>.

### **3.15 EXECUTION OF WEATHERPROFFING WORKS AND OTHER DETAILS**

- .1 Install waterproofing membranes to various roof details as indicated in typical details as shown in manufacturer's technical documentation.

### **3.16 CLEANING**

- .1 Remove bituminous markings from finished surfaces.
- .2 In areas where finished surfaces are soiled caused by work of this section, consult manufacturer of surfaces for cleaning advice and complying with their documented instructions.
- .3 Repair or replace defaced or disfigured finishes caused by work of this section.
- .4 Waste Management and Disposal:
  - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Waste Management and Disposal.

**END OF SECTION**

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## **PART 1 - GENERAL**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 02 41 00.08 – Demolition – Minor works
- .2 Section 07 52 00 – Modified bituminous membrane roofing.
- .3 Section 07 52 01 – Protected modified bituminous membrane roofing.
- .4 Section 70 62 00 – Sheet metal flashing and trim.

### **1.2 REFERENCE STANDARDS**

- .1 ASTM International
    - .1 ASTM C 578-11be1, Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
    - .2 ASTM C 726-12, Standard Specification for Mineral Fiber Roof Insulation Board.
    - .3 ASTM C 728-05(2010), Standard Specification for Perlite Thermal Insulation Board.
    - .4 ASTM C 1002-07, Standard Specification for Steel Self-Piercing, Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
    - .5 ASTM C 1177/C 1177M-08, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
    - .6 ASTM D 41/D 41M-11, Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing.
    - .7 ASTM D 312-00(2006), Asphalt Used in Roofing.
    - .8 ASTM D 448-08, Standard Classification for Sizes of Aggregate for Road and Bridge Construction.
    - .9 ASTM D 2178-04, Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing.
    - .10 ASTM D 6162-00a(2008), Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fibre Reinforcements.
    - .11 ASTM D 6163-00(2008), Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fibre Reinforcements.
    - .12 ASTM D 6164/6 164M-11, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements.
  - .2 Canadian General Standards Board (CGSB)
    - .1 CGSB 37-GP-9Ma-83, Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing.
    - .2 CGSB 37-GP-56M-80b(A1985), Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing.
    - .3 CAN/CGSB-51.33-M89, Vapour Barrier Sheet, Excluding Polyethylene, for Use in Building Construction.
  - .3 Canadian Roofing Contractors Association (CRCA)
    - .1 CRCA Roofing Specifications Manual, 2011.
  - .4 Roofing masters association of Quebec (AMCQ)
    - .1 Specification Manuel, roofing, latest edition
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- .5 CSA International
  - .1 CAN/CSA-A123.4-04(R2008), Asphalt for Construction of Built-Up Roof Coverings and Waterproofing Systems.
  - .2 CAN/CSA-A123.16-04(R2009), Asphalt-Coated Glass-Base Sheet.
- .6 Factory Mutual (FM Global)
  - .1 FM Approval Standard #4470-2010, Standard for Single-Ply, Polymer-Modified Bitumen, Sheet, Built-Up Roof (BUR) and Liquid Applied Roof Assemblies for Use in Class 1 and Noncombustible Roof Deck Construction.
  - .2 FM Roof Assembly Classifications.
- .7 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .8 Underwriters' Laboratories of Canada (ULC)
  - .1 CAN/ULC-S701-11, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.
  - .2 ULC - List of Equipment and Materials for:
    - .1 Building Materials.
    - .2 Fire Resistance.
    - .3 Fire Stop Systems and Components.

### 1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for roofing materials and include product characteristics, performance criteria, physical size, finish and limitations.
  - .2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.
- .3 Submit two (2) copies of the maintenance instructions for vegetated roof system, as established by the manufacturer (see section 3 of this specification), and the most recent technical data sheets. These sheets must present the physical properties of the materials and provide explanations on the installation of the products, including installation methods, restrictions, constraints and other recommendations of the manufacturer.
- .4 Provide an annual plant maintenance plan.

### 1.4 QUALITY ASSURANCE

- .1 The roofing contractor must ensure perfect continuity in the execution of roofing work so that the materials that are incorporated in such work, are not damaged by any cause whatsoever.
  - .2 The landscaper-installer and his subcontractors must be recognized as installers certified by the membrane manufacturer at the time of submission.
  - .3 Only a trained vegetated roof system applicator employed by a company with the appropriate equipment required for such work will be able to perform the work.
  - .4 The roofing work inspection described in this section and the relevant tests will be carried out by an independent inspection firm (control office), specialized in the roofing field, accredited by the Roofing masters association of Quebec, mandated and paid by the Departmental Representative.
-

- .5 The control office shall carry out a preliminary inspection to verify the support that will receive the roofing materials, slopes, strength, cleanliness, preparation and approval of related works such as: walls, parapets, front roofs, downspouts, plumbing vents, and any other required works.
- .6 In addition, the control office must, before the work starts, verify the conformity between the specifications and the Roofing masters association of Quebec minimum requirements, in order to ensure the issuance of its guarantee.
- .7 The presence of the control office's inspector will be continuous and no interruption will be allowed for the full duration of the roofing materials installation.
- .8 However the presence of the inspector is not required when executing cleaning work of the supports, whether it is to remove surplus materials, accumulations of snow and / or ice or the drying of the surfaces. If the roofing contractor mistakenly calls the inspector for periods when his presence is not required, he shall assume the costs of such presence.
- .9 After the installation of the metal, the control office's inspector shall ensure that the execution of sheet metal work is in accordance with plans and specifications and meets the applicable installation requirements. The continued presence of the inspector is not required during the installation of the metal.
- .10 The roofing work inspection will ensure compliance with plans and specifications and will include, among other things, the following verifications:
  - .1 The nature, thickness, weight, and number of impermeable membranes.
  - .2 Overlap and sealing joints of the membranes.
  - .3 Construction of membrane and metal flashings on walls or control or expansion joints.
  - .4 Tightness of mechanical, electrical or other equipment bases present on the roofs.
  - .5 The flow of rainwater to each drains.
- .11 After work acceptance by the inspector, the inspector will provide the roofing contractor with a certificate attesting to the quality of the work and compliance with the installation instructions.
- .12 The control office has full authority to stop and suspend the work if required until indicated rework are executed in accordance with the written instructions.
- .13 Keep a copy of each reference document on site.

## **1.5 MANUFACTURER'S REPRESENTATIVE**

- .1 At the beginning of the vegetalisation work, a representative from the weatherproofing manufacturer may be present on site.
- .2 The Contractor shall, at all times, allow and facilitate access to the site and on the roofs to any manufacturer's representative mentioned above.

## **1.6 REGULATORY REQUIREMENTS**

- .1 Comply with the relevant code for fire prevention and roofing and the RBQ (Régie du bâtiment du Québec).
  - .2 ULC: class A Fire Hazard Classification.
  - .3 FM: Roof Assembly Classification, of class 1 Construction.
  - .4 Comply with the 2015 National Code of Fire Prevention (NFC) for fire prevention and roofing work.
-

## 1.7 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements] [and] [with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 The delivered materials will be appropriately protected, permanently stored in a dry shelter, ventilated, protected from frost and weather, as well as any harmful substance.
- .4 If plantation work does not occur within two days of delivery to the site, the plants should be stored in their original containers and watered daily.
- .5 The materials will not be accumulated on the roofs to avoid compromising the solidity of structures in specific places by imposing loads higher than what is permissible.
- .6 Storage and Handling Requirements:
  - .1 Store rolls of felt and membrane in upright position. Store membrane rolls with selvage edge up.
  - .2 Remove only in quantities required for same day use.
  - .3 Place plywood runways over work to enable movement of material and other traffic.
  - .4 Store sealants at +5 degrees C minimum.
  - .5 Store and protect roofing materials from nicks, scratches, and blemishes.
  - .6 Replace defective or damaged materials with new.
- .7 Waste Management and Disposal:
  - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Waste Management and Disposal.

## 1.8 FIRE PROTECTION

- .1 Prior to the start of work, conduct an audit to ensure site safety to minimize fire hazards and hazards.
  - .2 Comply with safety instructions recommended by the concerned local authorities.
  - .3 At the end of each working day, use a heat detector gun to discover any possible hidden fires and wall fires.
  - .4 The site organization must allow the presence of the workers at least one (1) hours after the end of any welding work. An inspection must be carried out at the end of the work by a roofing contractor's employee who is specialized in this type of work and, if necessary, with the collaboration of a member of the municipality fire protection department.
  - .5 Never weld directly on combustible materials
  - .6 Portable fire extinguishers: keep on the roof, for each torch, a ULC approved auxiliary cylinder fire extinguisher class A, B and C, fully loaded and in perfect working condition. The extinguisher must be placed within 6 meters (20 feet) of any torch. Apply the safety instructions that accompany the roofing material data sheets. Make sure the torch is not placed near flammable or combustible products. The flame of the torch must never enter a place where it is not visible or can not be easily controlled.
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## **1.9 SITE CONDITIONS**

- .1 Follow manufacturers recommendations
- .2 Do not install roofing when temperature remains below -5 degrees C for torch application.
- .3 Minimum temperature for solvent-based adhesive is -5 degrees C.
- .4 Install roofing on dry deck, free of snow and ice, use only dry materials and apply only during weather that will not introduce moisture into roofing system.

## **1.10 WARRANTY**

- .1 With reference to this section, the manufacturer for waterproofing membranes will provide a written document, issued in the name of the owner, the warranty period prescribed in the general conditions is extended to 10 years, the warranty includes repair work for any leakage in the membrane to restore the roof system to a dry, watertight state, in the event of any manufacturing or installation defects resulting in water infiltration. The warranty will cover the total repair expenses during the entire warranty period. The guarantee certificate must reflect these requirements.
- .2 With reference to this section, the roofing contractor shall provide a written and signed document, issued on behalf of the owner, certifying that the completed work will remain in place and free from any leakage, the warranty period prescribed in the general conditions is extended to five (5) years
- .3 The contractor-installer will provide a 2 year guarantee certificate for the vegetation from the date of work acceptance.

## **1.11 SITE PROTECTION**

- .1 When transporting roof materials and performing roofing work, protect exposed surfaces of any finished walls with tarps to prevent any damage. Build traffic paths on the roofs with rigid board, over the newly installed materials, to allow the passage of people and equipment. Assume full responsibility for any damage.

## **1.12 MANUFACTURER'S REPRESENTATIVE**

- .1 At the beginning and during the tightness work, a manufacturer's representative for the waterproofing materials must be present on the site
- .2 The Contractor shall allow and facilitate access to the site and roof at all times to any manufacturer's representative mentioned above.

## **PART 2 - PRODUCTS**

### **2.1 PERFORMANCE CRITERIA**

- .1 Compatibility between components of roofing system is essential. Provide written declaration to Departmental Representative stating that materials and components, as assembled in system, meet this requirement.
  - .2 Roofing System: to CSA A123.21 for wind uplift resistance.
-

- .3 Roofing materials and systems must comply with the requirements of the NBC, AMCQ and ACEC.

## 2.2 MEMBRANE

- .1 Thermosealed high performance base sheet membrane for running surfaces composed of SBS modified bitumen and a composite reinforcement in compliance to ONGC 37.56-M (9<sup>th</sup> edition) standard and having the following specifications:
- |     |                             |                           |
|-----|-----------------------------|---------------------------|
| .1  | Thickness:                  | 2,5 mm                    |
| .2  | Reinforcement :             | composite                 |
| .3  | Underface:                  | Thermosealed plastic film |
| .4  | Top face:                   | Thermosealed plastic film |
| .5  | Strain energy:              | 7,8 / 7,2 kN/m            |
| .5  | Breaking strenght :         | 15 / 13,5 kN/m            |
| .6  | Ultimate elongation :       | 60 / 65%                  |
| .8  | Tear resistance:            | 125N                      |
| .9  | Static puncture resistance: | 560N                      |
| .10 | Dimensional stability:      | 0,2 / 0                   |
| .11 | Lap joint strength:         | pass > 4 kN/m             |
- .2 Thermosealed high performance base sheet membrane, for the vertical portions and parapets composed of wood paneling, composed of SBS modified bitumen and a composite reinforcement in compliance to ONGC 37.56-M (9<sup>th</sup> edition) and ASTM D6162 standards and having the following specifications:
- |    |                       |   |
|----|-----------------------|---|
| .1 | Thickness:            | 3 mm  |
| .2 | Reinforcement :       | composite   |
| .3 | Underface:            | Self-adhesive wrapped with detachable protective film |
| .4 | Top face:             | Thermosealed plastic film                             |
| .5 | Strain energy:        | 7,8 / 7,2 kN/m  |
| .6 | Ultimate elongation : | 60 / 65%  |
| .7 | Tear resistance:      | 125N  |
- .3 Thermosealed high performance gray cap sheet membrane for running surfaces and parapets composed of SBS modified bitumen with flame retardant agent and a composite reinforcement, in compliance to CAN/CGSB 37.56-M) standard and having the following specifications:
- |     |                                 |                           |
|-----|---------------------------------|---------------------------|
| .1  | Thickness:                      | 4,0 mm                    |
| .2  | Reinforcement :                 | composite                 |
| .3  | Underface:                      | Thermosealed plastic film |
| .4  | Top face:                       | granular                  |
| .5  | Strain energy:                  | 7,8 / 7,2 kN/m            |
| .6  | Ultimate elongation :           | 60 / 65%                  |
| .7  | Tear resistance:                | 125N                      |
| .8  | Static puncture resistance:     | 560N                      |
| .9  | Dimensional stability max L/T : | 0,2 / 0%                  |
| .10 | Colour :                        | gray                      |



## 2.3 PRIMER FOR SELF-ADHESIVE

- .1 Primer for self-adhesive membrane, composed of SBS synthetic rubbers, resins recognized for their adhesion and VOC-free solvents. Used as a primer to improve the adhesion of self-adhesive membranes, having the following properties:
- |    |                               |  |
|----|-------------------------------|--|
| .1 | Density:                      | 0,79 Kg/L  |
| .2 | Colour:                       | red  |
| .3 | Solid contents :              | 24%  |
| .4 | Viscosity, Brookfield at 25°C | 200cP  |
| .5 | Drying time                   | De 15 à 60minutes, selon la température et la quantité appliquée |

## 2.4 ROOT BARRIER POLYETHYLENE MEMBRANE

- .1 30 mil polyethylene membrane with tapped sealed joints

## 2.5 SELF-ADHESIVE TAPE FOR ROOT BARRIER MEMBRANE

- .1 100 mm self-adhesive tape made of polyethylene 7.5 mils thick.

## 2.6 FLAT INSULATION

- .1 Rigid thermal insulation board made of extruded polystyrene with shi lap or square edges on all four sides in compliance to CAN/ULC S701.1 type 4 standards and to the following specifications:
- |    |   |                            |
|----|---|----------------------------|
| .1 | Total Thickness :                                 | Indicated in drawings      |
| .2 | Board dimensions:                                 | 2438 x 610                 |
| .3 | Edges :   | Straight                   |
| .4 | Thermal resistance (ASTM C518) :                  | RSI 0,88 for 25,4 mm thick |
| .5 | Water absorption % max. per volume (ASTM D2842) : | 0,4%                       |
| .6 | Compression Strength (ASTM D1621) :               | 275 kPa (40 psi)           |

## 2.7 DRAINAGE PANEL

- .1 High density drainage panel consisting of a core made of recycled polypropylene on which a geotextile is laminated on each side. Tangled polypropylene filaments are melted and molded into an embossed panel in an embossed pattern for use on the insulation, having the following specifications:
- |              |  |   |
|--------------|--|---|
| .1           | Thickness :  | 11,43 mm  |
| .2           | Flow rate (l/min m) (ASTM D4716) :   | at 48 kPa (1000 psf) 257<br>at 144 kPa (3000 psf) 199<br>at 383 kPa (8000 psf) 40 |
| Core         |  |   |
| .3           | Compressive load test (ASTM D1621) (*Valeur maximale à affaissement complet) : | 1 436 kPa   |
| Woven fabric |  |   |
| .4           | Apparent opening size (ASTM D4751) :   | 0,212 mm  |
| .5           | Permissivité (ASTM D4491)  | 81,5 / sec. m <sup>2</sup>  |
| .6           | Résistance au poinçonnement (ASTM D4833) :                                     | 310 N   |
- .2 Additional drainage panel consisting of a core made of polyethylene on which a geotextile is laminated at the factory, to be used on the root barrier membrane and under insulation, having the following specifications:

.1	Thickness :	10 mm
.2	Roll dimensions	1,83 x 15,25 m
Noyau		
.3	Compressive Strength (ASTM D1621) :	550 kPa
.4	Maximum In-Plane Flow Rate (l/min m) (ASTM D4716) :	223 l/min.m
Tissus		
.5	Apparent Opening Size (ASTM D4751) :	0,21 mm
.6	Water Flow Rate (ASTM D4491)	5690 l/min.m <sup>2</sup>
.7	Grab Tensile (ASTM D4632)	450N
.8	Grab Elongation (ASTM D4632)	50%

## 2.8 GEOTEXTILE MEMBRANE

- .1 geotextile made of non-woven needle punched polypropylene and polyester fibres, having the following specifications:
- |    |  |                  |
|----|--|------------------|
| .1 | Thickness :  | 1 mm             |
| .2 | Colour:  | Gris             |
| .3 | Ultimate Elongation L/T (CAN/ONGC-148.1) :         | 40 / 100%        |
| .4 | Breaking Strength, Typical./min (CAN/ONGC-148.1) : | 500 / 450 N      |
| .5 | Permeability (CAN/ONGC-148.1) :                    | 1,4 x 10 cm/sec. |
| .6 | Filtration opening size FOS (CAN/ONGC-148.1) :     | 90-120 microns   |

## 2.9 PROTECTION BARRIER

- .1 Perimeter edge and changes in materials, prefabricated L-shaped aluminum trim of appropriate size.
- .2 Anchor as recommended by manufacturing

## 2.10 GROWING MEDIUM

- .1 Growing medium composed of a loose mixture of mineral and organic materials with a particle size less than 16 mm. The composition is elaborated by the manufacturer specially formulate, non-irrigated and low maintenance green roofs (extensive system or semi-intensive system), according to the optimal characteristics of water retention, permeability, structural stability and density, having the following specifications
- |    |  |                                 |
|----|--|---------------------------------|
| .1 | Volumetric Water Retention :                 | 30 – 40 %                       |
| .2 | Air-Filled Porosity                          | 20 – 30 %                       |
| .3 | Total Porosity                               | 60 – 70 %                       |
| .4 | Bulk Density: Damp) :                        | 950 – 1 050 kg/m <sup>3</sup>   |
| .5 | Bulk Density: Compacted, Wetted and Drained: | 1 150 – 1 250 kg/m <sup>3</sup> |
| .6 | Organic Matter, Dry Base :                   | 5 – 10 %                        |
| .7 | PH   | 6,0 – 7,0                       |
| .8 | Recycled Content (Weight) :                  | 68 %                            |
| .9 | Mineral Aggregates (Volume) :                | 70 %                            |

## 2.11 BALLAST

- .1 Crushed white marble gravel, hard, clean and non-friable, complies with BNQ-2560-040 and has a solar reflectance index (IRS) of 72 according to ASTM E 1980.

- .2 Particle size analysis shall be performed in accordance with LC-21-040, ASTM C 1549 and ASTM C 1371 and meet units of 40-20 mm Group 2 aggregate, with a maximum loss of 0.2%. to the MgSO<sub>4</sub> degradation test according to the CAN / CSA A23.2-9A method
- .3 Quantity: cover new roof composition with a minimum weight of 73kg / m<sup>2</sup> in general and 98 kg / m<sup>2</sup> on a perimeter band of 1.2m wide at each basin.

## **2.12 VEGETATION**

- .1 Use the plants described in this section, divide into the area equally. For the quantity of plants, refer to the areas to be covered in the drawings.
- .2 Perennials:
  - .1 Spurium tricolor sedum (3 colors variegated stonecrop), 1 gallon pot.
  - .2 Armeria maritima Alba (white Spanish turf), 1 gallon pot.
  - .3 Achillea millefolium Curise Queen, 1 gallon pot.
  - .4 Spurium fuldaglut sedum (orpin spurium Fuldaglut), 1 gallon pot.

## **2.13 FERTILIZERS, AMENDMENTS AND ADDITIVES**

- .1 Bone powder, mycorrhizae and any other additives recommended by the manufacturer.

## **2.14 SLAB**

- .1 IRS> 86 high roof reflective concrete roof slab, 600 x 600 x 50 mm, lightly sand-blasted, white color surface. Must have a flexural strength of 4.5 MPa and withstand live loads. in use of 300 kg (660 lb)

## **2.15 AJUSTABLE PAVER PEDESTAL**

- .1 Polypropylene adjustable paver pedestal used to support paving blocks on pedestrian traffic terraces composed of a head screw nut assembly and a base plate. Accessory required.

## **2.16 WATERPROOFING MASTIC**

- .1 Multipurpose elastomeric mastic based on SBS modified bitumen, fiber, mineral and solvents.

## **2.17 FASTENERS**

- .1 Covering to steel deck: No. 10 flat head, self tapping, Type A or AB, cadmium plated screws. Recommend FM Approved screw and plate assemblies.
- .2 Roofing nails: in compliance with ACNOR B111-1974, type "ARDOX", galvanized steel, sufficiently long to penetrate at least 20 mm into the wooden support, without however measuring less than 25 mm. mm long. Quantities according to the associations mentioned above. Use twisted nails with a 25 mm diameter steel washer head and a 3 mm thick rod of 25 or 38 mm length, type recommended by the waterproofing membrane manufacturer.

## **2.18 ROOF DRAINS**

- .1 Roof drain for roof deck:
  - .1 Copper or stainless steel apron 560 x 560, to suit existing conditions, x 1.066 mm thick (32 oz / copper or 22 gauge stainless steel).
  - .2 Copper or stainless steel downspout, of appropriate diameter for existing downspouts.

- .3 Connect deck to downspout with perfectly sealed weld.
- .4 Square strainer formed of 6.35 mm thick solid aluminum, perforated stainless steel support frame  $\pm 190 \times 190$ , with non-standard height adjustable from  $\pm 170$  to 195 mm and depending on conditions.

## 2.19 OTHER MATERIALS

- .1 Flame barrier: organic felts in compliance with CSA A123.3, no.15, saturated with asphalt
- .2 Self-adhesive, flame retardant membrane consisting of a glass mat reinforcement and SBS modified bitumen. The membrane is designed to prevent flame penetration into voids, spaces and openings. It is applied before the installation of a thermosealed membrane.
- .3 Filler panel: Perlite panel, 25 mm thick. Apply when correcting existing roof slopes when required or prescribed by the Departmental Representative.
- .4 One-component bitumen and polyurethane sealant. Use with primer and reinforcement mat as recommended by the manufacturer.

## 2.20 VAPOR RETARDER SUPPORT PANEL

- .1 Gypsum-core, water-repellent (type x) gypsum roof panel, to be used when required to replace existing panels, high performance in compliance with ASTM D3273 and ASTM C1177, fiberglass-reinforced, paperless board and mildew and moisture resistant, coated with glass mat, 16 mm thick or as existing.  
**SPEC NOTE:** .
- .2 Vapor retarder primer, based on volatile solvent bitumen and adhesion promoter additives, for use with new support panels, having the following properties:
  - .1 Density at 20°C : 0,91 Kg/L
  - .2 Colour : black
  - .3 Solid content: 35%
  - .4 drying period: 1 à 12 hours

## 2.21 MASTIC RESIN

- .1 Cold bitumen mono-component bitumen and waterproofing sealant with the following characteristics:
  - .1 Physical state: thick brown liquid.
  - .2 Solids content: 80%.
  - .3 Ultimate elongation : (ASTM D412): 500%.
  - .4 Strain energy: (ASTM D412): 1.35 MPa.
  - .5 Drying: overlayable after 2 hours dry: 12 hours (remains sticky to the touch).
- .2 Reinforcement mat recommended by the manufacturer.
- .3 Aluminum colour mastic coating

## **PART 3 - EXECUTION**

### **3.1 QUALITY OF WORK**

- .1 Do examination, preparation and roofing Work in accordance with Roofing Manufacturer's Specification Manual and AMCQ Roofing Specification Manual, particularly for fire safety precautions and according to ULC specifications.
- .2 At wall and roof junctions, interpose an interface made of a durable rigid material, ie steel metal sheet, intended to ensure the continuity of the airtightness system
- .3 Make the connection of the assembly of components and materials taking onto account the loads of the considered elements.
- .4 Compliance: Comply with manufacturer's written requirements and recommendations, including any available technical bulletins, instructions for handling, storing and operating products, and data sheet instructions.
- .5 Realize entirely all the Work of a basin prior to starting a new basin.
- .6 Roofing must run on a continuous basis as when the surfaces are ready and weather the conditions permit. Mot to undertake demolition if the weather forecast during working hours or other conditions prevent from completing Work.
- .7 Seal all joints of the sub-layers that are not covered with a coat membrane the same day. In no event shall there be any moisture trapped in the joints before laying a second membrane

### **3.2 DEMOLITION**

- .1 Demolish identified existing roofing complexes, completely up to existing waterproofing membrane, and report to the Departmental Representative the state of the membrane and its substrate.
- .2 Obtain a smooth support, free of material or asperity that may affect the installation of the new roofing complex. Heat the surface of the existing polyethylene.

### **3.3 EXAMINATION OF SURFACES**

- .1 Review the support, perform the preparatory work and lay the roof in accordance with the specifications of the roofing manufacturer, particularly with regard to fire safety.
  - .2 The examination and preparation of surfaces must be made according to the instructions included in the technical documentation of the roof membrane manufacturer.
-

- .3 Prior to the beginning of the work, the owner's representative and the roofing superintendent will be responsible to inspect and approve the condition of support (slopes and wood blocking, where applicable) as well as vertical surfaces at parapets, roof drains, plumbing vents and others, ventilation exhausts and others and construction joints. When applicable, a non-conformity notice will be given to the contractor in order for him to proceed to the corrections. The beginning of the work will be considered as an acceptance of the conditions related to the achievement of the work.
- .4 Do not start any of the work until surfaces are clean, smooth, dry and free of ice, snow and waste materials. The use of calcium salts and is forbidden to remove ice or snow.

### **3.4 PRE-INSTALLATION PROTECTION**

- .1 Cover walls, walks, slopped roofs and adjacent work where materials hoisted or used.
- .2 Use warning signs and barriers. Maintain in good order until completion of Work.
- .3 Clean off drips and smears of bituminous material immediately.
- .4 Dispose of rain water off roof and away from face of building until roof drains or hoppers installed and connected.
- .5 Protect roof from traffic and damage. Comply with precautions deemed necessary by Departmental Representative.
- .6 At end of each day's work or when stoppage occurs due to inclement weather, provide protection for completed Work and materials out of storage.
- .7 Metal connectors and decking will be treated with rust proofing or galvanization.

### **3.5 THERMOSEALED BASE SHEET APPLICATION**

- .1 Unroll the dry base sheet on the support taking care to align the edge of the first row with the center of the drain (parallel to the edge of the roof).
- .2 At cross-laps, cut at an angle the corner of the area that will be covered by the next membrane roll.
- .3 Weld base sheet with a torch directly over rock fiber insulation.
- .4 Each edge will overlap the previous one laterally along the appropriate line and will overlap 150 mm (6 in) at the ends. Space cross joints at least 300 mm (12 in.).
- .5 Application to be free of blisters, wrinkles and fishmouths.

### **3.6 SELF-ADHESIVE BASE SHEET APPLICATION ON VERTICAL SURFACES AND PARAPETS**

- .1 The primer must be dry when applying the base sheet.
  - .2 Before applying membranes, when there is overlap (inside and outside corners and running surface) always burn the plastic film for the portion to be covered. In the case of a sandblasted underlay, at the foot of the parapets apply self-adhesive membrane primer to the area to be covered.
-

- .3 At transverse laps, cut at an angle the corner of the area to be covered by the next membrane roll.
- .4 Each edge will overlap the previous one laterally in the appropriate line, and 150 mm (6 in.) At the ends.
- .5 Position the previously cut membrane. Detach the silicone paper up to 150 mm (6 in.) from the top of the parapet to hold the membrane in place.
- .6 Gradually remove the rest of the silicone paper while pressing the membrane with an aluminum applicator to promote adhesion. Use this same applicator to obtain a perfect transition between the vertical surfaces and the current surface. Roll a roller over the entire membrane to obtain a complete adhesion.
- .7 Install a reinforcement fasteners on all inside and outside corners
- .8 Always seal overlaps before the end of the work day.
- .9 Application to be free of blisters, wrinkles and fishmouths.

### **3.7 REINFORCEMENT FASTENERS APPLICATION**

- .1 Install reinforcement fasteners on all inside and outside corners.
- .2 Complete installation of the base sheet before installing and thermosetting the fasteners.

### **3.8 THERMOSEALED CAP SHEET APPLICATION FOR RUNNING SURFACES**

- .1 Use double-sided starting rollers for the first row. If a starting roll is not used, the longitudinal overlap covered with granules should be degranulated by sinking the pellets into the flame-heated bitumen over a 75 mm (3 in.) Width.
- .2 From the drain, Unroll the dry waterproofing membrane over the underlay taking care to align the edge of the first edge with the edge of the roof.
- .3 At transverse laps, cut at an angle the corner of the area to be covered by the next membrane roll.
- .4 Each edge will overlap the previous one laterally along the appropriate line and will overlap 150 mm (6 in) at the ends. Space cross joints at least 300 mm (12 in.).
- .5 Weld topcoat with torch over underlayment to create a slight bitumen overhang (3 to 6 mm) (1/8 "to 1/4").
- .6 Make sure to proceed without overheating the membranes and their reinforcement.
- .7 Application to be free of blisters, wrinkles and fishmouths.
- .8 Avoid circulating on finished surfaces; use rigid protective panels as needed.

### **3.9 THERMOSEALED CAP SHEET APPLICATION FOR VERTICAL SURFACES AND PARAPETS**

- .1 This cap sheet shall be arranged in 1m (3.25 ') wide sections.
-

- .2 Each edge will overlap the previous one laterally along the appropriate line and will overlap the current surface by 150 mm (6 in.). The cap sheet membranes applied on vertical surfaces should be at least 100 mm (4 in.) Away from the running surface cap sheet as to avoid any extra thickness.
- .3 At transverse laps, cut at an angle the corner of the area to be covered by the next membrane roll.
- .4 With a chalk line, draw a straight line on the running surface, 150 mm (6 in) from the vertical and parapets.
- .5 Using a blowtorch and a round-tip trowel, drive the surface granules into the hot bitumen layer starting from the drawn chalk line on the running surface up to the edge of the vertical surface or parapet, and vertical granulated overlap surfaces.
- .6 The cap sheet will be torch welded directly to the base sheet from bottom to top.
- .7 Application to be free of blisters, wrinkles and fishmouths.
- .8 Make sure to proceed without overheating the membranes and their reinforcement

### **3.10 ROOF DRAIN INSTALLATION**

- .1 Copper drains must be installed in compliance AMCQ details. Do not put flame in direct contact with the apron. Heat only the membrane, then apply it to the metal surface. Install the strainer. Connect the flange to the downspout, the assembly must be watertight and backflow proof.

### **3.11 ROOT BARRIER MEMBRANE INSTALLATION**

- .1 Unroll root membrane on finished waterproofing membrane.
- .2 Seal joints with self-adhesive tape.

### **3.12 ADDITIONAL DRAINAGE PANEL INSTALLATION**

- .1 Installation of additional drainage panel to increase drainage capacity.
- .2 Install drainage panels directly over root barrier membrane with geotextile fabric facing up. Place the panels in a juxtaposed way and cut out at the periphery according to the configuration of the surface, making sure not to damage the membranes.

### **3.13 INSULATION INSTALLATION IN INDEPENDENCE**

- .1 Lay insulation boards flat on inverted roof membrane.
- .2 Lay down the second row by offsetting the joints without being glued to the first thickness. If necessary, use a compatible adhesive to hold the panels together temporarily.

### **3.14 DRAINAGE PANEL INSTALLATION (ON INUSLATION)**

- .1 Install drainage panels directly over insulation. Place the drainage panels in a juxtaposed way and cut out at the periphery according to the configuration of the surface.
-



### **3.15 GEOTEXTILE MEMBRANE INSTALLATION**

- .1 Unroll the geotextile membrane directly on the drainage panel. Deposit on the periphery depending on the configuration of the surface, being careful not to damage the substrate. Double the membrane at the edges.

### **3.16 GROWING MEDIUM INSTALLATION**

- .1 Spread culture substrate on root barrier or capillary mat.
- .2 Incorporate amendments, fertilizers and additives into the growing medium in the top 20 mm.
- .3 Distribute regularly with a rake. The thickness should be regularly examined. The leveling of the surface must respect a tolerance of  $\pm 1$  cm.
- .4 Water substrate until saturation.
- .5 Compact with a turf roller, half filled with water.
- .6 Ensure minimum substrate thickness is 150 mm after compaction.
- .7 Calculate volumes based on substrate type and compaction.

### **3.17 VEGETATION PLANTATION**

- .1 Establish vegetation by sowing or planting, depending on the type chosen.
- .2 Water saturated in all cases.
- .3 Plant perennials randomly at the following density per square meter: 9 to 15 perennial plants in 100 mm pots.

### **3.18 SLABS AND AJUSTABLE PEDESTAL INSTALLATION**

- .1 Install adjustable pedestals on the drainage panel.
- .2 Adjust the level.
- .3 Follow the manufacturer's recommendations.
- .4 Place the slabs on the pedestals.

### **3.19 MASTIC RESIN APPLICATION**

- .1 Installation of liquid waterproofing resins according to manufacturer's written recommendations.
  - .2 Use a reinforcing mat
  - .3 Apply a final coat of aluminum-colored sealant.
  - .4 Use a putty tape to make straight line while before applying the mastic resin, remove at the end of the application.
-

### **3.20 BALLAST INSTALLATION**

- .1 Apply aggregate ballast, dry and in uniform fashion at minimum rate of 73 kg/m<sup>2</sup>, following insulation manufacturer's, ULC's and AMCQ's recommendations.
- .2 Spread additional stone ballast around perimeter of roof for width of 1200 mm to increase ballast weight to 100 kg/m<sup>2</sup>.

### **3.21 CLEANING**

- .1 Remove bituminous markings from finished surfaces.
- .2 In areas where finished surfaces are soiled caused by work of this section, consult manufacturer of surfaces for cleaning advice and complying with their documented instructions.
- .3 Repair or replace defaced or disfigured finishes caused by work of this section.
- .4 Waste Management and Disposal:
  - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Waste Management and Disposal.

**END OF SECTION**

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## **PART 1 - GENERAL**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 07 52 00 – Modified bituminous membrane roofing.
- .2 Section 07 52 01 - Protected modified bituminous membrane roofing.
- .3 Section 07 55 63 – Vegetated protected membrane roofing.
- .4 Section 07 92 00 – Joint sealants.

### **1.2 REFERENCE STANDARDS**

- .1 The Aluminum Association Inc. (AAI)
    - .1 AA Aluminum Design Manual 2015 Part VIII Guidelines for Aluminum Sheet Metal Work in Building Construction.
    - .2 AAI DAF45-2003(R2009), Designation System for Aluminum Finishes.
  - .2 American Architectural Manufacturers Association (AAMA)
    - .1 AAMA 611-14 Voluntary Specifications for Anodized Architectural Aluminum.
    - .2 AAMA 621-02 Voluntary Specifications for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) and Zinc-Aluminum Coated Substrates.
    - .3 AAMA 2603-15, Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.
    - .4 AAMA 2604-13 Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels.
    - .5 AAMA 2605-13 Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.
  - .3 American National Standards Institute (ANSI)
    - .1 ANSI/SPRI/FM 4435/ES-1, Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems 2011.
  - .4 ASTM International
    - .1 ASTM A 240/A 240M-16, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
    - .2 ASTM A 606/A 606M-15, Standard Specification for Steel, Sheet and Strip, High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, with Improved Atmospheric Corrosion Resistance.
    - .3 ASTM A 653/A 653M-15e1, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
    - .4 ASTM A 755/A 755M-16e1 Standard Specification for Steel Sheet, Metallic coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products.
    - .5 ASTM A 792/A 792M-10(2015), Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
    - .6 ASTM B 32-08(2014), Standard Specification for Solder Metal.
    - .7 ASTM B 209-14 Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
    - .8 ASTM D 523-14, Standard Test Method for Specular Gloss.
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- .9 ASTM D 1970/D 1970M-15a Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
- .10 ASTM D 4587-11 Standard Practice for Fluorescent UV-Condensation Exposures of Paint and Related Coatings.
- .11 ASTM F 1667-15 Standard Specification for Driven Fasteners: Nails, Spikes and Staples.
- .5 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type.
- .6 Canadian Roofing Contractors Association (CRCA)
  - .1 Roofing Specifications Manual 2012.
- .7 Canadian Sheet Steel Building Institute (CSSBI)
  - .1 CSSBI S8-2008 Quality and Performance Specification for Prefinished Sheet Steel Used for Building Products.
  - .2 CSSBI B17-2002 Barrier Series Prefinished Steel Sheet: Product Performance & Applications.
  - .3 CSSBI Sheet Steel Facts #12 2003 Fastener Guide for Sheet Steel Building Products.
- .8 CSA Group
  - .1 CSA A123.3-05(2015), Asphalt Saturated Organic Roofing Felt.
  - .2 CSA A123.22-08(2013) Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
- .9 FM Global
  - .1 Property Loss Prevention Data Sheets 1-49 Perimeter Flashing.
- .10 Green Seal Environmental Standards
  - .1 Standard GS-11-2015, Paints, Coatings, Stains, and Sealers.
  - .2 Standard GS-36-2013, Adhesives for Commercial Use.
- .11 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .12 Sheet Metal and Air Conditioning Contractors Association of North America (SMACNA)
  - .1 Architectural Sheet Metal Manual (2012)
  - .2 Residential Sheet Metal Guidelines (2001)

### 1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's printed product literature including product specifications and technical data sheets for sheet metal flashing fasteners and accessory materials. Include product characteristics, performance criteria, physical size, finish and limitations.
  - .2 Submit two copies WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 35 29.06 - Health and Safety Requirements.
- .3 Shop Drawings:
  - .1 Submit shop drawings [only for sheet metal flashing and trim items that differ from those indicated in Contract Documents] [for all sheet metal fabrications].
  - .2 Indicate sheet thickness, flashing dimensions and fastenings. Include anchorage, expansion joints and other provisions for thermal movement.

.3 Submit manufacturer's catalogue cut sheets for manufactured items.

.4 Samples:

.1 Submit duplicate 50 x 50 mm samples of each type of sheet metal material, finishes and colour.

#### **1.4 PRE-INSTALLATION MEETING**

.1 Include sheet metal flashing and trim on agenda of pre-installation meetings of affected sections.

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

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.

.2 Handle and store flashing materials to prevent creasing, buckling, scratching, or other damage.

.3 Waste Management and Disposal:

.1 Separate waste materials for recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

#### **1.6 WARRANTY**

.1 Provide, on behalf of the roofing contractor, a written guarantee in the name of the owner against any defect in labor or materials for a period of one (1) year from the date of almost completion of installation work.

.2 With respect to this section, provide a written warranty from the prepainted galvanized steel flashing manufacturer for any defects in the factory applied exterior finish for the warranty period, starting on the date of installation work completion against any cracking, scaling or peeling (loss of adhesion). The product is warranted for vertical or non-vertical applications, the degree of color fading and surface chalking of the product will be in accordance with the efficiency criteria, the warranty period prescribed in the general conditions is extended by ten (10) years.

### **PART 2 - PRODUCTS**

#### **2.1 BASE SHEET METAL MATERIALS**

.1 Provide sheet metal in base metal thickness specified. Where no thickness specified, provide base sheet metal in thickness recommended in SMACNA Architectural Sheet Metal Manual for type of item being fabricated, but not less than the thickness required by the authority having jurisdiction.

.2 Galvanized steel sheet: 24 gauge (0.604 mm thick, bare metal) for flashing and 20 gauge (0.911 mm thick, bare metal) for vertical flashing application, or as indicated on drawings, commercial quality, according to ASTM A 653 / A 653M, zinc-plated Z275, as identified as galvanized steel in the drawings.

#### **2.2 PREFINISHED STEEL SHEET**

.1 Prefinished steel sheet with Prefinished steel sheet with reactive primary metal paint, primer, two (2) silicone modified polyester resin with a total foliage thickness of 0.9 to 1.1 mils.

.1 Finish Class F1S

- .2 Color choice of architect among standard colors offered by the manufacturer. Provide 4 colors to the project. Provide one (1) additional metallic finish color for basin 1A and 1AA

## 2.3 ACCESSORIES

- .1 Isolation coating: alkali resistant bituminous paint.
- .2 Pourable sealer: proprietary two-part polyurethane pourable sealer designed for sealing penetration pockets.
- .3 Loose laid underlay for metal flashing: dry sheathing to CAN/CGSB-51.32.
- .4 Self-adhesive membrane underlay and tie-in membrane for metal flashings: To CSA A123.22 or ASTM D 1970.
- .5 Sealants: in accordance with Section 07 92 00, in colour to match flashing finish colour.
- .6 Cleats and hook strips: of same material, and temper as sheet metal, minimum 50 mm wide.
- .7 Nails: of same material as sheet metal, [ring thread] flat head roofing nails of length and thickness suitable for [metal flashing] application.
- .8 Screws: of same material as sheet metal, Suitable for substrate and material being fastened, coloured, nylon head, [neoprene washer].
- .9 Flux: rosin, cut hydrochloric acid, or commercial preparation suitable for materials to be soldered.
- .10 Touch-up paint: as recommended by prefinished material manufacturer.

## 2.4 FABRICATION

- .1 Fabricate sheet steel flashings and other sheet steel work in accordance with architectural details as indicated in drawings.
- .2 Form pieces in 2400 mm maximum lengths.
  - .1 Make allowance for expansion at joints.
- .3 Hem exposed edges on underside 12 mm.
  - .1 Mitre and seal corners with sealant.
- .4 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.
- .5 Apply isolation coating to metal surfaces to be embedded in concrete or mortar.

## 2.5 METAL FLASHINGS

- .1 Form flashings, copings and fascias to profiles indicated in drawings with galvanized prefinished steel.
-

## **2.6 PANS**

- .1 Form pans (concealed fasteners) to receive roofing galvanized prefinished steel sheet metal and incorporated into concrete structures in accordance with the details in the drawings.
  - .1 Elements shall have oval mounting holes and be secured by means of steel / plastic washer fasteners.
  - .2 The faces and ends of the elements must be covered with a plastic tape

## **2.7 REGLETS AND CAP FLASHINGS**

- .1 Form hidden reglets (concealed fasteners) sheet metal to be built-in concrete masonry work for base flashings as detailed in the drawings.
  - .1 Provide slotted fixing holes and steel/plastic washer fasteners.
  - .2 Cover face and ends with plastic tape.

## **PART 3 - EXECUTION**

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

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

### **3.2 INSTALLATION**

- .1 Install sheet metal work structures in accordance to the details in the drawings and in accordance to ACEC and AMCQ indications.
  - .2 Use concealed fastenings except where visible fasteners are approved by the Departmental representative before installation.
  - .3 Provide underlay under sheet metal.
    - .1 Secure in place and lap joints 100 mm.
    - .2 Provide self-adhesive membrane to tie into adjacent assemblies.
  - .4 Counterflash bituminous flashings at intersections of roof with vertical surfaces and curbs.
    - .1 Flash joints using S-lock forming tight fit over hook strips, as detailed.
  - .5 Lock end joints and caulk with sealant.
  - .6 Install surface mounted reglets true and level, and caulk top of reglet with sealant.
  - .7 Insert metal flashing into reglets to form weather tight junction.
  - .8 Provide bituminous with metal flashings. Unless otherwise specified, cover joints with "S" staples. The staples are placed on a bed of sealant.
  - .9 Caulk flashing at reglet with sealant.
  - .10 Install pans, where shown around items projecting through roof membrane.
  - .11 Where flashing installed with mechanical fasteners, install fasteners in slots or oversize holes to allow expansion and contraction of flashings.
-

- .12 Provide isolation coating or impervious self-adhesive membrane to separate aluminum items from concrete and masonry.

### **3.3 CLEANING**

- .1 Proceed in accordance with Section 01 74 00 - Cleaning.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.
- .3 Leave work areas clean, free from grease, finger marks and stains.
- .4 Waste Management and Disposal:
  - .1 Separate waste materials for recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

**END OF SECTION**

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## **PART 1 - GENERAL**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 07 52 00 – Modified bituminous membrane roofing.
- .2 Section 07 52 01 - Protected modified bituminous membrane roofing.
- .3 Section 07 55 63 – Vegetated protected membrane roofing.
- .4 Section 07 62 00 – Sheet metal flashing and trim.

### **1.2 REFERENCE STANDARDS**

- .1 ASTM International
  - .1 ASTM C 919-08, Standard Practice for Use of Sealants in Acoustical Applications.
- .2 Canadian General Standards Board (CGSB)
  - .1 CGSB 19-GP-5M-1984, Sealing Compound, One Component, Acrylic Base, Solvent Curing (Issue of 1976 reaffirmed, incorporating Amendment No. 1).
  - .2 CAN/CGSB-19.13-M87, Sealing Compound, One-component, Elastomeric, Chemical Curing.
  - .3 CGSB 19-GP-14M-1984, Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing (Reaffirmation of April 1976).
  - .4 CAN/CGSB-19.17-M90, One-Component Acrylic Emulsion Base Sealing Compound.
  - .5 CAN/CGSB-19.24-M90, Multi-component, Chemical Curing Sealing Compound.
- .3 General Services Administration (GSA) - Federal Specifications (FS)
  - .1 FS-SS-S-200-E(2)1993, Sealants, Joint, Two-Component, Jet-Blast-Resistant, Cold Applied, for Portland Cement Concrete Pavement.
- .4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .5 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
  - .1 SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.

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

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for [joint sealants] and include product characteristics, performance criteria, physical size, finish and limitations.
  - .2 Manufacturer's product to describe:
    - .1 Caulking compound.
    - .2 Primers.
    - .3 Sealing compound, each type, including compatibility when different sealants are in contact with each other.
  - .3 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.

- .3 Samples:
  - .1 Submit 2 samples of each type of material and colour.
  - .2 Cured samples of exposed sealants for each colour where required to match adjacent material.
- .4 Manufacturer's Instructions:
  - .1 Submit instructions to include installation instructions for each product used.

#### **1.4 CLOSEOUT SUBMITTALS**

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for incorporation into manual.

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

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements] [and] [with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect joint sealants from nicks, scratches, and blemishes.
  - .3 Replace defective or damaged materials with new.
- .4 Waste Management and Disposal:
  - .1 Separate waste materials for recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

#### **1.6 SITE CONDITIONS**

- .1 Ambient Conditions:
  - .1 Proceed with installation of joint sealants only when:
    - .1 Ambient and substrate temperature conditions are within limits permitted by joint sealant manufacturer or are above 4.4 degrees C.
    - .2 Joint substrates are dry.
    - .3 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.
- .2 Joint-Width Conditions:
  - .1 Proceed with installation of joint sealants only where joint widths are more than those allowed by joint sealant manufacturer for applications indicated.
- .3 Joint-Substrate Conditions:
  - .1 Proceed with installation of joint sealants only after contaminants capable of interfering with adhesion are removed from joint substrates.

## 1.7 ENVIRONMENTAL REQUIREMENTS

- .1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of Material Safety Data Sheets (MSDS) acceptable to Health Canada.

## 1.8 WARRANTY

- .1 With respect to this section, provide a written guarantee, issued on behalf of the Departmental Representative, certifying that the work specified in this section will be free from defects in materials and workmanship, including against leaks, cracking, crumbling, loss of consistency, contraction, sagging, loss of adhesion and dulling of adjacent surfaces. The warranty period prescribed in the general conditions is extended to five (5) years.
- .2 The warranty must cover the cost of any expenses incurred in repairing the aforementioned defects and any other damage to the building resulting from defects in the work of this section.
- .3 The warranty form must be approved by the Departmental Representative.

## PART 2 - PRODUCTS

### 2.1 SEALANT MATERIALS

- .1 Do not use caulking that emits strong odours, contains toxic chemicals or is not certified as mould resistant in air handling units.
- .2 When low toxicity caulks are not possible, confine usage to areas which off gas to exterior, are contained behind air barriers, or are applied several months before occupancy to maximize off gas time.
- .3 Where sealants are qualified with primers use only these primers.

### 2.2 SEALANT MATERIAL DESIGNATIONS

- .1 Primers: the type recommended by the sealant manufacturer.
- .2 Non-corrosive and non-greasy cleaning agents compatible with sealant and sealant materials and recommended by sealants manufacturer.
- .3 Sealants:
  - .1 Sealants, except those described in CAN / CGSB-19.1 and CAN / CGSB-19.18, must be on the list of approved products, published by the Product Certification Commission. of the ONGC (CGSB). In the case of sealants that have been approved with a primer, only this primer should be used with the sealant. All products must be low VOC (LEED).
    - .1 Product n° 1 :
      - .1 Multicomponent polyurethane sealant, colors to be chosen by the Departmental Representative and in accordance with CAN / CGSB-19.24-M90 Class B, Type II.
        - .1 Tensile Strength % Elongation (ASTM D 800-900% 412)
        - .2 Hardness Properties ASTM C 661 40 ± 5
        - .3 Movement Capability +50% / -50%
      - .2 Applications :

- .1 Expansion or control joints in interior and exterior masonry.
    - .2 Joints between exterior door frames and access hatches, windows, curtain walls and shutters or other and exterior masonry walls.
    - .3 Seams to support angles of masonry or exterior panels.
    - .4 All miscellaneous joints required by plans but not covered by other sections.
- .2 Product n° 2 :
  - .1 Single-component, moisture-cure, acetoxysilicone sealant, colors to be chosen by the Departmental Representative and in accordance with CAN/ONC-19.13-M87.
    - .1 Hardness (Shore A) (ASTM C 661) 26 à 30
    - .2 Peel Strength Aluminum and Glass 2,28 – 2,63 kN/m (ASTM C 794)
    - .3 Dynamic Movement (ASTM C 719) ±25%
    - .4 Tensile Strength at 100% Max Elongation 0,345-0,552 MPa (ASTM C 1184)
  - .2 Applications :
    - .1 Caulking of metal flashings (roofing).
    - .2 Sealing of plumbing pipe penetrations in gypsum structures, under the fitting collars.
    - .3 Joint between interior door frame, glazed partition or other and materials other than gypsum.
    - .4 Sealing joints between gypsum and window elements and curtain walls.
    - .5 Sealing between gypsum and metallic structures.
- .3 Product n° 3 :
  - .1 High-performance, fast-curing, single-component, lowmodulus, hybrid sealant, colors to be chosen by the Departmental Representative and in accordance with.
    - .1 Hardness Properties (ASTM C 661) 25
    - .2 Adhesion to Aluminum (ASTM C 794) 20 – 25 pli
    - .3 Movement Capability (ASTM C 719) ±35%
  - .2 Applications :
    - .1 Joint between interior door frame, glazed partition or other and materials other than gypsum.
    - .2 Sealing joints between gypsum and window elements and curtain walls.
    - .3 Sealing between gypsum and metal structures.
- .4 Product n° 4 :
  - .1 Flame retardant sealant:
    - .1 Acrylic-based Flexible Firestop Sealant that provides movement capability for firewall and thinness of pass-through that can be painted. Apply this product when the installation is visible unless the application does not meet the requirements of CAN-ULC-S115.
    - .2 Smoke retardant and acoustic sealant with no fire rating that can be painted.
    - .3 Silicone-based elastomeric fire retardant sealant that allows maximum movement in firewall and pipe penetration applications.
    - .4 Self-leveling, single component silicone sealant for applications in through-hole component and floor-to-floor joints.

- .4 Sealing and caulking products shall not contain or be made from the following components: aromatic solvents, talc or asbestos fibers, formaldehyde, halogenated solvents, mercury, lead, cadmium, hexavalent chromium, barium and derivatives, with the exception of barium sulphate.
- .5 In order to minimize health risks and maximize product performance, it is important that these be accompanied by detailed instructions regarding the method of application and necessary information regarding waste disposal methods. .
- .6 Caulking products that emit strong odors, contain toxic chemicals or are not certified to be of a mold resistant type should not be used in air handling units.
- .7 If you can not help but use toxic products, restrict use to areas where fumes can be exhausted outdoors or where they will be confined behind air barrier barriers. or apply them several months before the place is occupied so as to allow evacuation of the fumes over the longest possible period

## **2.3 BACKING MATERIAL**

- .1 Preformed, compressible and non-compressible
  - .1 Elements made of polyethylene foam, urethane, neoprene or vinyl.
    - .1 Extruded cellular foam filling rods.
    - .2 Oversized elements from 30 to 50%.
  - .2 Neoprene or rubber-butyl parts.
    - .1 Round and solid rods with a Shore A hardness of 70.
  - .3 High density foam elements.
    - .1 Extruded cellular PVC foam extruded cellular polyethylene foam with Shore A hardness of 20 and tensile strength of 140 to 200 kPa, extruded polyolefin foam, density of 32 kg / m<sup>3</sup>, or neoprene, recommended by the manufacturer.
  - .4 Anti-seizing tape.
    - .1 Polyethylene tape that does not adhere to the sealant.

## **2.4 COLOR OF SEALANTS AND MASTICS**

- .1 In general, the color of each sealant and mastics, at the discretion of the Departmental Representative, will match that of adjacent surfaces (submit color chart)

## **2.5 JOINT CLEANER**

- .1 Non-corrosive and non-staining type, compatible with joint forming materials and sealant in accordance with sealant manufacturer's written recommendations.
- .2 Primer: in accordance with sealant manufacturer's written recommendations.

# **PART 3 - EXECUTION**

## **3.1 EXAMINATION**

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for joint sealants installation in accordance with manufacturer's written instructions.
    - .1 Visually inspect substrate in presence of Departmental Representative.
    - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
-

- .3 Proceed with installation only after unacceptable conditions have been remedied [and after receipt of written approval to proceed from Departmental Representative.

### 3.2 SURFACE PREPARATION

- .1 Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants.
- .2 Clean bonding joint surfaces of harmful matter substances including dust, rust, oil grease, and other matter which may impair Work.
- .3 Do not apply sealants to joint surfaces treated with sealer, curing compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.
- .4 Ensure joint surfaces are dry and frost free.
- .5 Prepare surfaces in accordance with manufacturer's directions.

### 3.3 PRIMING

- .1 Where necessary to prevent staining, mask adjacent surfaces prior to priming and caulking.
- .2 Prime sides of joints in accordance with sealant manufacturer's instructions immediately prior to caulking.

### 3.4 BACKUP MATERIAL

- .1 Apply bond breaker tape where required to manufacturer's instructions.
- .2 Install joint filler to achieve correct joint depth and shape, with approximately 30% compression.

### 3.5 MIXING

- .1 Mix materials in strict accordance with sealant manufacturer's instructions.

### 3.6 APPLICATION

- .1 Sealant:
  - .1 Apply sealant in accordance with manufacturer's written instructions.
  - .2 Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint.
  - .3 Apply sealant in continuous beads.
  - .4 Apply sealant using gun with proper size nozzle.
  - .5 Use sufficient pressure to fill voids and joints solid.
  - .6 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.
  - .7 Tool exposed surfaces before skinning begins to give slightly concave shape.
  - .8 Remove excess compound promptly as work progresses and upon completion.
- .2 Curing:
  - .1 Cure sealants in accordance with sealant manufacturer's instructions.
  - .2 Do not cover up sealants until proper curing has taken place.

### **3.7 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
  - .1 Leave Work area clean at end of each day.
  - .2 Clean adjacent surfaces immediately.
  - .3 Remove excess and droppings, using recommended cleaners as work progresses.
  - .4 Remove masking tape after initial set of sealant.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
- .3 Waste Management and Disposal:
  - .1 Separate waste materials for recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

### **3.8 PROTECTION**

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

**END OF SECTION**

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## **PART 1 - GENERAL**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 09 91 99 – Painting for minor works.

### **1.2 REFERENCE STANDARDS**

- .1 ASTM International
  - .1 ASTM C 1396/C 1396M-09a, Standard Specification for Gypsum Wallboard.
  - .2 ASTM C 475/C 475M-02(2007), Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
  - .3 ASTM C 514-04(2009)e1, Standard Specification for Nails for the Application of Gypsum Board.
  - .4 ASTM C 645-09a, Standard Specification for Nonstructural Steel Framing Members.
  - .5 ASTM C 754-09a, Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
  - .6 ASTM C 840-08, Standard Specification for Application and Finishing of Gypsum Board.
  - .7 ASTM C 954-10, Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.122 in. (2.84 mm) in Thickness.
  - .8 ASTM C 1002-07, Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
  - .9 ASTM C 1047-10, Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
  - .10 ASTM C 1178/C 1178M-08, Standard Specification for Glass Mat Water-Resistant Gypsum Backing Board.
- .2 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
  - .1 SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.
- .3 Underwriters' Laboratories of Canada (ULC)
  - .1 CAN/ULC-S102-07, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

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

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for gypsum, framing, sealants and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Samples:
  - .1 Submit for review and acceptance of each unit.
  - .2 Samples will be returned for inclusion into work.
  - .3 Submit 300 x 300 mm size samples of gypsum board and 300 mm long samples of corner and casing beads, cornice cap and insulating strip.

- .4 Test and Evaluation Reports: submit test reports in accordance with Section 01 45 00 - Quality Control, from approved independent testing laboratory, certifying partition system complies with sound transmission rating and fire-resistance rating as specified.

#### **1.4 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store materials inside, level, under cover. Protect from weather, damage from construction operations and other causes, in accordance with manufacturer's printed instructions.
  - .3 Handle materials to prevent damage to edges or surfaces. Protect metal accessories and trim from being bent or damaged.
  - .4 Store and protect partition materials from nicks, scratches, and blemishes.
  - .5 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: remove for reuse of pallets, crates, padding, and packaging materials as specified in in accordance with Section 01 74 19 - Waste Management and Disposal.

### **PART 2 - PRODUCTS**

#### **2.1 MATERIALS**

- .1 Non-structural Metal Framing:
  - .1 Non-load bearing channel stud framing: to ASTM C 645, indicated stud size, roll formed from 0.53 mm thickness hot dipped galvanized steel sheet, for screw attachment of gypsum board. Knock-out service holes at 460 mm centres.
  - .2 Floor and ceiling tracks: to ASTM C 645 , in widths to suit stud sizes, 32 mm flange height.
- .2 Gypsum Board:
  - .1 Ordinary gypsum board: ASTM C1396 / C1396M standard type, 16 mm thick or the same thickness as the existing, 1200 mm wide and the longest usable length, with squared edges at the ends and beveled edges on the sides.
  - .2 Drywall furring channels: 0.5 mm core thickness galvanized steel channels for screw attachment of gypsum board.
  - .3 Steel drill screws: to ASTM C 514.

#### **2.2 ACCESSORIES**

- .1 Sealants: in accordance with Section 07 92 00 - Joint Sealants.
  - .2 Insulating strip: rubberized, moisture resistant, 3 mm thick closed cell neoprene strip, 12 mm wide, with self sticking permanent adhesive on one face, lengths as required.
-

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for product installation in accordance with manufacturer's written instructions prior to partition installation.
  - .1 Visually inspect substrate in presence of Departmental Representative.
  - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  - .3 Proceed with installation only after unacceptable conditions have been remedied [and after receipt of written approval to proceed from Departmental Representative.

### **3.2 ERECTION OF FRAMING**

- .1 Install steel framing members to receive screw-attached gypsum board in accordance with ASTM C 754 except where specified otherwise.
  - .2 Align partition tracks at floor and ceiling and secure at 600 mm on centre maximum.
  - .3 Place studs vertically at 400 mm on centre and maximum of 50 mm from abutting walls, and at each side of openings and corners. Position studs in tracks at floor and ceiling. Cross brace steel studs as required to provide rigid installation to manufacturer's instructions.
  - .4 Erect metal studding to tolerance of 1:1000.
  - .5 Co-ordinate simultaneous erection of studs with installation of service lines. When erecting studs ensure web openings are aligned.
  - .6 Include two studs extending from floor to ceiling at each side of openings wider than stud centres specified. Secure studs together, 50 mm apart using column clips or other approved means of fastening placed alongside frame anchor clips.
  - .7 Install heavy gauge single jamb studs at openings.
  - .8 Erect track at head of door/window openings and sills of sidelight/window openings to accommodate intermediate studs. Secure track to studs at each end, in accordance with manufacturer's instructions. Install intermediate studs above and below openings in same manner and spacing as wall studs.
  - .9 Include 40 mm stud or furring channel secured between studs for attachment of fixtures behind lavatory basins, toilet and bathroom accessories, and other fixtures including grab bars and towel rails, attached to steel stud partitions.
  - .10 Install steel studs or furring channel between studs for attaching electrical and other boxes.
  - .11 Extend partitions to ceiling height except where indicated.
  - .12 Maintain clearance under beams and structural slabs to avoid transmission of structural loads to studs. Use double track slip joint.
  - .13 Install continuous insulating strips to isolate studs from uninsulated surfaces.
  - .14 Install insulating strip under studs and tracks around perimeter of sound control partitions.
-

### 3.3 ERECTION OF GYPSUM BOARD AND ACCESSORIES

- .1 Do application and finishing of gypsum board in accordance with ASTM C 840 except where specified otherwise.
- .2 Erect hangers and runner channels for suspended gypsum board ceilings in accordance with ASTM C 840 except where specified otherwise.
- .3 Support light fixtures by providing additional ceiling suspension hangers within 150 mm of each corner and at maximum 600 mm around perimeter of fixture.
- .4 Frame with furring channels, perimeter of openings for access panels, light fixtures, diffusers, grilles.
- .5 Install 19 x 64 mm furring channels parallel to, and at exact locations of steel stud partition header track.
- .6 Furr for gypsum board faced vertical bulkheads within and at termination of ceilings.
- .7 Furr above suspended ceilings for gypsum board fire and sound stops and to form plenum areas as indicated.
- .8 Install wall furring for gypsum board wall finishes in accordance with ASTM C 840, except where specified otherwise.
- .9 Install gypsum boards in direction that will minimize number of end-butt joints. Stagger end joints 250 mm minimum.

### 3.4 APPLICATION

- .1 Apply gypsum board after bucks, anchors, blocking, sound attenuation, electrical and mechanical work are approved.
- .2 Apply single layer gypsum board to metal furring or framing using screw fasteners. Maximum spacing of screws 300 mm on centre.

### 3.5 INSTALLATION

- .1 Erect accessories straight, plumb or level, rigid and at proper plane. Use full length pieces where practical. Make joints tight, accurately aligned and rigidly secured. Mitre and fit corners accurately, free from rough edges. Secure at 150 mm on centre.
- .2 Install casing beads around perimeter of suspended ceilings.
- .3 Install casing beads where gypsum board butts against surfaces having no trim concealing junction and where indicated. Seal joints with sealant.
- .4 Install insulating strips continuously at edges of gypsum board and casing beads abutting metal window and exterior door frames, to provide thermal break.
- .5 Install access doors to electrical and mechanical fixtures specified in respective sections.
  - .1 Rigidly secure frames to furring or framing systems.

- .6 Finish face panel joints and internal angles with joint system consisting of joint compound, joint tape and taping compound installed according to manufacturer's directions and feathered out onto panel faces.
- .7 Finish corner beads, control joints and trim as required with two coats of joint compound and one coat of taping compound, feathered out onto panel faces.
- .8 Fill screw head depressions with joint and taping compounds to bring flush with adjacent surface of gypsum board so as to be invisible after surface finish is completed.
- .9 Completed installation to be smooth, level or plumb, free from waves and other defects and ready for surface finish.

### **3.6 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
- .3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
  - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

### **3.7 PROTECTION**

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

**END OF SECTION**

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## **PART 1 - GENERAL**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 09 92 99 – Partitions for minor works.

### **1.2 REFERENCE STANDARDS**

- .1 Green Seal Environmental Standards (GS)
  - .1 GS-11-2008, 2nd Edition, Paints and Coatings.
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .3 The Master Painters Institute (MPI)
  - .1 Architectural Painting Specification Manual - current edition.
  - .2 Maintenance Repainting Manual - current edition.
- .4 National Research Council Canada (NRC)
  - .1 National Building Code of Canada 2015 (NBC).
- .5 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
  - .1 SCAQMD Rule 1113-A2007, Architectural Coatings.

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

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for [paint and coating products] and include product characteristics, performance criteria, physical size, finish and limitations.
  - .2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.
- .3 Samples:
  - .1 Submit for review and acceptance of each unit.
  - .2 Samples will be returned for inclusion into work.
  - .3 Submit duplicate 200 x 300 mm sample panels of each paint with specified paint or coating in colours, gloss/sheen and textures required to MPI Painting Specification Manual standards.
- .4 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

### **1.4 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
  - .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
-

- .3 Storage and Handling Requirements:
  - .1 Provide and maintain dry, temperature controlled, secure storage.
  - .2 Store painting materials and supplies away from heat generating devices.
  - .3 Store materials and equipment in well ventilated area within temperature as recommended by manufacturer.
- .4 Fire Safety Requirements:
  - .1 Supply 1 9 kg Type ABC dry chemical fire extinguisher adjacent to storage area.
  - .2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.
  - .3 Handle, store, use and dispose of flammable and combustible materials in accordance with National Fire Code of Canada (NFC) requirements.
- .5 Packaging Waste Management: remove for reuse of pallets, crates, padding, and packaging materials in accordance with Section 01 74 19 - Waste Management and Disposal.

## 1.5 SITE CONDITIONS

- .1 Heating, Ventilation and Lighting:
  - .1 Ventilate enclosed spaces in accordance with Section 01 51 00 - Temporary Utilities.
  - .2 Co-ordinate use of existing ventilation system with Departmental Representative and ensure its operation during and after application of paint as required.
  - .3 Provide minimum lighting level of 323 Lux on surfaces to be painted.
- .2 Temperature, Humidity and Substrate Moisture Content Levels:
  - .1 Apply paint finishes when ambient air and substrate temperatures at location of installation can be satisfactorily maintained during application and drying process, within MPI and paint manufacturer's prescribed limits.
  - .2 Test concrete, masonry and plaster surfaces for alkalinity as required.
  - .3 Apply paint to adequately prepared surfaces, when moisture content is below paint manufacturer's prescribed limits.
- .3 Additional application requirements:
  - .1 Apply paint finish in areas where dust is no longer being generated by related construction operations or when wind or ventilation conditions are such that airborne particles will not affect quality of finished surface.
  - .2 Apply paint in occupied facilities during silent hours only. Schedule operations to approval of Departmental Representative such that painted surfaces will have dried and cured sufficiently before occupants are affected.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- .1 Supply paint materials for paint systems from single manufacturer.
- .2 Conform to latest MPI requirements for painting work including preparation and priming.
- .3 All Sico, Benjamin Moore and Sherwin Williams paint products are acceptable
  - .1 Primer: VOC limit 100 g/L maximum to SCAQMD Rule 1113.
  - .2 Paint: VOC limit 100 g/L maximum to SCAQMD Rule 1113.
- .4 Colours:
  - .1 Submit proposed Colour Schedule to Departmental Representative for review.



- .2 Base colour schedule on selection of 2 base colours.
- .5 Mixing and tinting:
  - .1 Perform colour tinting operations prior to delivery of paint to site, in accordance with manufacturer's written recommendations. Obtain written approval from Departmental Representative for tinting of painting materials.
  - .2 Use and add thinner in accordance with paint manufacturer's recommendations.
    - .1 Do not use kerosene or similar organic solvents to thin water-based paints.
  - .3 Thin paint for spraying in accordance with paint manufacturer's written recommendations.
  - .4 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity.

## 2.2 DEGREE OF GLOSS (SHEEN)

- .1 Gloss/sheen ratings:
  - .1 Paint gloss is defined as sheen rating of applied paint, in accordance with following values:

Gloss level-category	Gloss @60 degrees	Sheen @85 degrees
Gloss level 1 – Matte finish	Max. 5	Max. 10
Gloss level 2 – Velvet	Max. 10	10 to 35
Gloss level 3 – Eggshell	10 to 25	10 to 35
Gloss level 4 – Satin	20 to 35	Min. 35
Gloss level 5 – Semi-gloss	35 to 70	
Gloss level 6 – Gloss	70 to 85	
Gloss level 7 – High gloss	More than 85	
  - .2 Gloss level ratings of painted surfaces as indicated and as noted on Finish Schedule.

## PART 3 - EXECUTION

### 3.1 GENERAL

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheets.
- .2 Perform preparation and operations for interior painting in accordance with MPI - Architectural Painting Specifications Manual except where specified otherwise.

### 3.2 EXAMINATION

- .1 Investigate existing substrates for problems related to proper and complete preparation of surfaces to be painted. Report to Departmental Representative damages, defects, unsatisfactory or unfavourable conditions before proceeding with work.
- .2 Conduct moisture testing of surfaces to be painted using properly calibrated electronic moisture meter, except test concrete floors for moisture using simple "cover patch test". Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.

### 3.3 PROTECTION

- .1 Protect interior surfaces of building, adjacent fixtures and furniture that are not to be painted from speckles, marks and other damage with non-soiled covers or caches. If the surfaces in question are damaged, clean and repair them in accordance with the Departmental Representative's instructions.

- .2 Protect permanently attached items, for example, fire resistance labels for doors and racks.
- .3 Protect factory-finished equipment and components from a finishing product.
- .4 Provide protection for the general public and building occupants in or near the building.
- .5 Before commencing painting, remove cover plates from electrical equipment, lighting fixtures, visible hardware from door hardware, bathroom accessories and all other accessories, fixings and equipment. laid down. Store these items and put them down once the painting is done.
- .6 If necessary, cover or move furniture and transportable items to facilitate painting. Deliver these items and materials as work progresses.
- .7 As work progresses, place "WET PAINT" signs in occupied areas to the satisfaction of the Departmental Representative .

### 3.4 PREPARATION

- .1 Protection of in-place conditions:
  - .1 Protect existing building surfaces and adjacent structures from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore surfaces as directed by Departmental Representative.
  - .2 Protect items that are permanently attached such as Fire Labels on doors and frames.
  - .3 Protect factory finished products and equipment.
- .2 Surface Preparation:
  - .1 Remove electrical cover plates, light fixtures, surface hardware on doors, bath accessories and other surface mounted equipment, fittings and fastenings prior to undertaking painting operations. Identify and store items in secure location and re-installed after painting is completed.
  - .2 Move and cover furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.
  - .3 Place "WET PAINT" signs in occupied areas as painting operations progress. Signs to approval of Departmental Representative.
  - .4 Clean and prepare surfaces in accordance with MPI - Architectural Painting Specification Manual specific requirements and coating manufacturer's recommendations.
  - .5 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before prime coat is applied and between applications of remaining coats. Apply primer, paint, or pretreatment as soon as possible after cleaning and before deterioration occurs.
  - .6 Where possible, prime non-exposed surfaces of new wood surfaces before installation. Use same primers as specified for exposed surfaces.
    - .1 Apply vinyl sealer to MPI #36 over knots, pitch, sap and resinous areas.
    - .2 Apply wood filler to nail holes and cracks.
    - .3 Tint filler to match stains for stained woodwork.
  - .7 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm.
  - .8 Clean metal surfaces to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and other foreign substances in accordance with MPI requirements.
  - .9 Touch up of shop primers with primer as specified.
  - .10 Any existing damaged surface must be repaired before being painted; any surface should be free of foreign material, loose paint, dirt, stains, grease or any material that does not offer a perfect bond with the paint. **Wash and lightly sand all existing surfaces to be painted.** Remove the trademarks still in place on the materials. Clean all writes on the surfaces of ducts, ducts or other paint surfaces.

### 3.5 APPLICATION

- .1 Paint only after prepared surfaces have been accepted by Departmental Representative
- .2 Use method of application approved by Departmental Representative.
  - .1 Conform to manufacturer's application recommendations.
- .3 Apply coats of paint in continuous film of uniform thickness.
  - .1 Repaint thin spots or bare areas before next coat of paint is applied.
- .4 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.
- .5 Sand and dust between coats to remove visible defects.
- .6 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as tops of interior cupboards and cabinets and projecting ledges.
- .7 Finish inside of cupboards and cabinets as specified for outside surfaces.
- .8 Finish closets and alcoves as specified for adjoining rooms.
- .9 Finish top, bottom, edges and cutouts of doors after fitting as specified for door surfaces.
- .10 Mechanical/Electrical Equipment:
  - .1 Paint conduits, piping, hangers, ductwork and other mechanical and electrical equipment exposed in finished areas, to match adjacent surfaces, except as indicated.
  - .2 Do not paint over nameplates.
  - .3 Keep sprinkler heads free of paint.
  - .4 Paint fire protection piping red.
  - .5 Paint disconnect switches for fire alarm system and exit light systems in red enamel.
  - .6 Paint natural gas piping yellow.
  - .7 Paint both sides and edges of backboards for telephone and electrical equipment before installation.
    - .1 Leave equipment in original finish except for touch-up as required, and paint conduits, mounting accessories and other unfinished items.

### 3.6 FINISH

- .1 .1 System 1: Paint all ceilings and gypsum ceiling details as follows:
  - .1 New surface:
    - .1 1 coat of interior latex sealer primer.
    - .2 2 coats of 100% acrylic latex paint, matte finish.
  - .2 Existing painted surface:
    - .1 Wash and sand lightly, apply 1 coat of alkyd-based inner sealer (block stain and underlay)
    - .2 2 coats of 100% acrylic latex paint, velvety finish.
- .2 System 2: Paint gypsum board blast as follows:
  - .1 New surface:
    - .1 1 coat of interior latex sealer primer.
    - .2 2 coats of 100% acrylic latex paint, melamine finish.

### **3.7 EXISTING CONDITIONS**

- .1 Examine existing substrates to determine if their condition may compromise the preparation of surfaces to be painted. Prior to commencing work, report to Departmental Representative, if applicable, any unsatisfactory or adverse damages, defects or conditions found.
- .2 Control moisture content of surfaces to be painted and report results to Departmental Representative. Do not start work until surface conditions are acceptable, as recommended by the manufacturer.
- .3 Maximum permissible humidity level:
  - .1 Plaster and drywall: 12%.
  - .2 Masonry / concrete: 12%.
  - .3 Concrete blocks / bricks: 12%.

### **3.8 APPLICATION ON EXISTING PAINTED SURFACES**

- .1 Paint all walls, columns, doors, door frames and windows, and any other items already painted, as follows:
  - .1 Wash and sand lightly, apply 1 coat of POLYPREP Solvent-Based Interior Sealer Primer 145-033 or approved equivalent.
  - .2 1 to 2 coats of finishing paint according to the systems described above.

### **3.9 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
- .3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
  - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.
- .4 Place paint and primer defined as hazardous or toxic waste, including tubes and containers, in containers or areas designated for hazardous waste.

**END OF SECTION**

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**Part 1            General**

**1.1            ACTION AND INFORMATIONAL SUBMITTALS**

- .1      Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2      Product Data:
  - .1          Submit manufacturer's instructions, printed product literature and data and include product characteristics, performance criteria, physical size, finish and limitations.
- .3      Shop Drawings:
  - .1          Indicate on drawings:
    - .1              Mounting arrangements.
    - .2              Operating and maintenance clearances.

**1.2            CLOSEOUT SUBMITTALS**

- .1      Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2      Operation and Maintenance Data: submit operation and maintenance data for incorporation into manual.
  - .1          Operation and maintenance manual approved by, and final copies deposited with, Departmental Representative before final inspection.
  - .2          Maintenance data to include:
    - .1              Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.
    - .2              Data to include schedules of tasks, frequency, tools required and task time.
  - .3          Performance data to include:
    - .1              Equipment manufacturer's performance datasheets with point of operation as left after commissioning is complete.
    - .2              Equipment performance verification test results.
    - .3              Special performance data as specified.
  - .4          Approvals:
    - .1              Submit 2 copies of draft Operation and Maintenance Manual to Departmental Representative for approval. Submission of individual data will not be accepted unless directed by Departmental Representative.
  - .5          Additional data:
    - .1              Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.
  - .6          Site records:
    - .1              Departmental Representative will provide 1 set of reproducible mechanical drawings. Provide sets of prints as required for each phase of work. Mark changes as work progresses and as changes occur. Include changes to existing mechanical systems, control systems and low voltage control wiring.
    - .2              Transfer information to reproducibles, revising reproducibles to show work as actually installed.

- 
- .3 Use different colour waterproof ink for each service.
  - .4 Make available for reference purposes and inspection.
  - .7 As-Built drawings:
    - .1 Prior to start of Testing, Adjusting and Balancing for HVAC, finalize production of as-built drawings.
    - .2 Identify each drawing in lower right hand corner in letters at least 12 mm high as follows: "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (Date).
    - .3 Submit to Departmental Representative for approval and make corrections as directed.
    - .4 Perform testing, adjusting and balancing for HVAC using as-built drawings.
    - .5 Submit completed reproducible as-built drawings with Operating and Maintenance Manuals.
  - .8 Submit copies of as-built drawings for inclusion in final TAB report.

### **1.3 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Replace defective or damaged materials with new.

## **Part 2 Products**

### **2.1 NOT USED**

## **Part 3 Execution**

### **3.1 EXAMINATION**

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Departmental Representative.
  - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

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**3.2 PAINTING REPAIRS AND RESTORATION**

- .1 Do painting in accordance with Section.
- .2 Restore to new condition, finishes which have been damaged.

**3.3 SYSTEM CLEANING**

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

**3.4 FIELD QUALITY CONTROL**

- .1 Site Tests: conduct following tests in accordance with Section 01 45 00 - Quality Control and submit report as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.
- .2 Manufacturer's Field Services:
  - .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.
  - .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

**3.5 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

**3.6 PROTECTION**

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

**END OF SECTION**





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**Part 1            General**

**1.1            REFERENCE STANDARDS**

- .1    National Fire Prevention Association (NFPA)
  - .1       NFPA 13, Standard for the Installation of Sprinkler Systems.
  - .2       NFPA 25, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems.
- .2    Underwriter's Laboratories of Canada (ULC)
  - .1       CAN4 S543, Standard for Internal Lug Quick Connect Couplings for Fire Hose.

**Part 2            Products**

**2.1            ABOVE GROUND PIPING SYSTEMS**

- .1    Provide fittings for changes in direction of piping and for connections.
  - .1       Make changes in piping sizes through tapered reducing pipe fittings, bushings will not be permitted.

**2.2            PIPE, FITTINGS AND VALVES**

- .1    Pipe:
  - .1       Ferrous: to NFPA 13.
  - .2       Copper tube: to NFPA 13.
- .2    Fittings and joints to NFPA 13:
  - .1       Ferrous: screwed, welded, flanged or roll grooved.
    - .1           Grooved joints designed with two ductile iron housing segments, pressure responsive gasket, and zinc-electroplated steel bolts and nuts. Cast with offsetting angle-pattern bolt pads for rigidity and visual pad-to-pad offset contact.
  - .2       Copper tube: screwed, soldered, brazed, grooved.
  - .3       Provide threaded fittings into which sprinkler heads, sprinkler head riser nipples, or drop nipples are threaded.
  - .4       Fittings: ULC approved for use in wet pipe sprinkler systems.
  - .5       Side outlet tees using rubber gasketed fittings are not permitted.
  - .6       Sprinkler pipe and fittings: metal.
- .3    Pipe hangers:
  - .1       ULC listed for fire protection services in accordance with NFPA.

**2.3            SPRINKLER HEADS**

- .1    General: to NFPA 13 and ULC listed for fire services.
- .2    Sprinkler Head Type:
- .3    Provide nominal 1.2 cm orifice sprinkler heads.

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**2.4 ESCUTCHEON PLATES**

- .1 Provide polished stainless steel plates in finished spaces.

**Part 3 Execution**

**3.1 MANUFACTURER'S INSTRUCTIONS**

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

**3.2 INSTALLATION**

- .1 Install, inspect and test to acceptance in accordance with NFPA 13 and NFPA 25.
- .2 A relocated sprinkler head is a new head.

**3.3 PIPE INSTALLATION**

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

**END OF SECTION**

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**Part 1            General**

**1.1            ACTION AND INFORMATIONAL SUBMITTALS**

- .1    Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2    Product Data:
  - .1    Submit manufacturer's instructions, printed product literature and data sheets include product characteristics, performance criteria, physical size, finish and limitations.
- .3    Shop Drawings:
  - .1    Indicate on drawings:
    - .1    Mounting arrangements.
    - .2    Operating and maintenance clearances.
  - .2    Shop drawings and product data accompanied by:
    - .1    Detailed drawings of bases, supports, and anchor bolts.
    - .2    Acoustical sound power data, where applicable.
    - .3    Points of operation on performance curves.
    - .4    Manufacturer to certify current model production.
    - .5    Certification of compliance to applicable codes.

**1.2            CLOSEOUT SUBMITTALS**

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

- .1 Submit 2 copies of draft Operation and Maintenance Manual to Departmental Representative for approval. Submission of individual data will not be accepted unless directed Departmental Representative.
- .6 Additional data:
  - .1 Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.
- .7 Site records:
  - .1 Departmental Representative will provide 1 set of reproducible mechanical drawings. Provide sets of prints as required for each phase of work. Mark changes as work progresses and as changes occur.
  - .2 Transfer information to reproducible, revising reproducible to show work as actually installed.
  - .3 Use different colours waterproof ink for each service.
  - .4 Make available for reference purposes and inspection.
- .8 As-built drawings:
  - .1 Prior to start of Testing, Adjusting and Balancing for HVAC, finalize production of as-built drawings.
  - .2 Identify each drawing in lower right hand corner in letters at least 12 mm high as follows: - "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (Date).
  - .3 Submit to Departmental Representative for approval and make corrections as directed.
  - .4 Perform testing, adjusting and balancing for HVAC using as-built drawings.
  - .5 Submit completed reproducible as-built drawings with Operating and Maintenance Manuals.
- .9 Submit copies of as-built drawings for inclusion in final TAB report.

### **1.3 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Replace defective or damaged materials with new.

## **Part 2 Products**

### **2.1 NOT USED**

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**Part 3                      Execution**

**3.1                      EXAMINATION**

- .1      Verification of Conditions: verify that conditions of the substrate previously installed under other Sections or Contracts are acceptable for installation in accordance with manufacturer's written instructions.
  - .1          Visually inspect substrate in presence of Departmental Representative.
  - .2          Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  - .3          Proceed with installation only after unacceptable conditions have been remedied [and after receipt of written approval to proceed Departmental Representative.

**3.2                      PAINTING REPAIRS AND RESTORATION**

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

**3.3                      SYSTEM CLEANING**

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

**3.4                      FIELD QUALITY CONTROL**

- .1      Site Tests: conduct following tests in accordance with Section 01 45 00 - Quality Control and submit report as described in PART 1 -ACTION AND INFORMATIONAL SUBMITTALS.
- .2      Manufacturer's Field Services:
  - .1          Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.
  - .2          Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

**3.5                      CLEANING**

- .1      Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1          Leave Work area clean at end of each day.
- .2      Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

**3.6                      PROTECTION**

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

**END OF SECTION**



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**Part 1            General**

**1.1            REFERENCE STANDARDS**

- .1 American Society of Mechanical Engineers International (ASME)
  - .1 ANSI/ASME B16.15, Cast Cooper Alloy Threaded Fittings, Classes 125 and 250.
  - .2 ANSI/ASME B16.18, Cast Copper Alloy Solder Joint Pressure Fittings.
  - .3 ANSI/ASME B16.22, Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
  - .4 ASME B16.26, Cast Copper Alloy Fittings for Flared Copper Tubes.
- .2 ASTM International
  - .1 ASTM B42, Seamless Copper Tube, Standard Sizes.
  - .2 ASTM B88M, Standard Specification for Seamless Copper Water Tube (Metric).
- .3 Underwriters Laboratories of Canada (ULC)
  - .1 CAN/ULC S101, Fire Endurance Tests of Buildings Construction and Materials.
  - .2 CAN/ULC S102.2, Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings and Miscellaneous Materials and Assemblies.
  - .3 CAN/ULC S115, Standard Method of Fire Tests of Firestop.
- .4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .5 Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS).
  - .1 MSS-SP-67, Butterfly Valves.
- .6 National Research Council (NRC)
  - .1 National Plumbing Code of Canada (NPC) 2015.

**Part 2            Products**

**2.1            PIPING**

- .1 Domestic hot, cold and recirculation systems, within building.
  - .1 Above ground:
    - .1 Copper tube, hard drawn, type L: to ASTM B88M.

**2.2            FITTINGS**

- .1 Bronze pipe flanges and flanged fittings, Class 150: to ANSI/ASME B16.24.
- .2 Cast bronze threaded fittings, Class 125: to ANSI/ASME B16.15.
- .3 Cast copper, solder type: to ANSI/ASME B16.18.
- .4 Wrought copper and copper alloy, solder type: to ANSI/ASME B16.22.
- .5 NPS 2 and larger:
  - .1 ANSI/ASME B16.18 or ANSI/ASME B16.22 roll grooved to CSA B242.
  - .2 PEX fittings to CSA B137.5 and F1960.

- .6 NPS 1 ½ and smaller:
  - .1 Cast copper to ANSI/ASME B16.18; with 301 stainless steel internal components and EPDM seals. Suitable for operating pressure to 1380 kPa.

## **2.3 JOINTS**

- .1 Rubber gaskets, 1.6 mm thick: to AWWA C111.
- .2 Bolts, nuts, hex head and washers: to ASTM A307, heavy series.
- .3 Solder: 95/5.
- .4 Teflon tape: for threaded joints.
- .5 Dielectric connections between dissimilar metals: dielectric fitting, complete with thermoplastic liner.

## **2.4 BALL VALVES**

- .1 NPS 2 and under, screwed:
  - .1 Class 150.
  - .2 Bronze body, stainless steel ball, PTFE adjustable packing, brass gland and Bunan seat, steel lever handle as specified Section.

# **Part 3 Execution**

## **3.1 APPLICATION**

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

## **3.2 INSTALLATION**

- .1 Install in accordance with NPC.
- .2 Install pipe work in accordance with Section 23 05 05 - Installation of Pipework, supplemented as specified herein.
- .3 Assemble piping using fittings manufactured to ANSI and Standard Council of Canada (SCC) standards.
- .4 Connect to fixtures and equipment in accordance with manufacturer's written instructions unless otherwise indicated.

## **3.3 PRESSURE TESTS**

- .1 Test pressure: greater of 1 times maximum system operating pressure or 860 kPa.

## **3.4 START-UP**

- .1 Timing: start up after:
  - .1 Pressure tests have been completed.
- .2 Provide continuous supervision during start-up.



- .3 Start-up procedures:
  - .1 Establish circulation and ensure that air is eliminated.
- .4 Rectify start-up deficiencies.

**END OF SECTION**



**Part 1 General**

**1.1 REFERENCE STANDARDS**

- .1 ASTM International Inc.
  - .1 ASTM B32, Standard Specification for Solder Metal.
  - .2 ASTM B306, Standard Specification for Copper Drainage Tube (DWV).
  - .3 ASTM C564, Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
- .2 Canadian Standards Association (CSA International).
  - .1 CSA B67, Lead Service Pipe, Waste Pipe, Traps, Bends and Accessories.
  - .2 CAN/CSA-B70, Cast Iron Soil Pipe, Fittings and Means of Joining.
  - .3 CAN/CSA-B125.3, Plumbing Fittings.
- .3 National Research Council Canada (NRC)
  - .1 National Plumbing Code of Canada 2015 (NPC).

**Part 2 Products**

**2.1 CAST IRON PIPING AND FITTINGS**

- .1 Above ground storm: to CAN/CSA-B70.
  - .1 Joints:
    - .1 Hub and spigot:
      - .1 Caulking lead: to CSA B67.
    - .2 Mechanical joints:
      - .1 Neoprene or butyl rubber compression gaskets with stainless steel clamps.

**Part 3 Execution**

**3.1 APPLICATION**

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

**3.2 INSTALLATION**

- .1 In accordance with Section 23 05 05 - Installation of Pipework.
- .2 Install in accordance with National Plumbing Code.

**3.3 TESTING**

- .1 Hydraulically test to verify grades and freedom from obstructions.

**3.4 PERFORMANCE VERIFICATION**

- .1 Cleanouts:
  - .1 Ensure accessible and that access doors are correctly located.
  - .2 Open, cover with linseed oil and re-seal.
  - .3 Verify that cleanout rods can probe as far as the next cleanout, at least.
- .2 Storm water drainage:
  - .1 Verify domes are secure.
  - .2 Ensure weirs are correctly sized and installed correctly.
  - .3 Verify provisions for movement of roof system.
- .3 Affix applicable label c/w directional arrows every floor or 4.5 m (whichever is less).

**END OF SECTION**

**Part 1 General**

**1.1 REFERENCE STANDARDS**

- .1 ASTM International
  - .1 ASTM A126, Standard Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings.
  - .2 ASTM B62, Standard Specification for Composition Bronze or Ounce Metal Castings.
- .2 CSA International
  - .1 CSA B79, Commercial and Residential Drains and Cleanouts.
- .3 National Research Council Canada (NRC)
  - .1 National Plumbing Code of Canada 2015 (NPC).

**Part 2 Products**

**2.1 ROOF DRAINS**

- .1 See architecture

**2.2 CLEANOUTS**

- .1 Cleanout Plugs: heavy cast iron male ferrule with brass screws and threaded brass or bronze plug. Sealing-caulked lead seat or neoprene gasket.

**2.3 Frost proof outlets, wall mounted**

- .1 Wall type, recessed box, chrome finish with vacuum breaker, outlet for flexible hose, operation key. NPS 20 mm.

**2.4 WATER HAMMER ARRESTORS**

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

**Part 3 Execution**

**3.1 MANUFACTURER'S INSTRUCTIONS**

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

**3.2 INSTALLATION**

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

**3.3 CLEANOUTS**

- .1 Install cleanouts at base of soil and waste stacks, and rainwater leaders, at locations required code, and as indicated.
- .2 Bring cleanouts to wall or finished floor unless serviceable from below floor.
- .3 Building drain cleanout and stack base cleanouts: line size to maximum NPS 4.

**3.4 NON-FREEZE WALL HYDRANTS**

- .1 Install 600 mm above finished grade.

**3.5 WATER HAMMER ARRESTORS**

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

**3.6 TESTING AND ADJUSTING**

- .1 General:
- .2 Cleanouts:
  - .1 Verify covers are gas-tight, secure, yet readily removable.
- .3 Wall, ground hydrants:
  - .1 Verify complete drainage, freeze protection.
  - .2 Verify operation of vacuum breakers.

**3.7 PROTECTION**

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

**END OF SECTION**

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**Part 1            General**

**1.1            MAINTENANCE MATERIAL SUBMITTALS**

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

**Part 2            Products**

**2.1            Not Used**

**Part 3            Execution**

**3.1            EXAMINATION**

- .1        Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for installation in accordance with manufacturer's written instructions.
  - .1        Visually inspect substrate in presence of Departmental Representative.
  - .2        Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  - .3        Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed Departmental Representative.

**3.2            PAINTING REPAIRS AND RESTORATION**

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

**3.3            FIELD QUALITY CONTROL**

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

**3.4            DEMONSTRATION**

- .1        Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.
- .2        Use operation and maintenance manual, as-built drawings, and audio visual aids as part of instruction materials.

- .3 Instruction duration time requirements as specified in appropriate sections.

### **3.5 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave Work area clean at end of each day.

### **3.6 PROTECTION**

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

**END OF SECTION**



**Part 1 General**

**1.1 SUMMARY**

- .1 This Section includes requirements for selective demolition and related mechanical components and incidentals required to complete work described in this Section.

**1.2 DEFINITIONS**

- .1 Demolish: Detach items from existing construction and legally dispose of items off site, unless indicated as removed and salvaged, or removed and reinstalled.
- .2 Remove: Planned deconstruction and disassembly of electrical items from existing construction including removal of conduit, junction boxes, cabling and wiring from electrical component to panel taking care not to damage adjacent assemblies designated to remain; legally dispose of items off site, unless indicated as removed and salvaged, or removed and reinstalled.
- .3 Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.
- .4 Existing to Remain: Existing items of construction that are not removed and that are not otherwise indicated as being removed and salvaged, or removed and reinstalled.

**1.3 ADMINISTRATIVE REQUIREMENTS**

- .1 Coordination: Coordinate work of this Section to avoid interference with work by other Sections.

**1.4 SITE CONDITIONS**

- .1 Existing Conditions: Condition of materials identified as being salvaged or demolished are based on their observed condition at the beginning of the construction.

**Part 2 Products**

**2.1 NOT USED**

**Part 3 Execution**

**3.1 EXAMINATION**

- .1 Verification of Existing Conditions: Visit site, thoroughly examine and become familiar with conditions that may affect the work of this Section.

**3.2 PREPARATION**

- .1 Protection of Existing Systems to Remain: Protect systems and components indicated to remain in place during selective demolition operations and as follows:

**END OF SECTION**



**Part 1            General**

**1.1            REFERENCE STANDARDS**

- .1 American Society of Mechanical Engineers (ASME)
  - .1 ASME B31.1, Power Piping.
- .2 ASTM International
  - .1 ASTM A125, Standard Specification for Steel Springs, Helical, Heat-Treated.
  - .2 ASTM A307-07b, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
  - .3 ASTM A563-07a, Standard Specification for Carbon and Alloy Steel Nuts.
- .3 Factory Mutual (FM)
- .4 Manufacturer's Standardization Society of the Valves and Fittings Industry (MSS)
  - .1 MSS SP58, Pipe Hangers and Supports - Materials, Design and Manufacture.
  - .2 MSS SP69, Pipe Hangers and Supports - Selection and Application.
  - .3 MSS SP89, Pipe Hangers and Supports - Fabrication and Installation Practices.
- .5 National Research Council Canada (NRC)
  - .1 National Plumbing Code of Canada 2015 (NPC).
- .6 Underwriter's Laboratories of Canada (ULC)

**Part 2            Products**

**2.1            SYSTEM DESCRIPTION**

- .1 Design Requirements:
  - .1 Construct pipe hanger and support to manufacturer's recommendations utilizing manufacturer's regular production components, parts and assemblies.
  - .2 Base maximum load ratings on allowable stresses prescribed by ASME B31.1 or MSS SP58.
  - .3 Ensure that supports, guides, anchors do not transmit excessive quantities of heat to building structure.
  - .4 Design hangers and supports to support systems under conditions of operation, allow free expansion and contraction, prevent excessive stresses from being introduced into pipework or connected equipment.
  - .5 Provide for vertical adjustments after erection and during commissioning. Amount of adjustment in accordance with MSS SP58.
- .2 Performance Requirements:
  - .1 Design supports, platforms, catwalks, hangers to withstand seismic events.

**2.2            GENERAL**

- .1 Fabricate hangers, supports and sway braces in accordance with MSS SP58. ANSI B31.1 and
- .2 Use components for intended design purpose only. Do not use for rigging or erection purposes.

## **2.3 PIPE HANGERS**

- .1 Finishes:
  - .1 Pipe hangers and supports: painted with zinc-rich paint after manufacture.
  - .2 Use hot dipped galvanizing process.
- .2 Upper attachment structural: suspension from lower flange of I-Beam:
  - .1 Cold piping NPS 2 maximum: malleable iron C-clamp with hardened steel cup point setscrew, locknut carbon steel retaining clip.
    - .1 Rod: 9 mm UL listed.
  - .2 Cold piping NPS 2 1/2 or greater, hot piping: malleable iron beam clamp, eye rod, jaws and extension with carbon steel retaining clip, tie rod, nuts and washers, UL listed.
- .3 Upper attachment structural: suspension from upper flange of I-Beam:
  - .1 Cold piping NPS 2 maximum: ductile iron top-of-beam C-clamp with hardened steel cup point setscrew, locknut and carbon steel retaining clip, UL listed.
  - .2 Cold piping NPS 2 1/2 or greater, hot piping: malleable iron top-of-beam jaw-clamp with hooked rod, spring washer, plain washer and nut UL listed.
- .4 Upper attachment to concrete:
  - .1 Ceiling: carbon steel welded eye rod, clevis plate, clevis pin and cotters with weldless forged steel eye nut. Ensure eye 6 mm minimum greater than rod diameter.
  - .2 Concrete inserts: wedge shaped body with knockout protector plate UL listed to MSS SP69.
- .5 Hanger rods: threaded rod material to MSS SP58:
  - .1 Ensure that hanger rods are subject to tensile loading only.
  - .2 Provide linkages where lateral or axial movement of pipework is anticipated.
  - .3 Do not use 22 mm or 28 mm rod.
- .6 Pipe attachments: material to MSS SP58:
  - .1 Attachments for steel piping: carbon steel galvanized.
  - .2 Attachments for copper piping: copper plated black steel.
  - .3 Use insulation shields for hot pipework.
  - .4 Oversize pipe hangers and supports.
- .7 U-bolts: carbon steel to MSS SP69 with 2 nuts at each end to ASTM A563.

## **2.4 EQUIPMENT ANCHOR BOLTS AND TEMPLATES**

- .1 Provide templates to ensure accurate location of anchor bolts.

## **Part 3 Execution**

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

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

### **3.2 INSTALLATION**

- .1 Install in accordance with:
  - .1 Manufacturer's instructions and recommendations.

- .2 Vibration Control Devices:
  - .1 Install on piping systems at pumps, boilers, chillers, cooling towers, and as indicated.
- .3 Clevis plates:
  - .1 Attach to concrete with 4 minimum concrete inserts, one at each corner.
- .4 Provide supplementary structural steelwork where structural bearings do not exist or where concrete inserts are not in correct locations.

### 3.3 HANGER SPACING

- .1 Plumbing piping: to National Plumbing Code of Canada (NPC).
- .2 Copper piping: up to NPS 1/2: every 1.5 m.
- .3 Flexible joint roll groove pipe: in accordance with table below for steel, but not less than one hanger at joints. Table listings for straight runs without concentrated loads and where full linear movement is not required.
- .4 Within 300 mm of each elbow.

Maximum Pipe Size: NPS	Maximum Spacing Steel	Maximum Spacing Copper
up to 1-1/4	2.4 m	1.8 m
1-1/2	3.0 m	2.4 m
2	3.0 m	2.4 m
2-1/2	3.7 m	3.0 m
3	3.7 m	3.0 m
3-1/2	3.7 m	3.3 m
4	3.7 m	3.6 m
5	4.3 m	
6	4.3 m	
8	4.3 m	
10	4.9 m	
12	4.9 m	

### 3.4 HANGER INSTALLATION

- .1 Install hanger so that rod is vertical under operating conditions.
- .2 Adjust hangers to equalize load.
- .3 Support from structural members. Where structural bearing does not exist or inserts are not in suitable locations, provide supplementary structural steel members.

### 3.5 HORIZONTAL MOVEMENT

- .1 Angularity of rod hanger resulting from horizontal movement of pipework from cold to hot position not to exceed 4 degrees from vertical.
- .2 Where horizontal pipe movement is less than 13 mm, offset pipe hanger and support so that rod hanger is vertical in the hot position.

### 3.6 FINAL ADJUSTMENT

- .1 Adjust hangers and supports:
  - .1 Ensure that rod is vertical under operating conditions.
  - .2 Equalize loads.

- .2 Adjustable clevis:
  - .1 Tighten hanger load nut securely to ensure proper hanger performance.
  - .2 Tighten upper nut after adjustment.
- .3 C-clamps:
  - .1 Follow manufacturer's recommended written instructions and torque values when tightening C-clamps to bottom flange of beam.
- .4 Beam clamps:
  - .1 Hammer jaw firmly against underside of beam.

**END OF SECTION**

## **Part 1 General**

### **1.1 SUMMARY**

- .1 Section Includes:
  - .1 Vibration isolation materials and components, seismic control measures and their installation.

### **1.2 REFERENCE STANDARDS**

- .1 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .2 National Research Council Canada (NRC)
  - .1 National Building Code of Canada 2015 (NBC).

## **Part 2 Products**

### **2.1 GENERAL**

- .1 Size and shape of bases type and performance of vibration isolation as indicated.

### **2.2 SEISMIC CONTROL MEASURES**

- .1 General:
  - .1 Seismic control systems to work in every direction.
  - .2 Fasteners and attachment points to resist same maximum load as seismic restraint.
  - .3 Drilled or power driven anchors and fasteners not permitted.
  - .4 No equipment, equipment supports or mounts to fail before failure of structure.
  - .5 Supports of cast iron or threaded pipe not permitted.
  - .6 Seismic control measures not to interfere with integrity of firestopping.
- .2 Static equipment:
  - .1 Anchor equipment to equipment supports. Anchor equipment supports to structure.
  - .2 Suspended equipment:
    - .1 Use one or more of following methods depending upon site conditions:
      - .1 Install tight to structure.
      - .2 Cross brace in every direction.
      - .3 Brace back to structure.
      - .4 Cable restraint system.
  - .3 Seismic restraints:
    - .1 Cushioning action gentle and steady.
    - .2 Never reach metal-like stiffness.
- .3 Vibration isolated equipment:
  - .1 Seismic control measures not to jeopardize noise and vibration isolation systems. Provide 6 to 9 mm clearance during normal operation of equipment and systems between seismic restraint and equipment.
  - .2 Incorporate seismic restraints into vibration isolation system to resist complete isolator unloading.

- .3 As indicated.
- .4 Piping systems:
  - .1 Piping systems: hangers longer than 300 mm; brace at each hanger.
  - .2 Compatible with requirements for anchoring and guiding of piping systems.
- .5 Bracing methods:
  - .1 Approved by Departmental Representative.
  - .2 Structural angles or channels.
  - .3 Cable restraint system incorporating grommets, shackles and other hardware to ensure alignment of restraints and to avoid bending of cables at connection points. Incorporate neoprene into cable connections to reduce shock loads.

### **Part 3 Execution**

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

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

#### **3.2 INSTALLATION**

- .1 Seismic control measures to meet requirements of NBC.
- .2 Install vibration isolation equipment in accordance with manufacturers instructions and adjust mountings to level equipment.
- .3 Ensure piping, ducting and electrical connections to isolated equipment do not reduce system flexibility and that piping, conduit and ducting passage through walls and floors do not transmit vibrations.
- .4 Unless indicated otherwise, support piping connected to isolated equipment with spring mounts or spring hangers with 25 mm minimum static deflection.
- .5 Where isolation is bolted to floor use vibration isolation rubber washers.
- .6 Block and shim level bases so that ductwork and piping connections can be made to rigid system at operating level, before isolator adjustment is made. Ensure that there is no physical contact between isolated equipment and building structure.

**END OF SECTION**



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**Part 1            General**

**1.1            SUMMARY**

- .1    Section Includes:
  - .1        Materials and requirements for the identification of piping systems, duct work, valves and controllers, including the installation and location of identification systems.

**1.2            REFERENCE STANDARDS**

- .1    Canadian General Standards Board (CGSB)
  - .1        CAN/CGSB-24.3, Identification of Piping Systems.
- .2    National Fire Protection Association (NFPA)
  - .1        NFPA 13-2002, Standard for the Installation of Sprinkler Systems.

**Part 2           Products**

**2.1            EXISTING IDENTIFICATION SYSTEMS**

- .1    Apply existing identification system to new work.
- .2    Where existing identification system does not cover for new work, use identification system specified this section.
- .3    Before starting work, obtain written approval of identification system from Departmental Representative.

**2.2            PIPING SYSTEMS GOVERNED BY CODES**

- .1    Identification:
  - .1        Sprinklers: to NFPA 13.

**2.3            IDENTIFICATION OF PIPING SYSTEMS**

- .1    Identify contents by background colour marking, pictogram (as necessary), legend; direction of flow by arrows. To CAN/CGSB 24.3 except where specified otherwise.
- .2    Legend:
  - .1        Block capitals to sizes and colours listed in CAN/CGSB 24.3.
- .3    Arrows showing direction of flow:
  - .1        Outside diameter of pipe or insulation less than 75 mm: 100 mm long x 50 mm high.
  - .2        Outside diameter of pipe or insulation 75 mm and greater: 150 mm long x 50 mm high.
- .4    Extent of background colour marking:
  - .1        To full circumference of pipe or insulation.
  - .2        Length to accommodate pictogram, full length of legend and arrows.
- .5    Materials for background colour marking, legend, arrows:
  - .1        Pipes and tubing 20 mm and smaller: waterproof and heat-resistant pressure sensitive plastic marker tags.

- .2 Other pipes: pressure sensitive plastic-coated cloth and vinyl with protective overcoating, waterproof contact adhesive undercoating, suitable for ambient of 100% RH and continuous operating temperature of 150 degrees C and intermittent temperature of 200 degrees C.

.6 Colours and Legends:

- .1 Where not listed, obtain direction from Departmental Representative.

- .2 Colours for legends, arrows: to following table:

Background colour:	Legend, arrows:
Yellow	BLACK
Green	WHITE
Red	WHITE

- .3 Background colour marking and legends for piping systems:

Contents	Background colour marking	Legend
Domestic cold water supply	Green	DOM. CWS
Storm water	Green	STORM
Fire protection water	Red	FIRE PROT. WTR

## 2.4 IDENTIFICATION DUCTWORK SYSTEMS

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

## 2.5 LANGUAGE

- .1 Identification in English and French.

## Part 3 Execution

### 3.1 MANUFACTURER'S INSTRUCTIONS

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

### 3.2 LOCATION OF IDENTIFICATION ON PIPING AND DUCTWORK SYSTEMS

- .1 On long straight runs in open areas in boiler rooms, equipment rooms, galleries, tunnels: at not more than 17 m intervals and more frequently if required to ensure that at least one is visible from any one viewpoint in operating areas and walking aisles.  
 .2 Adjacent to each change in direction.  
 .3 At least once in each small room through which piping or ductwork passes.  
 .4 On both sides of visual obstruction or where run is difficult to follow.  
 .5 On both sides of separations such as walls, floors, partitions.  
 .6 Where system is installed in pipe chases, ceiling spaces, galleries, confined spaces, at entry and exit points, and at access openings.  
 .7 At beginning and end points of each run and at each piece of equipment in run.  
 .8 At point immediately upstream of major manually operated or automatically controlled valves, and dampers. Where this is not possible, place identification as close as possible, preferably on upstream side.

**3.3            CLEANING**

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

**END OF SECTION**



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**Part 1            General**

**1.1            SUMMARY**

- .1    Section Includes:
  - .1       Thermal insulation for piping and piping accessories in commercial type applications.

**1.2            REFERENCE STANDARDS**

- .1    American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)
  - .1       ASHRAE Standard 90.1, Energy Standard for Buildings Except Low-Rise Residential Buildings (IESNA co-sponsored; ANSI approved; Continuous Maintenance Standard).
- .2    American Society for Testing and Materials International (ASTM)
  - .1       ASTM B209M, Standard Specification for Aluminum and Aluminum Alloy Sheet and Plate.
  - .2       ASTM C335, Standard Test Method for Steady State Heat Transfer Properties of Horizontal Pipe Insulation.
  - .3       ASTM C411, Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.
  - .4       ASTM C449/C449M, Standard Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement.
  - .5       ASTM C533, Calcium Silicate Block and Pipe Thermal Insulation.
  - .6       ASTM C547, Mineral Fiber Pipe Insulation.
  - .7       ASTM C795, Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.
  - .8       ASTM C921, Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.
- .3    Canadian General Standards Board (CGSB)
  - .1       CGSB 51-GP-52Ma, Vapour Barrier, Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.
  - .2       CAN/CGSB-51.53, Poly (Vinyl Chloride) Jacketting Sheet, for Insulated Pipes, Vessels and Round Ducts
- .4    Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1       Material Safety Data Sheets (MSDS).
- .5    Manufacturer's Trade Associations
  - .1       Thermal Insulation Association of Canada (TIAC): National Insulation Standards (Revised 2004).
- .6    Underwriters' Laboratories of Canada (ULC)
  - .1       CAN/ULC-S102, Surface Burning Characteristics of Building Materials and Assemblies.
  - .2       CAN/ULC-S701, Thermal Insulation, Polystyrene, Boards and Pipe Covering.
  - .3       CAN/ULC-S702, Thermal Insulation, Mineral Fibre, for Buildings
  - .4       CAN/ULC-S702.2, Thermal Insulation, Mineral Fibre, for Buildings, Part 2: Application Guidelines.

### 1.3 DEFINITIONS

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

## Part 2 Products

### 2.1 FIRE AND SMOKE RATING

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

### 2.2 INSULATION

- .1 Mineral fibre specified includes glass fibre, rock wool, slag wool.
- .2 Thermal conductivity ("k" factor) not to exceed specified values at 24 degrees C mean temperature when tested in accordance with ASTM C335.
- .3 TIAC Code A-3: rigid moulded mineral fibre with factory applied vapour retarder jacket.
  - .1 Mineral fibre: to CAN/ULC-S702 or ASTM C547.
  - .2 Jacket: to CGSB 51-GP-52Ma.
  - .3 Maximum "k" factor: to CAN/ULC-S702 or ASTM C547.
- .4 TIAC Code C-2: mineral fibre blanket faced with factory applied vapour retarder jacket (as scheduled in PART 3 of this section).
  - .1 Mineral fibre: to CAN/ULC-S702 or ASTM C547.
  - .2 Jacket: to CGSB 51-GP-52Ma.
  - .3 Maximum "k" factor: to ASTM C547 or CAN/ULC-S702.

### 2.3 INSULATION SECUREMENT

- .1 Tape: self-adhesive, aluminum, reinforced, 50 mm wide minimum.
- .2 Contact adhesive: quick setting.
- .3 Canvas adhesive: washable.
- .4 Tie wire: 1.5 mm diameter stainless steel.
- .5 Bands: stainless steel, 19 mm wide, 0.5 mm thick.

### 2.4 VAPOUR RETARDER LAP ADHESIVE

- .1 Water based, fire retardant type, compatible with insulation.

### 2.5 INDOOR VAPOUR RETARDER FINISH

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

## **2.6 JACKETS**

- .1 Polyvinyl Chloride (PVC):
  - .1 One-piece moulded type and sheet to CAN/CGSB-51.53 with pre-formed shapes as required.
  - .2 Minimum service temperatures: -20 degrees C.
  - .3 Maximum service temperature: 65 degrees C.
  - .4 Moisture vapour transmission: 0.02 perm.
  - .5 Fastenings:
    - .1 Use solvent weld adhesive compatible with insulation to seal laps and joints.
    - .2 Tacks.
    - .3 Pressure sensitive vinyl tape of matching colour.

## **Part 3 Execution**

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

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

### **3.2 PRE-INSTALLATION REQUIREMENT**

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

### **3.3 INSTALLATION**

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

### **3.4 PIPING INSULATION SCHEDULES**

- .1 Includes valves, valve bonnets, strainers, flanges and fittings unless otherwise specified.
- .2 TIAC Code: A-3.
  - .1 Securements: Tape.
  - .2 Seals: VR lap seal adhesive, VR lagging adhesive.
  - .3 Installation: TIAC Code: 1501-C.
- .3 TIAC Code: with C-2 vapour retarder jacket.
  - .1 Insulation securements.
  - .2 Seals: lap seal adhesive, lagging adhesive.

.3 Installation: TIAC Code: 1501-C.

.4 Thickness of insulation as listed in following table.

.1 Run-outs to individual units and equipment not exceeding 4000 mm long.

.2 Do not insulate exposed runouts to plumbing fixtures, chrome plated piping, valves, fittings.

Application	Temp degrees C	TIAC code	Pipe sizes (NPS) and insulation thickness (mm)					
Run out	to 1	1 1/4 to 2	2 1/2 to 4	5 to 6	8 & over			
Domestic CWS	A-3	25	25	25	25	25	25	
Domestic CWS with vapour retarder	C-2	25	25	25	25	25	25	
Rain pipe	C-2	25	25	25	25	25	25	

.5 Finishes:

.1 PVC jacket.

**END OF SECTION**



**Part 1 General**

**1.1 REFERENCE STANDARDS**

- .1 American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)
- .2 ASTM International
  - .1 ASTM A480/A480M, Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet and Strip.
  - .2 ASTM A635/A635M, Standard Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Hot-Rolled, Alloy, Carbon, Structural, High-Strength Low-Alloy, and High-Strength Low-Alloy with Improved Formability, General Requirements for.
  - .3 ASTM A653/A653M, Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
- .3 Green Seal Environmental Standards (GS)
  - .1 GS-36, Standard for Adhesives for Commercial Use.
- .4 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)
  - .1 SMACNA HVAC Duct Construction Standards - Metal and Flexible.
  - .2 SMACNA HVAC Air Duct Leakage Test Manual.
  - .3 IAQ Guideline for Occupied Buildings Under Construction.
- .5 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
  - .1 SCAQMD Rule 1168, Adhesives and Sealants Applications.

**Part 2 Products**

**2.1 SEAL CLASSIFICATION**

- .1 Classification as follows:

Maximum Pressure Pa	SMACNA Seal Class
500	B

- .2 Seal classification:
  - .1 Class B: longitudinal seams, transverse joints and connections made airtight with sealant.

**2.2 SEALANT**

- .1 Sustainability Characteristics:
  - .1 Adhesives and sealants: in accordance with Section 07 92 00- Joint Sealants.
- .2 Sealant: oil resistant, water borne, polymer type flame resistant duct sealant. Temperature range of minus 30 degrees C to plus 93 degrees C.

**2.3 DUCT LEAKAGE**

- .1 In accordance with SMACNA HVAC Air Duct Leakage Test Manual.

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**2.4 FITTINGS**

- .1 Fabrication: to SMACNA.

**2.5 GALVANIZED STEEL**

- .1 Lock forming quality: to ASTM A653/A653M, Z90 zinc coating.
- .2 Thickness, fabrication and reinforcement: to SMACNA.
- .3 Joints: to SMACNA and ASHRAE.

**Part 3 Execution**

**3.1 EXAMINATION**

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for metal duct installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Departmental Representative.
  - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

**3.2 GENERAL**

- .1 Do work in accordance with ASHRAE, SMACNA, NFPA 90B and NFPA 90A.
- .2 Support risers in accordance with SMACNA and ASHRAE.
- .3 Install proprietary manufactured flanged duct joints in accordance with [manufacturer's instructions.

**3.3 SEALING AND TAPING**

- .1 Apply sealant in accordance with SMACNA and to manufacturer's recommendations.
- .2 Bed tape in sealant and recoat with minimum of 1 coat of sealant to manufacturers recommendations.

**END OF SECTION**

**Part 1            General**

**1.1            Not Used**

**Part 2            Products**

**2.1            FANS GENERAL**

.1            Existing fans.

**Part 3            Execution**

**3.1            UNINSTALLATION AND INSTALLATION OF FANS**

.1            Uninstall and install fans as indicated, including necessary accessories, including mounting studs in accordance with section 23 05 48 - VIBRATION AND SEISMIC CONTROLS FOR HVAC PIPING AND EQUIPMENT.

.2            Supply and install the required accessories after repositioning the fans.

**END OF SECTION**



**Part 1            General**

**1.1            SYSTEM DESCRIPTION**

- .1        Adapt required services for proper localisation of services or for unit temporarily removed and reinstalled.

**1.2            EXISTING CONDITIONS**

- .1        Using existing conditions, supply required services for proper localisation of services or unit removed temporarily.

**Part 2            Products**

**2.1            INSTALLATION**

- .1        As per existing.

**Part 3            Execution**

**3.1            INSTALLATION**

- .1        Install equipment, components so that manufacturer's and CSA labels are visible and legible after commissioning is complete.

**END OF SECTION**



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**Part 1            General**

**1.1            REFERENCE STANDARDS**

- .1    CSA Group
  - .1    CSA C22.1, Canadian Electrical Code, Part 1 (22nd Edition), Safety Standard for Electrical Installations.
  - .2    CSA C22.2 No. 0-10 (R2015). General requirements - Canadian electrical code, part II
  - .3    CAN3-C235-83 (R2015), Preferred Voltage Levels for AC Systems, 0 to 50,000 V.

**1.2            DEFINITIONS**

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

**1.3            ACTION AND INFORMATIONAL SUBMITTALS**

- .1    Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2    Product Data:
  - .1    Submit manufacturer's instructions, printed product literature and data sheets and include product characteristics, performance criteria, physical size, finish and limitations.
- .3    Shop drawings:
  - .1    Submit drawings stamped and signed by a professional engineer registered or licensed in Province of Quebec, Canada.
  - .2    Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure co-ordinated installation.
  - .3    Indicate of drawings clearances for operation, maintenance, and replacement of operating equipment devices.
  - .4    Submit a number of copies of drawings in electronic format to authority having jurisdiction.
  - .5    If changes are required, notify Departmental Representative of these changes before they are made.
- .4    Certificates:
  - .1    Provide CSA certified material.
  - .2    Submit test results of installed electrical systems and instrumentation.
  - .3    Permits and fees: in accordance with General Conditions of contract.
  - .4    Submit certificate of acceptance from authority having jurisdiction upon completion of Work to Departmental Representative.

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## **1.4 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirement.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with the manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Store materials off ground and in accordance with the manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Replace defective or damaged materials with new.

## **Part 2 Products**

### **2.1 DESIGN REQUIREMENTS**

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

### **2.2 MATERIALS AND EQUIPMENT**

- .1 Provide material in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Material to be CSA certified. Factory assemble control panels and component assemblies.

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

- .1 Verify installation and co-ordination responsibilities related to motors, equipment and controls, as indicated.

### **2.4 WIRING TERMINATIONS**

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

### **2.5 EQUIPMENT IDENTIFICATION**

- .1 Identify electrical equipment with labels as follows:
- .2 Labels: embossed plastic labels with 6 mm high letters unless specified otherwise.
- .3 Wording on labels to be approved by Departmental Representative prior to manufacture.
- .4 Allow for minimum of twenty-five (25) letters per label.
- .5 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.



- .6 Identify equipment with Size 3 labels engraved "ASSET INVENTORY NO. [\_\_\_\_] " as directed by Departmental Representative.
- .7 Disconnects, starters and contactors: indicate equipment being controlled and voltage.
- .8 Terminal cabinets and pull boxes: indicate system and voltage.

## 2.6 WIRING IDENTIFICATION

- .1 Identify wiring with permanent indelible identifying markings, coloured plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.
- .2 Maintain phase sequence and colour coding throughout.
- .3 Colour coding: to CSA C22.1.
- .4 Use colour coded wires in communication cables, matched throughout system.

## 2.7 CONDUIT AND CABLE IDENTIFICATION

- .1 Colour code conduits, boxes and metallic sheathed cables.
- .2 Code with plastic tape or paint at points where conduit or cable enters wall, ceiling, or floor, and at 15 m intervals.
- .3 Colours: 25 mm wide prime colour and 20 mm wide auxiliary colour.

Type	Prime	Auxiliary
up to 250 V	Yellow	
up to 600 V	Yellow	Green
up to 5 kV	Yellow	Blue
up to 15 kV	Yellow	Red
Telephone	Green	
Other Communication Systems	Green	Blue
Fire Alarm	Red	
Emergency Voice	Red	Blue
Other Security Systems	Red	Yellow

## 2.8 FINISHES

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

## Part 3 Execution

### 3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for installation in accordance with the manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Departmental Representative.
  - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed Departmental Representative.

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**3.2 INSTALLATION**

- .1 Do complete installation in accordance with CSA C22.1 except where specified otherwise.
- .2 Do overhead and underground systems in accordance with CAN/CSA-C22.3 No.1 except where specified otherwise.

**3.3 NAMEPLATES AND LABELS**

- .1 Ensure manufacturer's nameplates, CSA labels and identification nameplates are visible and legible after equipment is installed.

**3.4 FIELD QUALITY CONTROL**

- .1 Conduct following tests in accordance with Section 01 45 00 - Quality Control.
  - .1 Circuits originating from branch distribution panels.
  - .2 Motors and associated control equipment including sequenced operation of systems where applicable.
  - .3 Insulation resistance testing:
    - .1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.
    - .2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.
    - .3 Check resistance to ground before energizing.
- .2 Carry out tests in presence of Departmental Representative.
- .3 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of the project.

**3.5 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave Work area clean at the end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
  - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

**END OF SECTION**

**Part 1            General**

**1.1            REFERENCE STANDARDS**

- .1    CSA International
  - .1        CAN/CSA-C22.2 No.18.3-12(R2017) Conduits, tubing and cable fittings.
  - .2        CAN/CSA-C22.2 No.65-13 (R2018), Wire Connectors.
- .2    National Electrical Manufacturers Association (NEMA)

**1.2            PRODUCT DATA**

- .1    Provide product data in accordance with Section 01 33 00 - Submittal Procedures.
- .2    Specifications sheet
  - .1        Submit specifications sheets required with manufacturer instructions and documentation concerning wires and box. Specifications sheets need to include product characteristics, performance criteria, sizes, limits and finish.

**1.3            DELIVERY, STORAGE AND HANDLING**

- .1    Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2    Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with the manufacturer's name and address.
- .3    Storage and Handling Requirements:
  - .1        Store materials off ground and in accordance with the manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2        Replace defective or damaged materials with new.
- .4    Packaging Waste Management: remove for reuse as specified in [Construction Waste Management Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

**Part 2           Products**

**2.1            MATERIALS**

- .1    Pressure type wire connectors to: CAN/CSA-C22.2 No. 65, with current carrying parts of copper sized to fit copper conductors as required.
- .2    Bushing stud connectors, NEMA compliant, to consist of:
  - .1        Connector body and stud clamp for tube conductors copper.
  - .2        Stud clamp bolts.
  - .3        Bolts for copper conductors.
  - .4        Sized for conductors as indicated.
- .3    Clamps or connectors for flexible conduit, as required to: CAN/CSA-C22.2 No.18.3.

**Part 3            Execution**

**3.1            EXAMINATION**

- .1      Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for wire and box connectors installation in accordance with the manufacturer's written instructions.

**3.2            INSTALLATION**

- .1      Remove insulation carefully from ends of conductors [cables] and:
  - .1          Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by manufacturer. Installation shall meet secureness tests in accordance with CAN/CSA-C22.2 No. 65.
  - .2          Install bushing stud connectors in accordance with NEMA.

**3.3            CLEANING**

- .1      Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1          Leave Work area clean at end of each day.
- .2      Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3      Waste Management: separate waste materials for recycling or reuse.
  - .1          Remove recycling containers and bins from site and dispose of materials at appropriate facility.

**END OF SECTION**

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**Part 1            General**

**1.1            REFERENCE STANDARDS**

- .1    Group CSA
  - .1    CAN/CSA C22.1-15, Canadian Electrical Code, Part I (23rd edition)
  - .2    CAN/CSA-C22.2 No 51-14 Armoured cables.
  - .3    CAN/CSA-C22.2 No 75-17-Thermoplastic insulated wires and cables.

**1.2            PRODUCT DATA**

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

**1.3            DELIVERY, STORAGE AND HANDLING**

- .1    Packaging Waste Management: remove for reuse in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

**Part 2           Products**

**2.1           BUILDING WIRES**

- .1    Conductors: stranded for 10 AWG and larger. Minimum size: 12 AWG.
- .2    Copper conductors: size as indicated, with 600 V insulation of cross-linked thermosetting polyethylene material rated RWU90 XLPE, Jacketted.
- .3    Neutral supported cable: 3 phase insulated conductors of Copper and one neutral conductor of Copper steel reinforced, size as indicated. Type: NS90 Insulation: Type NSF-2 flame retardant rated 600 V.

**2.2           ARMOURED CABLES**

- .1    Conductors: insulated, copper, size as indicated.
- .2    Armour: interlocking type fabricated from galvanized steel strip.
- .3    Type: flame retardant ACWU90 with PVC jacket over thermoplastic armour and compliant to applicable Building Code classification for this project wet locations.
- .4    Connectors: anti short connectors.

**Part 3           Execution**

**3.1           FIELD QUALITY CONTROL**

- .1    Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.
- .2    Perform tests using method appropriate to site conditions and to approval of Departmental Representative and local authority having jurisdiction over installation.
- .3    Perform tests before energizing electrical system.

### **3.2 GENERAL CABLE INSTALLATION**

- .1 Lay cable in cable trays in accordance with Section 26 05 29 - Cable Trays for Electrical Systems.
- .2 Terminate cables in accordance with Section 26 05 20 - Wire and Box Connectors - (0-1000 V).
- .3 Cable Colour Coding: to Section 26 05 00 - Common Work Results for Electrical.
- .4 Conductor length for parallel feeders to be identical.
- .5 Lace or clip groups of feeder cables at distribution centres, pull boxes, and termination points.
- .6 Provide numbered wire collars for control wiring. Numbers to correspond to control shop drawing legend. Obtain wiring diagram for control wiring.

### **3.3 INSTALLATION OF BUILDING WIRES**

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

### **3.4 INSTALLATION OF ARMOURED CABLES**

- .1 Group cables wherever possible on channels.

**END OF SECTION**

**Part 1 General**

**1.1 REFERENCE STANDARDS**

- .1 Group CSA
  - .1 CSA C22.1-15, Canadian Electrical Code, Part I (23rd edition)
  - .2 CAN/CSA-C22.2 numéro 62275-16, Cable management systems - Cable ties for electrical installations
  - .3 CAN/CSA-C22.2 no 18.4-15 Hardware for the support of the conduit, tubing, and cable.

**1.2 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with the manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Store materials off ground and in accordance with the manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Replace defective or damaged materials with new.

**Part 2 Products**

**2.1 SUPPORT CHANNELS**

- .1 U shape, size 41 x 41 mm, 2.5 mm thick, surface mounted.

**Part 3 Execution**

**3.1 EXAMINATION**

- .1 Verification of Conditions: verify that conditions of the substrate previously installed under other Sections or Contracts are acceptable for hangers and supports installation in accordance with the manufacturer's written instructions.

**3.2 INSTALLATION**

- .1 Secure equipment to hollow masonry, tile and plaster surfaces with lead anchors.
- .2 Secure equipment to poured concrete with expandable inserts.
- .3 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.
- .4 For surface mounting of two or more conduits use channels and space them as required by in effect electrical code.
- .5 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.
- .6 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.

- .7 Do not use wire lashing or perforated strap to support or secure raceways or cables.
- .8 Do not use supports or equipment installed for other trades for conduit or cable support except with permission of other trade and approval of Departmental.
- .9 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with the manufacturer's installation recommendations.

### **3.3 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave Work area clean at the end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials for reuse and for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
  - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

**END OF SECTION**



**Part 1 General**

**1.1 REFERENCE STANDARD**

- .1 Canadian Standards Association / CSA International
  - .1 CSA C22.1-15, Canadian Electrical Code, Part I, 23<sup>rd</sup> edition.
  - .2 CAN/CSA-C22.2 no 18.1-13(R2018), Metallic Outlet Boxes.
  - .3 CAN/CSA-C22.2 no 18.2-06(R2016), Nonmetallic Outlet Boxes.

**1.2 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Provide manufacturers printed product literature, specifications and data sheets and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Provide shop drawings: in accordance with Section 01 33 00 - Submittal Procedures.
  - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Quebec, Canada.

**1.3 DELIVERY, STORAGE AND HANDLING**

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

**Part 2 Products**

**2.1 JUNCTION AND PULL BOXES**

- .1 Construction: PVC boxes when connected to PVC conduits.
- .2 Weather resistant.
- .3 Conceived to receive four (4) screws plates.

**Part 3 Execution**

**3.1 JUNCTION AND PULL BOXES INSTALLATION**

- .1 Install pull boxes in accessible locations.
- .2 Only main junction and pull boxes are indicated. Install additional pull boxes as required by Canadian electrical code.

**3.2 IDENTIFICATION**

- .1 Equipment Identification: to Section 26 05 00 - Common Work Results for Electrical.
- .2 Identification Labels: size 2 indicating voltage and phase system name or as indicated.

**END OF SECTION**



**Part 1 General**

**1.1 REFERENCE STANDARDS**

- .1 Canadian Standards Association (CSA International)
  - .1 CAN/CSA-C22.2 no 18.1-13(R2018), Metallic Outlet Boxes.
  - .2 CAN/CSA-C22.2 no 18.2-06(R2016), Nonmetallic Outlet Boxes.
  - .3 CAN/CSA-C22.2 no 18.3-12 (R2017), Conduit, tubing, and cable fittings.
  - .4 CSA C22.2 no 56-17, Flexible metal conduit and liquid-tight flexible metal conduit.
  - .5 CSA C22.2 no. 85-14, Rigid PVC boxes and fittings.

**1.2 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate waste materials for reuse and for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .2 Place materials defined as hazardous or toxic waste in designated containers.
- .3 Ensure emptied containers are sealed and stored safely for disposal away from children.

**Part 2 Products**

**2.1 CONDUITS**

- .1 Rigid PVC conduit: to CSA C22.2 No. 211.2.
- .2 Flexible metal conduit and liquid-tight flexible metal: to CSA C22.2 No. 56.

**2.2 CONDUIT FASTENINGS**

- .1 One hole steel PVC covered straps to secure surface conduits 53 mm and smaller.
  - .1 Two hole steel PVC covered straps for conduits larger than 53 mm (2").
- .2 Beam clamps to secure conduits to exposed steel work.
- .3 Channel type supports for two or more conduits.

**2.3 CONDUIT FITTINGS**

- .1 Fittings: to CAN/CSA C22.2 No. 85, manufactured for use with conduit specified. Coating: same as conduit.
- .2 Ensure factory "ells" where 90 degrees bends for 27 mm (1") and larger conduits.

**2.4 EXPANSION FITTINGS FOR RIGID CONDUIT**

- .1 Weatherproof expansion fittings with internal bonding assembly suitable for 200 mm linear expansion.
- .2 Watertight expansion fittings with integral bonding jumper suitable for linear expansion and 19 mm deflection.
- .3 Weatherproof expansion fittings for linear expansion at entry to panel.

**2.5 FISH CORD**

- .1 Polypropylene.

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**Part 3                      Execution**

**3.1                      MANUFACTURER'S INSTRUCTIONS**

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

**3.2                      INSTALLATION**

- .1                      Use rigid PVC conduit on roofing.
- .2                      Use liquid tight flexible metal conduit for connection to motors or vibrating equipment on roofing.
- .3                      Bend conduit cold:
  - .1                      Replace conduit if kinked or flattened more than 1/10th of its original diameter.
- .4                      Install fish cord in empty conduits.
- .5                      Remove and replace blocked conduit sections.
  - .1                      Do not use liquids to clean out conduits.
- .6                      Dry conduits out before installing wire.

**3.3                      SURFACE CONDUITS**

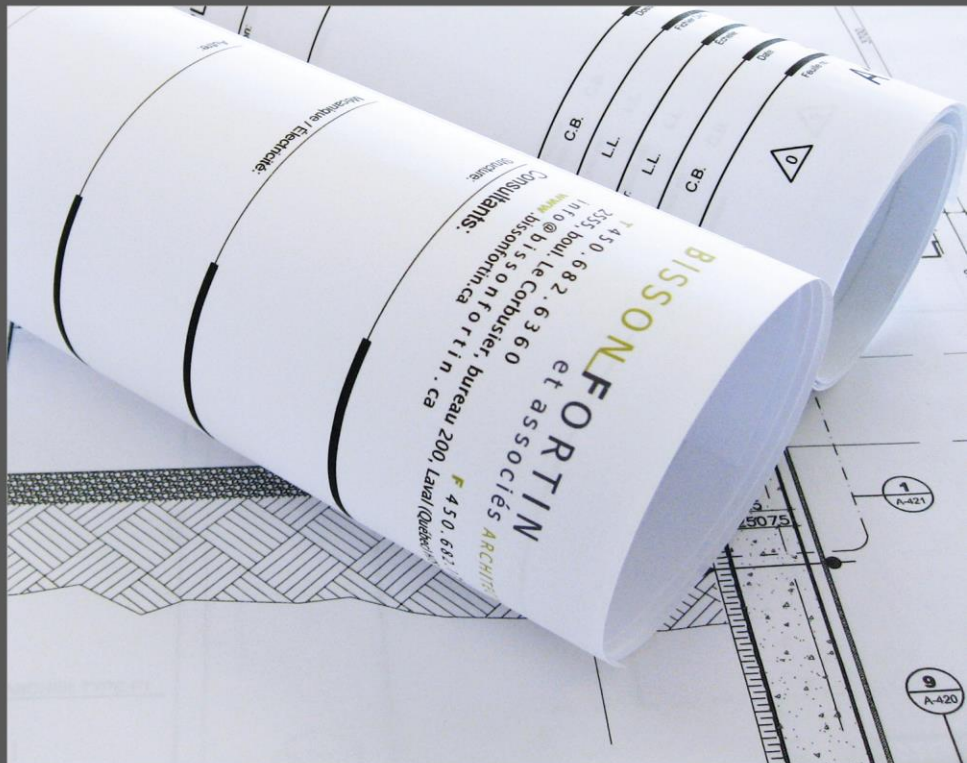
- .1                      Run parallel or perpendicular to building lines.
- .2                      Group conduits wherever possible on surface channels.
- .3                      Do not pass conduits through structural members except as indicated.
- .4                      Do not locate conduits less than 75 mm parallel to steam or hot water lines with minimum of 25 mm at crossovers.

**3.4                      CLEANING**

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

**END OF SECTION**





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