

**Part 1            General**

**1.1            REFERENCES**

- .1    ASTM International
  - .1    ASTM C612-10, Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
  - .2    ASTM E1966-07 (2011), Standard Test Method for Fire-Resistive Joint Systems.
  - .3    ASTM E2174-14 – Standard Practice for On-Site Inspection of Installed Firestops.
  - .4    ASTM G21-15, Determining Resistance of Synthetic Polymeric Materials to Fungi.
- .2    Firestop Contractors International Association (FCIA)
  - .1    FCIA Firestop Industry Manual of Practice, 5<sup>th</sup> Edition.
- .3    FM Global (FM)
  - .1    FM Approvals 4991 – Approval of Firestop Contractors.
- .4    Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1    Material Safety Data Sheets (MSDS).
- .5    National Fire Protection Association (NFPA)
  - .1    NFPA 101 – Life Safety Code, 2009 Edition.
- .6    UL (formerly Underwriters Laboratories)
  - .1    UL 1479 – Standard for Fire Tests of Through-Penetration Firestops.
  - .2    UL 2079 – Standard for Tests for Fire Resistance of Building Joint Systems.
- .7    Underwriter's Laboratories of Canada (ULC)
  - .1    CAN/ULC S101-07 – Standard Methods of Fire Endurance Tests of Building Construction and Materials.
  - .2    CAN/ULC S102-07 – Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
  - .3    CAN/ULC S115-05 - Fire Tests of Firestop Systems.

**1.2            DEFINITIONS**

- .1    Fire Stop Material: Device intended to close off opening or penetration during fire or materials that fill openings in wall or floor assembly where penetration is by cables, cable trays, conduits, ducts and pipes and poke-through termination devices, including electrical outlet boxes along with their means of support through wall or floor openings.

- .2 Single Component Fire Stop System: Fire stop material that has Listed Systems Design and is used individually without use of high temperature insulation or other materials to create fire stop system.
- .3 Multiple Component Fire Stop System: Exact group of fire stop materials that are identified within Listed Systems Design to create on site fire stop system.
- .4 Tightly Fitted (ref: NBC Part 3.1.9.1.1 and 9.10.9.6.1): Penetrating items that are cast in place in buildings of noncombustible construction or have "0" annular space in buildings of combustible construction.
  - .1 Words "tightly fitted" should ensure that integrity of fire separation is such that it prevents passage of smoke and hot gases to unexposed side of fire separation.

### **1.3 PERFORMANCE REQUIREMENTS**

- .1 Materials, accessories, and application procedures: Listed by ULC, cUL, or tested in accordance with CAN/ULC S115 to comply with applicable building code requirements.
- .2 Firestopping materials: To CAN/ULC S101, to achieve fire rating as noted on Drawings and ULC Design Number shown.

### **1.4 SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's printed product literature, specifications, and datasheets. Include product characteristics, performance criteria, physical size, finish, and limitations.
  - .2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets.
- .3 Shop Drawings:
  - .1 Submit shop drawings to show location, proposed material, reinforcement, anchorage, fastenings, and method of installation.
  - .2 Ensure construction details accurately reflect actual job conditions.
- .4 System Design Listings, including illustrations from a qualified testing and inspection agency as applicable for each firestop configuration.
- .5 Samples:
  - .1 Submit duplicate 200 x 200 mm samples showing actual fire stop material proposed for project.
- .6 Quality Assurance Submittals: Submit following in accordance with Section 01 45 00 - Quality Control.
  - .1 Certificates: Signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
  - .2 Manufacturer's Instructions: Including special handling criteria, installation sequence, and cleaning procedures.

- .7 Project Record Documentation: Supply documentation for each single application addressed. Identify each penetration and joint location on entire project. Provide at completion of project.
  - .1 Include the following for through-penetrations:
    - .1 Sequential location number.
    - .2 Project name.
    - .3 Installation date.
    - .4 Detailed description of penetration location.
    - .5 Tested System or Engineered Judgment Number.
    - .6 Type of assembly penetrated.
    - .7 Detailed description of size and type of penetrating item.
    - .8 Size of opening.
    - .9 Number of sides of assemblies addressed.
    - .10 Hour rating achieved.
    - .11 Installer's name.
  - .2 Include the following for construction joints:
    - .1 Sequential location number.
    - .2 Project name.
    - .3 Installation date.
    - .4 Detailed description of construction joint location.
    - .5 Tested System or Engineered Judgment Number.
    - .6 Type of construction joint.
    - .7 Width of joint.
    - .8 Lineal footage of joint.
    - .9 Number of sides of assemblies addressed.
    - .10 Hour rating achieved.
    - .11 Installer's name.

## **1.5 QUALITY ASSURANCE**

- .1 Single Source Responsibility: Obtain firestop systems for each type of penetration and construction situation from a single primary firestop systems manufacturer.
- .2 Regulatory Requirements:
  - .1 Conform to applicable code for fire resistance ratings and surface burning characteristics.
  - .2 Provide certificate of compliance from authority having jurisdiction indicating approval of materials used.

## **1.6 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 Deliver materials to the site in undamaged condition and in original unopened containers, marked to indicate brand name, manufacturer, and ULC or cUL labels.
- .3 Store materials in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .4 Replace defective or damaged materials with new.
- .5 Waste Management and Disposal:
  - .1 Remove waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

## **1.7 SITE CONDITIONS**

- .1 Apply materials within temperature range recommended by manufacturer.
- .2 Maintain recommended temperature before, during, and for 72 hours after installation of materials.

## **1.8 SEQUENCING AND SCHEDULING**

- .1 Schedule installation of other firestopping materials after completion of penetrating item installation, but prior to covering or concealing of openings.

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 Fire stopping and smoke seal systems: In accordance with CAN/ULC S115.
  - .1 Asbestos-free materials and systems capable of maintaining effective barrier against flame, smoke, and gases in compliance with requirements of CAN/ULC S115 and not to exceed opening sizes for which they are intended.
  - .2 Ensure firestopping system components are fully compatible with each other, with substrates, and with items penetrating the firestopping.
  - .3 Mould and mildew resistance to ASTM G21: 0 (Zero).
- .2 Service penetration assemblies: Systems tested to CAN/ULC S115.
- .3 Service penetration fire stop components: Certified by test laboratory to CAN/ULC S115.
- .4 Fire-resistance rating of installed fire stopping assembly in accordance with NBC.
- .5 Fire stopping and smoke seals at openings intended for ease of re-entry such as cables: Elastomeric seal.
- .6 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork, and other mechanical items requiring sound and vibration control: Elastomeric seal.
- .7 Primers: To manufacturer's recommendation for specific material, substrate, and end use.

- .8 Water (if applicable): Potable, clean, and free from injurious amounts of deleterious substances.
- .9 Insulation: Mineral wool fibre semi-rigid insulation to ASTM C612 – Type IVA, UL 2079, and ASTM E1966; minimum density 64 kg/m<sup>3</sup> (4 lbs/ft<sup>3</sup>).
- .10 Damming and backup materials, supports, and anchoring devices: To manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.
- .11 Sealants for vertical joints: Non-sagging.
- .12 Installation Accessories: Clips, collars, fasteners, temporary stops or dams, and other devices required to position and retain materials in place.

### **Part 3 Execution**

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

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

#### **3.2 EXAMINATION**

- .1 Verify existing conditions before starting work.
- .2 Verify opening configurations, penetrating items, substrates, and other conditions affecting performance of firestopping are ready to receive the work of this Section.
- .3 Proceed with installation only when unsatisfactory conditions have been corrected.

#### **3.3 PREPARATION**

- .1 Ensure substrates and surfaces are clean, dry, and frost free.
- .2 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials.
- .3 Prepare surfaces in contact with fire stopping materials and smoke seals to manufacturer's instructions.
- .4 Maintain insulation around pipes and ducts penetrating fire separation, without interruption to vapour barrier.
- .5 Mask and use drop cloths where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

#### **3.4 INSTALLATION**

- .1 Install fire stopping and smoke seal material and components in accordance with manufacturer's certified tested system listing.

- .2 Seal holes or voids made by through penetrations, poke-through termination devices, and unpenetrated openings or joints to ensure continuity and integrity of fire separation are maintained.
- .3 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.
- .4 Tool or trowel exposed surfaces to neat finish.
- .5 Remove excess compound promptly as work progresses and upon completion.

### **3.5 LABELLING**

- .1 Provide and install identification labels for each individual penetration with firestopping.
  - .1 Install labels in readily visible location, on both sides of penetrated assembly, with permanently bonding adhesive.
  - .2 Label to include:
    - .1 Warning indicating that system is firestopping installation to be left undisturbed.
    - .2 Installing Contractor name and contact information.
    - .3 System designation of testing organization.
    - .4 Installation date.
    - .5 Manufacturer.

### **3.6 FIELD QUALITY CONTROL**

- .1 Section 01 45 00: Quality Control.
- .2 Inspections: Notify Departmental Representative when ready for inspection and prior to concealing or enclosing fire stopping materials and service penetration assemblies.

### **3.7 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.
- .3 Remove temporary dams after initial set of firestopping and smoke seal materials.

**END OF SECTION**

**Part 1            General**

**1.1            REFERENCES**

- .1    ASTM International
  - .1    ASTM C719-14, Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants under Cyclic Movement (Hockman Cycle).
  - .2    ASTM C834-05, Standard Specification for Latex Sealants.
  - .3    ASTM C919-12, Standard Practice for Use of Sealants in Acoustical Applications.
  - .4    ASTM C920-05, Standard Specification for Elastomeric Joint Sealants.
  - .5    ASTM C1193-13, Standard Guide for Use of Sealants.
  - .6    ASTM C1311-02, Standard Specification for Solvent Release Sealants.
  - .7    ASTM E814-13a, Standard Test Method for Fire Tests of Penetration Firestop Systems.
- .2    Canadian General Standards Board (CGSB)
  - .1    CAN/CGSB 19.13-M87, Sealing Compound, One-component, Elastomeric, Chemical Curing.
  - .2    CGSB 19-GP-14M-1984, Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing.
  - .3    CAN/CGSB 19.17-M90, One-Component Acrylic Emulsion Base Sealing Compound.
  - .4    CAN/CGSB 19.21-M87, Sealing and Bedding Compound, Acoustical.
  - .5    CAN/CGSB 19.24-M90, Multi-component, Chemical Curing Sealing Compound.
- .3    Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1    Material Safety Data Sheets (MSDS).
- .4    South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
  - .1    SCAQMD Rule 1168-A2005, Adhesive and Sealant Applications.

**1.2            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. 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 WHMIS MSDS.

- .3 Manufacturer's Instructions:

- .1 Submit instructions to include installation instructions for each product used.

### **1.3 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.

### **1.4 QUALITY ASSURANCE**

- .1 Compatibility: Verify sealants used are compatible with their respective joint substrates.
- .2 Provide sealants with appropriate expansion and contraction properties for the joints being sealed.
- .3 Perform sealant application work to ASTM C1193.
- .4 Perform acoustic sealant application work to ASTM C919.

### **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 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 Replace defective or damaged materials with new.

### **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°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.
- .2 [e]partmental Representative to arrange for ventilation system to be operated on maximum outdoor air and exhaust during installation of caulking and sealants.

## **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 that 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 MATERIALS**

- .1 Air/vapour barrier sealant and adhesive: To ASTM C920, Type S, Grade NS, Class 35, single component, low odour, moisture cure, medium modulus, low VOC.
  - .1 Adhesion to ASTM C719:  $\pm 35\%$ .
  - .2 Ultimate Elongation: 450 - 550%.
  - .3 Modulus, 100%: 275 - 345 kPa.
  - .4 Shore A Hardness:  $25 \pm 5$ .
  - .5 Tensile Strength: 1034 – 1378 kPa.
  - .6 Maximum VOC: 5 g/L.
- .2 Polyurethane Sealant: To CAN/CGSB 19.24, Type 2, Class B; and ASTM C920, Type M, Grade NS, Use NT, M, A and O; non-sag, multi component, chemical curing.
  - .1 Typical uses: Control joints in concrete floors (when no hard finish is specified), exterior joints, precast concrete panels, expansion joints, curtain walls, panel walls, perimeter windows.

- .3 Elastomeric Polyurethane Sealant: To CAN/CGSB 19.13, Type 2; and ASTM C920, Type S, Grade NS, Use NT, M, A and O; non-sag, single component, moisture curing hybrid polyurethane.
  - .1 Typical uses: Expansion and control joints, pre-cast concrete panel joints, perimeter caulking of windows and doors, curtain wall joints.
- .4 Latex Sealant: To CAN/CGSB 19.17; and ASTM C834; single component, acrylic latex or siliconized acrylic latex.
  - .1 Typical uses: General purpose, acoustic sealing, back bedding glazing compound, window frame perimeters.
- .5 Acoustic Sealant: To CAN/CGSB 19.21 and ASTM C919, acoustic grade, single component, non-hardening, non-skinning.
  - .1 Typical uses: Acoustic sealing of gypsum wall board partitions and curtainwalls, sealing of interior polyethylene air/vapour barrier.
- .6 Acoustic and Smoke Sealant: To CAN/CGSB 19.21 and ASTM C919, acoustic grade, single component, non-hardening, non-skinning.
  - .1 Typical use: Acoustic and smoke sealing of gypsum wall board partitions.
- .7 Fire-Resistive Sealant: To ASTM E814, one part fire-stopping sealant.
  - .1 Typical uses: Penetrations in fire-rated floor and wall assemblies.
  - .2 Refer to Section 07 84 00 – Fire Stopping.
- .8 Silicone, one part: To CAN/CGSB 19.13; and ASTM C920, Type S, Grade NS; mildew resistant, single component, colour white unless otherwise specified.
  - .1 Typical uses: Around washroom fixtures, lavatories, janitor's sinks, and other wet areas.
- .9 Preformed compressible and non-compressible back-up materials:
  - .1 Polyethylene, urethane, neoprene or vinyl foam:
    - .1 Extruded [open] [closed] cell foam backer rod.
    - .2 Size: oversize [30 to 50 %].
  - .2 Neoprene or butyl rubber:
    - .1 Round solid rod, Shore A hardness 70.
  - .3 High density foam:
    - .1 Extruded closed cell polyvinyl chloride (PVC), extruded polyethylene, closed cell, Shore A hardness 20, tensile strength 140 to 200 kPa, extruded polyolefin foam, 32 kg/m<sup>3</sup> density, or neoprene foam backer, size as recommended by manufacturer.
  - .4 Bond breaker tape:
    - .1 Polyethylene bond breaker tape that will not bond to sealant.
- .10 Primer: As recommended by sealant manufacturer, where required, for adhesion of sealant to substrate.

## **2.3 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        Verify conditions of substrates are acceptable for joint sealants installation in accordance with manufacturer's written instructions.
  - .1        Visually inspect substrate.
  - .2        Inform Departmental Representative of unacceptable conditions.
  - .3        Proceed with installation only after unacceptable conditions have been remedied.

**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 that 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 joint substrates as recommended by sealant manufacturer 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 accordance with sealant manufacturer's instructions.

**3.6                APPLICATION**

- .1        Sealant:
  - .1        Mask edges of joint where irregular surface or sensitive joint border exists, to provide neat joint.
  - .2        Apply sealant in continuous beads.
  - .3        Apply sealant using gun with proper size nozzle.
  - .4        Use sufficient pressure to fill voids and joints solid.

- .5 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.
- .6 Tool exposed surfaces before skinning begins to give slightly concave shape.
- .7 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 11 - 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 11 - Cleaning.
- .3 Waste Management: Remove waste materials in accordance with Section 01 74 21 - Construction/Demolition 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**