

**Part 1 General**

**1.1 SYSTEMS DESCRIPTION**

- .1 This Section specifies fire stop systems and/or fire stop materials intended to fill gaps between fire separations, between fire separations and other construction assemblies, or used in or around items which fully or partially penetrate a fire separation, to restrict the spread of fire and smoke thus maintaining the integrity of a fire separation.
- .2 This Section includes requirements for:
  - .1 Through-penetration fire stops:
    - .1 For openings created to allow a penetrating item such as piping, conduits, raceways, ducts, cable trays, cables, tubing or structural components to pass completely through a fire separation or fire-resistance rated assembly.
  - .2 Membrane penetration fire stops:
    - .1 For openings where penetrating items such as piping, conduits, raceways, ducts, cable trays, cables, tubing, recessed components (e.g.: panels, electric boxes, devices) or structural components pass through only one membrane of a fire separation or fire-resistance rated assembly.
  - .3 Blank opening fire stops:
    - .1 For openings created in a fire separation where the penetrating item has not yet been installed or has been removed.
  - .4 Construction joint fire stops:
    - .1 For locations where adjacent fire separations or components of fire separations meet. These locations include: ceiling/wall and roof/wall joints, wall/wall joints at corners or in the same plane, wall/floor joints, floor/floor joints and ceiling/ceiling joints.
    - .2 Includes fire stops for seismic joints, vertical control joints, expansion joints, and joints which occur at the tops and bottoms of fire separation walls.
    - .3 Includes fire stops for head of wall to non-rated roof or floor assemblies.
  - .5 Building perimeter fire stops:
    - .1 For the space between a fire-resistance rated floor assembly and the curtain wall (e.g.: safing slot gaps).
- .3 This Section includes fire stopping work for entire Project including selection, installation and inspection of all required fire stops.

**1.2 REFERENCE STANDARDS**

- .1 ASTM International (ASTM)
  - .1 ASTM E595- 15, Standard Test Method for Total Mass Loss and Collected Volatile Condensable Materials from Outgassing in a Vacuum Environment.

- .2 ASTM E2032-09(2013), Standard Guide for Extension of Data From Fire Resistance Tests Conducted in Accordance with ASTM E 119.
- .3 ASTM E2174-14b, Standard Practice for On-Site Inspection of Installed Firestops.
- .4 ASTM E2307-15be1, Standard Test Method for Determining Fire Resistance of Fire Barriers Using Intermediate-Scale, Multi-story Test Apparatus.
- .5 ASTM E2393-10a (2015), Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers.
- .6 ASTM E2837- 13(2017), Standard Test Method for Determining the Fire Resistance of Continuity Head-of-Wall Joint Systems Installed Between Rated Wall Assemblies and Nonrated Horizontal Assemblies.
- .2 Firestop Contractors International Association (FCIA)
  - .1 FCIA Firestop Manual of Practice, 6th Edition 2015.
- .3 Factory Mutual Approvals (FM)
  - .1 FM 4991, Approval Standard for Firestop Contractors.
- .4 International Accreditation Service (IAS)
  - .1 IAS AC291, Accreditation Criteria for Special Inspection Agencies.
- .5 International Firestop Council (IFC)
  - .1 IFC Guidelines for Evaluating Engineering Judgments.
  - .2 IFC Guidelines for Evaluating Engineering Judgments - Perimeter Fire Barrier Systems.
  - .3 IFC Inspection Guidelines for Penetration Firestop Systems and Fire Resistive Joint Systems in Fire Resistance Rated Construction, 5th Edition.
- .6 National Research Council Canada (NRC)
  - .1 National Building Code of Canada 2015 (NBC).
- .7 Underwriter's Laboratories of Canada (ULC)
  - .1 CAN/ULC-S115-11(R2016), Standard Method of Fire Tests of Firestop Systems.
  - .2 ULC Qualified Firestop Contractor Program.

### 1.3 DEFINITIONS

- .1 Fire Blocking: materials, components or system installed in a concealed space in the building to restrict the spread of fire and smoke in that concealed space or from that concealed space to an adjacent space.
- .2 Fire Stop: a material, component or system, and its means of support, used to protect gaps between fire separations, between fire separations and other construction assemblies, or used in openings where penetrating items wholly or partially penetrate fire separations, to restrict the spread of fire and smoke thus maintaining the fire-resistance continuity of a fire separation.
- .3 Fire Stop System: the combination of specific materials and/or devices required with the penetrating item(s), the assembly and the opening to assemble the fire stop.

- .4 Intumescent: materials that expand with heat to prevent fire spread through fire separations.
- .5 Listed Fire Stop System: a specific field erected construction consisting of the assembly, fire stop materials, any penetrating items and their means of support which have met the requirements for an F, FT, FH, FTH and/or L rating when tested in a fire-resistance rated assembly in accordance with CAN/ULC-S115 - Standard Method of Fire Tests of Firestop Systems.
  - .1 F-Rating: the amount of time a fire stop system can remain in place without the passage of flame through the opening or the occurrence of flaming on the unexposed face of the fire stop.
  - .2 FT-Rating: a fire stop system with an F-Rating for the required time period which can also resist the transmission of heat through the fire stop during the same period and limit the rise in temperature on the unexposed face and/or penetrating item of the fire stop.
  - .3 FH-Rating: a fire stop system with an F-Rating for the required time period which can also resist the force of a hose stream without developing openings for a prescribed period.
  - .4 FTH-Rating: a fire stop system with an FT-Rating for the required time period which also passed the hose stream test for a prescribed period.
  - .5 L-Rating: largest test sample leakage rate, determined in accordance with the optional air leakage test of CAN/ULC-S115.
- .6 Multi-penetration: two or more service penetrations through an opening in the fire separation.
- .7 Non-rated Fire Separation: fire separation acting as a barrier to the spread of smoke until a response is initiated such as the activation of a fire suppression system.
- .8 Single-penetration: single service penetration through an opening in the fire separation.
- .9 System Design Listing: document providing proof of testing with technical details, specifications and requirements that leads to the application of a specific listed fire stop system.

#### **1.4 SEQUENCING**

- .1 Proceed with installation only when submittals have been reviewed by Departmental Representative.
- .2 Fire stops located in floor assemblies: install before interior partition erections.
- .3 Metal deck bonding: unless noted otherwise on system design listing and manufacturer's installation instructions, fire stopping to precede spray applied fireproofing to ensure required bonding.
- .4 Pipe and duct insulation: certified fire stop system component.
  - .1 Ensure pipe and duct insulation installation precedes fire stopping.

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

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

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- .2 Qualification Statement
    - .1 Submit contractor qualification statements and certificates demonstrating compliance with the qualification requirements of this Section, as described in PART 1 - QUALITY ASSURANCE, within 10 working days after award of contract and before starting Work.
  - .3 Product Data:
    - .1 Submit manufacturer's printed product literature, specifications and datasheet. Submit complete product data for each individual component and include:
      - .1 Product name and product number.
      - .2 Product characteristics and performance criteria.
      - .3 Physical size, finish and limitations.
      - .4 Technical data on out-gassing, off-gassing and age testing.
      - .5 Curing time.
      - .6 Chemical compatibility to other construction materials.
      - .7 Shelf life.
      - .8 Life expectancy.
      - .9 Temperature range for installation.
      - .10 Humidity range for installation.
      - .11 Sound attenuation STC-Rating.
    - .2 Manufacture Product Certification:
      - .1 Submit certification by the manufacturer that products supplied comply with local regulations controlling use of Volatile Organic Compounds (VOC's) and are non-toxic to building occupants.
      - .2 Submit test reports showing compliance to ASTM E595.
    - .3 For each individual component, Submit copies of WHMIS Safety Data Sheets (SDS) in accordance with Section [02 81 00 - Hazardous Materials]
    - .4 Submit a comprehensive list of all products and components included in submittal.
  - .4 Shop Drawings:
    - .1 Submit shop drawings showing system design listings for Project including proposed materials, reinforcement, anchorage, fastenings, and method of installation.
    - .2 Construction details to accurately reflect actual job conditions for each product and assembly.
    - .3 Submit details for materials and prefabricated devices.
    - .4 Submit electronic copy of shop drawings and include:
      - .1 Title page, labelled "Fire and Smoke Stop System Listings". Include project name, date and the names of the installation company and the manufacturer of proposed products.
      - .2 Table of Contents.

- .3 List of each proposed listed fire stop system and corresponding service penetration type or joint type in a matrix spreadsheet schedule, indicating floor and wall system, including rating for each.
  - .4 Location of penetrations.
  - .5 System Design Listings.
  - .6 Certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .5 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, and cleaning procedures.
- .6 Engineering Judgments:
  - .1 Where there is no specific tested listed fire stop system available from the manufacturer for a particular fire stop configuration, review systems from other manufacturers to obtain a listed fire stop system.
  - .2 Submit an Engineering Judgment (EJ) from the system manufacturer if there are no listed systems available from other manufacturers.
  - .3 Prepare and submit an EJ in accordance with best practices established in the following documents:
    - .1 IFC Guidelines for Evaluating Engineering Judgments.
    - .2 IFC Guidelines for Evaluating Engineering Judgments - Perimeter Fire Barrier Systems.
  - .4 For each EJ submitted, include:
    - .1 Project name, number and location.
    - .2 A description of the proposed system with detailed drawing.
    - .3 Installation instructions.
    - .4 Complete descriptions of critical elements for the fire stop configuration.
    - .5 Copies of all referenced system design listings on which the EJ is based on.
    - .6 EJ issuer name and contact information.
    - .7 Date of issue of EJ with authorization signature of issuer.
    - .8 Manufacturer letter stating their opinion, with supporting justification, that the EJ will perform as a fire stop system were it to be subjected to the appropriate standard fire test method for the required fire rating duration.
- .7 Once the EJ has been reviewed, submit the EJ to the authority having jurisdiction for final approval.
- .8 EJ shall be issued only by fire stop manufacturer's qualified technical personnel or in concert with the manufacturer by a knowledgeable registered Professional Engineer, a Fire Protection Engineer or an independent testing agency that provides testing and listing services for fire stop systems similar to the EJ being contemplated.

- .9 EJ shall be based upon interpolations of previously tested fire stop systems that are either sufficiently similar in nature or clearly bracket the conditions upon which the Engineering Judgment is to be given. Additional knowledge and technical interpretations based upon accepted engineering principles, fire science and fire testing guidelines (e.g.: ASTM E2032) may also be used as further support data.
- .10 EJ shall be based upon knowledge of the elements of the construction to be protected and understanding of the probable behaviour of that construction and the recommended fire stop system protecting it were they to be subjected to the adequate standard fire test method for the required fire rating duration.
- .11 EJ shall be limited to the specific conditions and configurations upon which EJ was rendered and should be based upon reasonable performance expectations for the recommended fire stop system under those conditions.
- .12 EJ shall be accepted only for a single specific job and location and should not be transferred to any other job or location without thorough and appropriate review of all aspects of the next job or location's circumstances.
- .13 Manufacturer's Field Reports: submit manufacturer's written reports within 3 days of review, verifying compliance of Work, as described in PART 3 - FIELD QUALITY CONTROL.
- .14 Sustainable Design Submittals:
  - .1 Low-Emitting Materials: submit listing of [paints and coatings] to comply with VOC and chemical component limits or restrictions requirements.

## 1.6 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. Include:
  - .1 WHMIS Safety Data Sheets (SDS).
  - .2 Product data and manufacturer's installation and maintenance instructions for each product/system used on this project.
  - .3 Approved system design listings and Engineering Judgments.
  - .4 Matrix schedule listing all system design listings and Engineering Judgments with a description of their penetration or joint type.
  - .5 Certifications:
    - .1 Proof of training for each worker that performed installation on the Project.
    - .2 Proof of company as a FCIA - Member in Good Standing.
    - .3 Certification of company as a ULC Qualified [or FM 4991 Approved] Firestop Contractor, including the Designated Responsible Individual (DRI) certificate.
    - .4 Accreditation of third-party inspection firm.
  - .6 Manufacturer's field reports.
  - .7 Warranty information on fire stop installations.

- .8 Life expectancy of each product installed as part of Project. For each system, list the installation date of products and the expected expiration date (month/year).
- .3 Record Documentation:
  - .1 Maintain a daily log of all activities on site during the course of construction. Submit a copy of all daily logs after completion of fire stopping work.
  - .2 As-built Drawings:
    - .1 Submit marked-up set of drawings to provide referencing system identifying the location of each fire stop.
    - .2 Identify each penetration type fire stop with their penetration identification number.
    - .3 Provide detailed drawings of system design listings for each type of fire stop (i.e.: through-penetration, membrane penetration, blank opening, construction joint, building perimeter).
  - .3 Fire Stop Schedules:
    - .1 Submit complete fire stop schedules for floors, walls and ceilings.
    - .2 Indicate all penetration fire stops and joint fire stops through each reference wall, floor and ceiling in the schedules.
    - .3 Cross-reference fire stop schedules with as-built drawings and indicate design listing numbers associated to each penetration fire stop and joint fire stop.

## 1.7 QUALITY ASSURANCE

- .1 Provide systems selection and analysis, installation and inspection of fire stop systems in accordance with the recommended practices detailed in the following guides:
  - .1 FCIA Firestop Manual of Practice (MOP).
- .2 Qualifications:
  - .1 Installer: person specializing in fire stopping installations with minimum five (5) years documented experience approved by the fire stopping manufacturer.
  - .2 Manufacturer: company with minimum five (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.

## 1.8 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.
  - .3 Deliver materials to the site in undamaged condition and in original unopened containers, marked to indicate manufacturer and ULC markings.

- .2 Storage and Protection:
  - .1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Replace defective, expired or damaged materials with new.
  - .3 Coordinate delivery of materials with scheduled installation dates to allow minimum storage time on site.
  - .4 Comply with recommended procedures, precautions and measures described in WHMIS Safety Data Sheets (SDS).

## 1.9 FIELD CONDITIONS

- .1 Ambient Conditions:
  - .1 Install fire stops when ambient and substrate temperatures are within the limits prescribed by the manufacturer and when the substrate is dry and without risk of condensation.
  - .2 Maintain manufacturer's recommended ambient and substrate temperatures for 48 hours before and 72 hours after installation.
- .2 Ventilate fire stops in accordance with manufacturers' instructions by natural means or where this is inadequate using forced air circulation.

## 1.10 WARRANTY

- .1 For the Work of this Section 07 84 00 - Fire Stopping, the 12 month warranty period is extended to 24 months.
- .2 Manufacturers shall warrant work of this section against defects and deficiencies in the product material for a period of 24 months. Promptly correct any defects or deficiencies, which become apparent within warranty period at no expense.
- .3 Contractor shall warrant workmanship on materials and installation for a period of 24 months. Promptly correct any defects or deficiencies which become apparent within warranty period at no expense.

## Part 2 Products

### 2.1 MANUFACTURERS

- .1 Provide products from a single manufacturer to the greatest extent possible, to perform all fire stopping work. Materials of different manufacturers will not be permitted without written authorization from Departmental Representative.
- .2 Where there is no specific tested listed fire stop system available from the manufacturer for a particular fire stopping application, provide a listed system from an alternative manufacturer to avoid providing an Engineering Judgment.

### 2.2 DESIGN/PERFORMANCE CRITERIA



- .1 Fire stop and smoke stop systems and systems providing a barrier to smoke spread consisting of a material or combination of materials installed to maintain the integrity of the fire resistance rating of a fire separation in accordance with the requirements of NBC-2015.
- .2 Dynamic joints: where required, fire and smoke stop systems to be designed to accommodate a defined amount of movement to account for expansion or contraction in construction joints and mechanical piping, for movement in structural elements and to accommodate for movement and sound and vibration control in mechanical installations.
- .3 Insulated pipes and ducts: listed fire stop system designed and tested with actual insulation materials penetrating the fire separation, as indicated on the system design listing.
- .4 Architectural considerations: when exposed to view, fire stop system to consider architectural finish, potential traffic, and exposure to moisture and heat.

## 2.3 MATERIALS

- .1 Fire stop and smoke stop systems: in accordance with CAN-ULC-S115.
  - .1 Asbestos-free materials and systems capable of maintaining effective barrier against the passage of flame, smoke and water and the transmission of heat in compliance with requirements of CAN-ULC-S115 and not to exceed opening sizes for which they are intended, as indicated on System Design Listing.
  - .2 Fire stop system rating to match fire resistance rating of fire separation.
  - .3 Service penetration assemblies and fire stop components: certified by test laboratory to CAN/ULC-S115.
- .2 Fire and smoke stop systems at openings intended for re-entry such as cables: provide elastomeric seal or non-shrink foam cement mortar.
- .3 Fire and smoke stop systems at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: provide elastomeric protection.
- .4 Fire and smoke stops behind and around mechanical and electrical boxes within wall, floor and ceiling assemblies: provide elastomeric seal.
- .5 Primers: to manufacturer's recommendation for specific material, substrate, and end use.
- .6 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.
- .7 Packing/damming materials, supports and anchoring devices: to manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.
- .8 Fire stop insulation: pre-formed, semi rigid, non-combustible mineral wool, pre-cut in 1220 mm lengths to required depth and width.
- .9 Junction box / outlet sealing putty: intumescent putty, pre-formed in pads.
- .10 Sealants: good adhesion without use of primer, high visibility safety colours.
  - .1 Flame spread rating: maximum 25.

- .2 Smoke development classification: maximum 50.
- .3 For vertical joints: non-sagging.
- .4 For horizontal joints: single component, self-levelling.

## **2.4 FIRE STOP IDENTIFICATION**

- .1 Identification labels and markings to be indelible for the expected service life of the installation.
- .2 Fire Stopped Penetrations:
  - .1 Provide identification labels at each penetration.
  - .2 Identification labels: adhesive plastic stickers with the following information:
    - .1 Penetration number.
    - .2 Floor number.
    - .3 Room number.
    - .4 Product name and number.
    - .5 System Design number.
    - .6 Fire Rating Required: in hours.
    - .7 Fire Stop Contractor's Name and phone number.
    - .8 Installer's Name.
    - .9 Date of Installation.
    - .10 Re-penetrated by: Company, Installer and Date.
  - .3 Label shall state that the fill material around the penetration is a fire stop system and it shall not be disturbed except by authorized personnel.
- .3 Fire Separation (Barrier) Markings:
  - .1 Provide identification for all vertical fire separations.
  - .2 Identification markings: adhesive tamper evident stickers with lettering at least 75mm in height with a minimum 10mm stroke in contrasting colour.
  - .3 Marking to incorporate the assembly's fire-resistance rating and the following suggested wording, "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS", or other accepted wording.
- .4 Include horizontal painted line, 75 mm in width, between identification markings.

## **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 EXAMINATION

- .1 Verify substrate conditions are acceptable for product installation in accordance with manufacturer's instructions and approved system design listings for each condition.
- .2 Verify each opening/annular space to ensure it does not exceed the maximum and minimum dimensions indicated on the approved system design listing.
- .3 Verify that all joints, service penetrating elements and supporting devices/hangers have been properly installed as indicated on approved system design listings. All temporary lines and markings have been removed to meet the approved system design listings.
- .4 Verify that the proposed fire stop system is composed of components that are compatible with each other, the substrates forming the openings, and the items, if any, penetrating the fire stop under conditions of application and service, as demonstrated by the fire stop manufacturer based on testing and field experience.
- .5 Pipe and duct insulation: confirm that the proposed fire stop system has been tested with the actual insulation penetrating the fire separation on site, as indicated in the approved system design listing. Maintain insulation around pipes and ducts penetrating the fire separation.
- .6 Ensure no additional items have been installed through opening that does not appear on the approved system design listing.
- .7 Ensure areas that are to be fire stopped are accessible for proper application and conditions are suitable for installation of the fire stop system. Areas to remain accessible for inspection.
- .8 Report in writing to Departmental Representative any defective surfaces or conditions affecting the fire stop system installation, immediately and prior to commencing any installations.
- .9 Proceed only once defected surfaces or conditions have been corrected.
- .10 Beginning of installation means acceptance of site conditions.

### 3.3 PREPARATION

- .1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials.
  - .1 Ensure that substrates and surfaces are clean, dry and frost free.
  - .2 Ensure substrates and surfaces are free of dirt, grease, oil, rust, laitance, release agents, water repellents, and any other substances that may affect proper adhesion.
- .2 Prepare surfaces in contact with fire stop and smoke stop materials to manufacturer's instructions.
- .3 Maintain insulation around pipes and ducts penetrating fire separation without interruption to vapour barrier.
- .4 Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.
- .5 Protect adjacent work areas and finish surfaces from damage during product installation.

- .6 Ensure multi-penetration openings have been framed and boarded out, all around the annular opening as indicated in the system design listing prior to prepping the opening.

### 3.4 INSTALLATION

- .1 Install fire stop and smoke stop materials and components in accordance with manufacturer's certified tested system listing.
- .2 Coordinate with other sub-trades to ensure that all pipes, conduits, cables, and other items, which penetrate fire separations, have been permanently installed before installation of fire stop systems.
- .3 Schedule work to ensure that fire separations and all other construction that conceals penetrations are not erected before installation of fire and smoke stop systems
- .4 Protect holes or gaps made by through penetrations, poke through termination devices, and un-penetrated openings or joints to ensure that both continuity and integrity of fire separation are maintained.
- .5 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing per manufacturer's instructions.
- .6 Tool or trowel exposed surfaces to neat finish.
- .7 Remove excess compound promptly as work progresses and upon completion.
- .8 Protect gaps around recessed components (e.g.: panels, electrical boxes, outlets) with sealing putty in accordance with manufacturer's instructions.
- .9 Do not use damaged or expired material.
- .10 Joint Fire Stops:
  - .1 For sealant applications, install joint fillers to support fire stop materials during application. Position joint fillers to ensure fire stop material cross-sectional shape and thickness relative to the joint width allows for optimum sealant movement, while developing the required fire-resistance rating.
  - .2 Install fire stops using techniques recommended by the manufacturer:
    - .1 Fully wetting joint substrates to optimize adhesion.
    - .2 Completely filling recesses provided for each joint configuration.
    - .3 Providing uniform, cross-sectional shapes and thickness relative to joint width that optimize movement capability.
    - .4 Tooling non-sag fire stop materials immediately after their application and prior to the time skinning begins. Form smooth, uniform beads of configuration indicated or required to:
  - .3 Joint Systems and Perimeter Fire Containment Systems:
    - .1 For systems with dynamic joints, ensure movement capabilities of the installation meet or exceed the movement expectations of the system design listing and manufacturer's installation instructions.

### 3.5 IDENTIFICATION

- .1 General:
  - .1 Clean substrate prior to applying identification.
  - .2 Final location of identification to be determined on site.
  - .3 Identification is not required on both sides of the fire separation.
  - .4 Refer to drawings for locations of fire separations and rating required.
- .2 Fire Stopped Penetrations:
  - .1 Install identification label adjacent to each wall/floor service penetrations fire stopped Provide one identification label per single opening or per grouping cluster.
  - .2 Securely apply identification to substrate by providing adequate adhesive.
  - .3 Secure tags with metal fasteners or hang with metal chain or wire.
  - .4 Identification shall be completely filled out and installed prior to requesting substantial performance.

### 3.6 REPAIRS AND MODIFICATIONS

- .1 Identify damaged or re-entered seals requiring repair or modification.
- .2 Remove loose or damaged materials. If penetrating items are to be added, remove sufficient material to insert new elements and to avoid damaging the balance of the seal.
- .3 Ensure that surfaces to be sealed are clean and dry.
- .4 Use only materials that are suitable for repair of original seal, as approved by manufacturer. Do not mix products from different manufacturers.
- .5 Repair all damage resulting from fire stop destructive testing.

### 3.7 FIELD QUALITY CONTROL

- .1 Inspections: notify Departmental Representative when ready for inspection and prior to concealing or enclosing fire stop materials and service penetration assemblies.
- .2 Manufacturer's Field Services:
  - .1 Mock-ups: manufacturer to provide written confirmation that the fire stop system installed meets or exceeds the system design listing requirements for each mock-up application.
  - .2 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.
  - .3 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.
  - .4 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

### 3.8 INSPECTIONS

- .1 Third-Party Inspection Firm: provide the services of a third-party inspection firm to conduct random inspections and direct exploratory review (i.e.: destructive testing) during the course of construction and prior to closing off any concealed areas. Inspections and destructive testing shall be performed in compliance with ASTM E2174 and ASTM E2393.
- .2 Departmental Representative will conduct random inspections and direct exploratory review (i.e.: destructive testing) during the course of construction and prior to closing off any concealed areas. Inspections and destructive testing will be performed in compliance with ASTM E2174 and ASTM E2393.
  - .1 Include for a minimum of 2% for each area of 900 square meters for exploratory reviews for each approved system design listing and each trade involved. Perform cut tests at perimeter joints every 15 meters. Perform cut test at bottom and top of wall joints and wall to wall joints and building expansion joints every 15 meters.
  - .2 Cut out fire stop and remove to ensure fire stop system installation meets or exceeds the system design listing as identified.
- .3 Upon completion of construction and before requesting substantial performance review, fire stop contractor and manufacturer's representative shall inspect all fire stopping work and prepare a deficiency list. Submit deficiency list to Departmental Representative for review. Repair any deficiencies and re-inspect work to ensure that all deficiencies have been completed.
- .4 Submit formal request for substantial performance review of work once all work is completed, quality control has been performed and all fire stop installations have been inspected and identified with the approved fire stop identification labels.
- .5 Departmental Representative will conduct the substantial performance review in the presence of the fire stop contractor and the manufacturer's representative.
- .6 Perform all cutting and removal of systems for visual review by Departmental Representative. After review and acceptance are completed, replace fire stop system with new materials.

### 3.9 FIRE STOPPING LOCATIONS

- .1 Provide fire stop and L-Rated smoke-resistant fire stop systems at:
  - .1 Penetrations through fire-resistance and smoke-resistance rated masonry, concrete, and gypsum board partitions and walls.
  - .2 Penetrations through fire-resistance rated floor slabs/systems, ceilings and roof.
  - .3 Edge of floor slabs at curtain wall and precast concrete panels.
  - .4 Edge of fire-resistant floor or roof assemblies and exterior wall assemblies.
  - .5 Joints at top and bottom of fire-resistance rated masonry and gypsum board partitions. Joints to allow for independent movement.
  - .6 Joints at top and bottom of fire-resistance rated walls where they meet non-rated fire separation assemblies.

- .7 Intersection of fire-resistance rated masonry, concrete and gypsum board partitions.
- .8 Control and sway joints in fire-resistance rated masonry and gypsum board partitions and walls.
- .9 Expansion joints in fire-resistance rated floors, walls, ceilings and roof assemblies.
- .10 Perimeter gaps at curtain wall or other exterior wall assembly and horizontal fire-separation.
- .11 Openings and sleeves installed for future use through fire separations.
- .12 Around mechanical and electrical assemblies/devices penetrating fire separations.
- .13 Mechanical and electrical recessed boxes in walls and partitions.
- .14 Rigid ducts: fire stopping to consist of bead of fire stop material between retaining angle and fire separation and between retaining angle and duct, on each side of fire separation.

**3.10 CLEANING**

- .1 Proceed in accordance with Section 01 74 00 – Cleaning.
- .2 Remove equipment, excess materials and debris and clean adjacent surfaces immediately after application. Use methods and cleaning materials approved by manufacturer.
- .3 Protect fire stops during and after curing period from contact with contaminating substances. Repair all damage.
- .4 Remove temporary dams after initial set of fire stop and smoke stop materials.

**END OF SECTION**

**Part 1 General**

**1.1 REFERENCE STANDARDS**

- .1 ASTM International
  - .1 ASTM C919-18, 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 Safety Data Sheets (SDS).
- .5 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
  - .1 SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.

**1.2 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 WHMIS SDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.

.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 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 in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect joint sealants.
  - .3 Replace defective or damaged materials with new.

**1.5 SITE CONDITIONS**

- .1 Ambient Conditions:
  - .1 Proceed with installation of 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.

## **1.6 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 Safety Data Sheets (SDS) acceptable to Health Canada.

## **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 SELECTION**

- .1 Exposed interior drywall cracks and holes: sealant type: Drywall compound patching sealant.

### **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 Verification of Conditions: verify that conditions of existing substrate 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.

### **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: separate waste materials for recycling.
- .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

**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**