

**PART 1 - GENERAL****1.1 REFERENCE STANDARDS**

- .1 ASTM International Inc.
  - .1 ASTM D312/D312M-16a, Standard Specification for Asphalt Used in Roofing.
  - .2 ASTM D6163/D6163M-16, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fibre Reinforcements.
  - .3 ASTM D6164/D6165M-16, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements.
- .2 Canadian General Standards Board (CGSB)
  - .1 CGSB 37-GP-56M, Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing.
- .3 Canadian Roofing Contractors Association (CRCA)
  - .1 CRCA Roofing Specifications Manual.
- .4 Canadian Standards Association (CSA International)
  - .1 CAN/CSA A123.4-04 (R2013), Asphalt for Constructing Built-Up Roof Coverings and Waterproofing Systems.
- .5 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .6 Underwriters Laboratories' of Canada (ULC).

**1.2 ADMINISTRATIVE REQUIREMENTS**

- .1 Convene pre-installation meeting two weeks prior to beginning waterproofing Work, with roofing contractor's representative and Departmental Representative to:
  - .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.

**1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Provide one copy 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 one copy of WHMIS MSDS for:
    - .1 Primers.
    - .2 Asphalt.
    - .3 Sealers.
    - .4 Filter fabric.
- .3 Provide shop drawings:
  - .1 Indicate flashing details.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

(Cont'd)

- .4 Manufacturer's Certificate: certify that products meet or exceed specified requirements.
- .5 Test and Evaluation Reports: submit laboratory test reports certifying compliance of membrane with specification requirements.
- .6 Manufacturer's Installation Instructions: indicate special precautions required for seaming the membrane.
- .7 Reports: indicate procedures followed, ambient temperatures and wind velocity during application.

1.4 QUALITY ASSURANCE

- .1 Installer qualifications: company or person specializing in application of modified bituminous roofing systems approved by manufacturer with 5 years documented experience.

1.5 FIRE PROTECTION

- .1 Follow all procedures as outlined in Section 01 35 29.06 - Health and safety Requirements.
- .2 Fire Extinguishers:
  - .1 Maintain one stored pressure rechargeable type with hose and shut-off nozzle,
  - .2 ULC labelled for A, B and C class protection.
  - .3 Size 2.25 kg on roof per torch applicator, within 6 m of torch applicator.
- .3 Maintain fire watch for 1 hour after each day's roofing operations cease.

1.6 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .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 weather and deleterious materials.
- .3 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding and packaging materials.
  - .1 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan.
  - .2 Fold up metal banding, flatten and place in designated area for recycling.

**1.7 SITE CONDITIONS**

- .1 Ambient Conditions:
  - .1 Do not install roofing when temperature remains below -18 degrees C for torch application, or -5 degrees C for mop application, and to manufacturers' recommendations.
  - .2 Minimum temperature for solvent-based adhesive is -5 degrees C.
- .2 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.

**1.8 EXTENDED WARRANTY**

- .1 For Work of this Section 01 78 00 - Closeout Submittals, 12 months warranty period is extended to 24 months.

**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 and with existing roofing system, meet this requirement.

**2.2 VAPOUR RETARDER**

- .1 Base sheet vapour retarder: to CGSB 37-GP-56M and ASTM D6163, Styrene-Butadiene-Styrene (SBS) elastomeric polymer.
  - .1 Top and bottom surfaces: sanded/polyethylene.

**2.3 MEMBRANE**

- .1 Base sheet: to CGSB 37-GP-56M and glass fibres to ASTM D6163.
  - .1 Styrene-Butadiene-Styrene (SBS) elastomeric polymer prefabricated sheet, reinforcement, having nominal weight of 100 g/m<sup>2</sup>.
  - .2 Type 1, fully adhered.
  - .3 Class A - granule surfaced C - plain surfaced.
  - .4 Grade 1 - standard service.
  - .5 Top and bottom surfaces:
    - .1 Sanded/polyethylene.
  - .6 Base sheet membrane properties: to CGSB 37-GP-56M.
    - .1 Strain energy (longitudinal/transversal): 8.1/8.8 kN/m.
    - .2 Breaking strength (longitudinal/transversal): 17.0/12.5 N/5 cm.
    - .3 Ultimate elongation (longitudinal/transversal): 60/65%.
    - .4 Tear resistance: 60 N.
    - .5 Cold bending at -30 degrees C: no cracking.
    - .6 Softening point: >110 degrees C.
    - .7 Static puncture resistance: 300 .
    - .8 Dimensional Stability: -0.3/0.3%.
  - .7 ULC certification: Class A.
- .2 Cap sheet membrane: to CGSB 37-GP-56M and polyester fibres to ASTM D6164.
  - .1 Styrene-Butadiene-Styrene (SBS) elastomeric polymer reinforcement, having nominal weight of 180 g/m<sup>2</sup>.
  - .2 Type 2, fully adhered.

<u>2.3 MEMBRANE (Cont'd)</u>	.2	(Cont'd)
	.3	Class A-granule surfaced.
	.1	Colour for granular surface: gray.
	.4	Grade heavy duty service.
	.5	Bottom surface polyethylene.
	.6	Cap sheet membrane properties: to CGSB 37-GP-56M.
	.1	Strain energy (longitudinal/transversal): 11.0/11.4 kN/m.
	.2	Breaking strength (longitudinal/transversal): 25.0/16.0 kN/m.
	.3	Ultimate elongation (longitudinal/transversal): 60/65%.
	.4	Tear resistance: 80 N.
	.5	Cold bending at -30 degrees C: No cracking.
	.6	Softening point: >110 degrees C.
	.7	Static puncture resistance: 370.
	.8	Dimensional Stability: -0.2/0.2%.
	.7	ULC certification: Class A.
<u>2.4 ADHESIVE</u>	.1	Adhesive for securing overlay board and insulation: asphalt extended vulcanized adhesive, two component unit, consisting of two liquids mixed on site to produce pourable adhesive.
<u>2.5 BITUMEN</u>	.1	Asphalt: to CAN/CSA A123.4 and ASTM D312, Type 2.
<u>2.6 INSULATION</u>	.1	Type and thickness to match existing.
<u>2.7 SEALERS</u>	.1	Plastic cement: asphalt.
<b><u>PART 3 - EXECUTION</u></b>		
<u>3.1 QUALITY OF WORK</u>	.1	Do examination, preparation and roofing Work in accordance with Roofing Manufacturer's Specification Manual and CRCA Roofing Specification Manual, particularly for fire safety precautions.
	.2	Do priming in accordance with manufacturers written recommendations.
	.3	Assembly, component and material connections will be made in consideration of appropriate design loads, with reversible mechanical attachments.
<u>3.2 EXAMINATION OF ROOF DECKS</u>	.1	Verification of Conditions: .1 Inspect with Departmental Representative deck conditions including ventilation outlets to determine readiness to proceed.

3.2 EXAMINATION OF  
ROOF DECKS  
(Cont'd)

- .2 Evaluation and Assessment:
  - .1 Prior to beginning of work ensure:
    - .1 Decks are firm, straight, smooth, dry, free of snow, ice or frost, and swept clean of dust and debris. Do not use calcium or salt for ice or snow removal.
    - .2 Curbs have been built.
    - .3 Plywood and lumber nailer plates have been installed to deck, walls and parapets as indicated.
  - .3 Do not install roofing materials during rain or snowfall.

3.3 PROTECTION OF  
IN-PLACE CONDITIONS

- .1 Cover walls, walks 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 Protect roof from traffic and damage. Comply with precautions deemed necessary by Departmental Representative.
- .5 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.
- .6 Metal connectors and decking will be treated with rust proofing or galvanization.

3.4 VAPOUR  
RETARDER  
(CONCRETE/GYPSUM  
BOARD/PLYWOOD  
DECK)

- .1 Embed one-ply of felts glass in hot bitumen spread at rate of 1.2 kg/m<sup>2</sup> for glass asphalt.
- .2 Modified bituminous vapour retarder sheet.

3.5 CONVENTIONAL  
MEMBRANE ROOFING  
APPLICATION

- .1 Insulation: fully adhered, adhesive application: Adhere insulation laminated vapour barrier using solvent-based adhesive. ce to fill all gaps left by demolition.
  - .3 Cut end pieces to suit.
  - .4 Apply adhesive in continuous ribbons at 300 mm on centre.
  - .5 Ensure no gaps, all insulation to be tight fitting.
- .2 Base sheet application:
  - .1 Unroll and embed base sheet in uniform coating of asphalt applied at rate of 1.2 kg/m<sup>2</sup>, at 230 degrees C.
  - .2 Unroll and torch base sheet onto substrate taking care not to burn membrane or its reinforcement or substrate.
  - .3 Lap sheets 75 mm minimum for side and 150 mm minimum for end laps.
  - .4 Application to be free of blisters, wrinkles and fishmouths.

### 3.5 CONVENTIONAL MEMBRANE ROOFING APPLICATION (Cont'd)

- .3 Cap sheet application:
  - .1 Unroll and embed cap sheet in uniform coating of asphalt applied at rate of 1.2 kg/m<sup>2</sup>, EVT at point of contact.
  - .2 Unroll and torch cap sheet onto base sheet taking care not to burn membrane or its reinforcement.
  - .3 Lap sheets 75 mm minimum for side laps and 150 mm minimum for end laps. Offset joints in cap sheet 300 mm minimum from those in base sheet.
  - .4 Application to be free of blisters, fishmouths and wrinkles.
  - .5 Do membrane application in accordance with manufacturer's recommendations.
- .4 Flashings:
  - .1 Complete installation of flashing base sheet stripping prior to installing membrane cap sheet.
  - .2 Torch base sheet onto substrate in 1 metre wide strips.
  - .3 Lap flashing base sheet to membrane base sheet minimum 150 mm and seal by mopping or torch welding.
  - .4 Lap flashing cap sheet to membrane cap sheet 250 mm minimum and torch weld.
  - .5 Provide 75 mm minimum side lap and seal.
  - .6 Properly secure flashings to their support, without sags, blisters, fishmouths or wrinkles.
- .5 Roof penetrations:
  - .1 Install vent stack covers and other roof penetration flashings and seal to membrane in accordance with manufacturer's recommendations and details and as shown.

### 3.6 FIELD QUALITY CONTROL

- .1 Inspections:
  - .1 Inspection and testing of roofing application will be carried out by testing laboratory designated by Departmental Representative .
  - .2 Departmental Representative will pay for tests.

### 3.7 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: separate waste materials for reuse recycling.
  - .1 Place materials defined as hazardous or toxic in designated containers.
  - .2 Clearly label location of salvaged material's storage areas and provide barriers and security devices.
  - .3 Ensure emptied containers are sealed and stored safely.
  - .4 Divert unused aggregate materials from landfill to local facility for reuse.
  - .5 Unused int coating material must be disposed of at official hazardous material collections site.

3.7 CLEANING(Cont'd)

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(Cont'd)

.6

Unused adhesive, sealant and asphalt materials must not be disposed of into sewer system, into streams, lakes, onto ground or in other location where it will pose health or environmental hazard.

.7

Dispose of unused adhesive material at official hazardous material collections site.

.8

Dispose of unused sealant material at official hazardous material collections site.

.9

Dispose of unused asphalt material at official hazardous material collections site.

END OF SECTION

**PART 1 - GENERAL**

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|--|----|---|
| <u>1.1 GENERAL</u>                             | .1 | Work in this section includes patching of existing firestopping as a result of mechanical work being performed. Coordinate work to ensure all areas affected by work are                |
|  |    |   |
| <u>1.2 REFERENCE STANDARDS</u>                 | .1 | Health Canada/Workplace Hazardous Materials Information System (WHMIS)  |
|  | .1 | Material Safety Data Sheets (MSDS).   |
|  | .2 | Underwriter's Laboratories of Canada (ULC)  |
|  | .1 | CAN-ULC-S101-14, Standard Methods of fire Endurance Tests of Building Construction and Materials.   |
|  | .2 | CAN-ULC-S102-07, Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.   |
|  |    |   |
| <u>1.3 ACTION AND INFORMATIONAL SUBMITTALS</u> | .1 | Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.  |
|  | .2 | Product Data:   |
|  | .1 | Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.        |
|  | .2 | Submit two copies of WHMIS MSDS - Material Safety Data Sheets.  |
|  | .3 | Samples: submit duplicate 300 x 300 mm size sample of exposed fireproofing for approval of texture and colour.  |
|  | .4 | Quality assurance submittals: submit following:   |
|  | .1 | Test Reports:   |
|  | .1 | Submit product data including certified copies of test reports verifying fireproofing applied to substrate as constructed on project will meet or exceed requirements of Specification. |
|  | .2 | Submit test results in accordance with CAN-ULC-S101 for fire endurance and CAN-ULC-S102 for surface burning characteristics.  |
|  | .3 | Submit Design Test Sheets to suit application from ULC or Intertek.   |
|  | .4 | For assemblies not tested and rated, submit proposals based on related designs using accepted fireproofing design criteria.   |
|  | .2 | Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.                           |
|  | .3 | Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures.                                 |
|  | .4 | Manufacturer's Field Reports: submit to manufacturer's written reports within 3 days of review, verifying compliance of Work, as described in PART 3 - FIELD QUALITY CONTROL.           |



1.4 QUALITY  
ASSURANCE

- .1 Qualifications:
  - .1 Installer: company specializing in sprayed-on fireproofing with 5 years documented experience.
- .2 Site Meetings:
  - .1 Convene pre-installation meeting two weeks prior to beginning work of this Section, with contractor's representative and Departmental Representative to:
    - .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.
    - .5 Review safety precautions and occupant restrictions:
  - .2 Prior to start of Work arrange for site visit with Departmental Representative to examine existing site conditions adjacent to demolition work.
  - .3 Hold project meetings in coordination with Contractor's Representative and Departmental Representative.
  - .4 Ensure key personnel attend.
- .3 Site Meetings: as part of Manufacturer's Services described in PART 3 - FIELD QUALITY CONTROL, schedule site visits, to review Work, at stages listed.
  - .1 After delivery and storage of products, and when preparatory Work is complete but before installation begins.
  - .2 Twice during progress of Work.
  - .3 Upon completion of Work, after cleaning is carried out.

1.5 DELIVERY,  
STORAGE AND  
HANDLING

- .1 Packing, shipping, handling and unloading:
  - .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
  - .2 Deliver packaged materials in original unopened containers, marked to indicate brand name, manufacturer, ULC markings.
- .2 Storage and Protection:
  - .1 Store materials indoors.
  - .2 Store and protect materials from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.
  - .3 Damaged or opened containers will be rejected.
  - .4 Packaging to indicate shelf-life and materials to be applied prior to expiration of shelf-life.
  - .5 Provide temporary enclosures to prevent spray from contaminating air beyond application area.
  - .6 Protect adjacent surfaces and equipment from damage by overspray, fall-out, and dusting of fireproofing materials.

1.6 AMBIENT  
CONDITIONS

- .1 At temperatures less than 5 degrees C, ensure that 5 degrees C air and substrate temperature is maintained during and for 24 hours after application. Ensure that natural ventilation to properly dry the fireproofing during and subsequent to its application is provided. In enclosed areas lacking openings for natural ventilation, ensure that interior air is circulated and exhausted to the outside.

1.6 AMBIENT  
CONDITIONS  
(Cont'd)

- .2 Maintain relative humidity within limits recommended fireproofing manufacturer.
- .3 Ensure that natural ventilation to properly dry fireproofing during and subsequent to its application is provided.
- .4 In enclosed areas lacking openings for natural ventilation, provide minimum of 4 air exchanges per hour by forced air circulation.

**PART 2 - PRODUCTS**2.1 MATERIALS

- .1 Sprayed fireproofing: ULC certified cementitious asbestos-free mineral fibre fireproofing qualified for use in ULC or Intertek Designs specified and fungus resistant for 28 days.
- .2 Curing compound: type recommended by fireproofing manufacturer, qualified for use in ULC or Intertek Designs specified.
- .3 Sealer: type recommended by fireproofing manufacturer, qualified for use in ULC Design specified.
  - .1 Colour: white.
- .4 Fireproofing: minimum dry density and cohesion/adhesion properties as follows:
  - .1 Fireproofing for structural components located in mechanical rooms and storage areas: minimum applied dry density of 640 kg per cubic metre and cohesion/adhesion strength of 350 kPa.
  - .2 Ensure spray-applied fireproofing: does not crack, spall or delaminate under downward deflection conditions over 3 m clear span.
  - .3 Minimum compressive strength: 48 kPa.
  - .4 Spray-Applied fireproofing material: not contribute to corrosion of test panels.
  - .5 Dust removal: not exceed 0.25 gram per square meter.

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

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

3.2 PREPARATION

- .1 Substrate: free of material, which would impair bond.
- .2 Verify that painted substrates are compatible and have suitable bonding characteristics to receive fireproofing.
- .3 Remove incompatible materials. Ensure existing fireproofing and new are compatible.
- .4 Ensure that items required to penetrate fireproofing are placed before installation of fireproofing.

3.2 PREPARATION  
(Cont'd)

- .5 Ensure that ducts, piping, equipment, or other items which would interfere with application of fireproofing are not positioned until fireproofing work is completed.

3.3 APPLICATION

- .1 Apply bonding adhesive or primer to substrate if recommended by manufacturer.
- .2 Apply fireproofing to correspond with tested assemblies, or acceptable calculation procedures to provide following fire resistance ratings.
- | Location              | Rating | ULC Design Test     |
|-----------------------|--------|---------------------|
| Roof supports (Beams) | 2 Hrs. | BXUVC.F816 or equal |
- .3 Apply fireproofing over substrate, building up to required thickness to cover substrate with monolithic blanket of uniform density and texture. Ensure patches are same depth as surrounding material.
- .4 Tamp smooth, surfaces visible in finished work.
- .5 Apply curing compound to surface of cementitious fireproofing as required by manufacturer.
- .6 Apply sealer to surface of mineral fibre fireproofing as required by manufacturer.

3.4 FIELD QUALITY CONTROL

- .1 Manufacturer's Field Services:
- .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.
  - .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
  - .3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.
- .2 Inspection and Site Tests:
- .1 Inspection and testing of fireproofing will be carried out by Testing Laboratory designated by Departmental Representative.
  - .2 Departmental Representative will pay costs for testing.

3.5 PATCHING

- .1 Patch damage to fireproofing caused by testing or by other trades before fireproofing is concealed, or if exposed, before final inspection.

3.6 CLEANING

- .1 Clean surfaces not indicated to receive fireproofing of sprayed material within 24 hours period after application.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION