

Part 1 General**1.1 SCOPE**

- .1 The Scope of the work of this Section is to repair and patch holes made in existing building construction and maintain fire separations. Refer to Mechanical and Electrical Sections and drawings for areas that openings in existing construction are required.

1.2 RELATED SECTIONS

- .1 Division 01-General Requirements

1.3 GENERAL DESCRIPTION OF THE WORK OF THIS SECTION

- .1 Provide fire and smoke stop systems consisting of a material, or combination of materials installed to maintain the integrity of the Fire Resistance Rating of the fire separation by maintaining an effective barrier against the spread of flame, smoke, heat and/or hot gases through penetrations, blank openings, construction joints, or at perimeter fire containment in or adjacent to the Fire Separation in accordance with the requirements of the National Building Code.
- .2 This section specifies firestopping material and/or systems intended to act as a fire stop and smoke seal system to protect against the passage of fire, hot gases and toxic smoke within fire separation for the Fire Resistance Rating of a wall, floor, ceiling or roof assemblies for any through-penetration item, membrane penetration poke-through termination device, blanks, gaps, voids or any un-penetrated joint or opening, to form a draft-tight barrier within or between construction assemblies and act to retard the passage of flame, smoke and toxic gases.
- .3 Only tested fire and smoke stop systems shall be used in specific locations as follows and also as indicted in the schedule of firestop locations,including Item 3.4:
 - .1 Service Penetrations for the passage of duct, cable tray, conduit, piping, electrical bus ways and raceways, empty/blank openings through vertical fire separations (walls and partitions), horizontal that have a fire separation (floor/ceiling assemblies), and vertical service fire separation shaft walls and partitions.
 - .2 Openings between structural separation sections of walls or floors that have a fire separation.
 - .3 Joints between the bottom of walls or wall-to-wall joints
 - .4 Joints between the top of walls and ceilings, or floor and roof assemblies, slip joint or concrete shrinkage joint detail
 - .5 Mechanical and electrical recessed boxes through fire resistant membranes
 - .6 Expansion joints in vertical and horizontal fire separations.
 - .7 Systems installed to allow and be designed to accommodate movement (expansion) in all joints as indicated on architectural/structural drawings and specifications and plumbing pipes and sprinkler pipes that require movement during the activation of these systems.

- .8 Openings around structural members which penetrate horizontal and vertical fire separations and their fire resistant membranes.
- .4 All fire separations to have a Fire Resistance Rating to them as indicated on drawings. All Non-rated Fire Separations to be assigned a 60-minute Fire Resistance Rating or an F-Rating of 1-hour minimum. Both sides of a non-rated fire separation to have a tested fire and smoke stop system applied, to match or exceed the F-rating, as indicated.
- .5 All multiple service penetration through a fire separation must have a minimum space equal to the same size of the smallest pipe or greater, minimum 50mm, between pipes to be considered an individual services penetration. Penetrations where the space between penetrating items is less than 50mm or as indicated will be classified as a multi-penetrations and a square or rectangular framed out opening shall be constructed around the penetrations with a fire and smoke stop system applied to the entire opening.

1.4 RELATED WORK

- .1 Fire stopping and smoke seals within mechanical assemblies (i.e. inside ducts, dampers) and electrical assemblies (i.e. inside cable trays) are specified in Division 21, 22, 23 and 26 respectively.
- .2 Firestopping is to be inspected and evaluated as per ASTM 2174 Standard Practice for On-Site Inspection of Installed Firestops. Reports shall be submitted to the Department Representative for review and that the standard has been met.

1.5 REFERENCES

- .1 Underwriters Laboratories of Canada (ULC)
 - .1 ULC-S115-11, Fire Tests of Firestop Systems.
- .2 CAN 4S115-M.2005 or ASTM E814 Test Requirements
- .3 Standard Test Method for Fire-Resistive Joint Systems, ASTM E1966 under designation UL 2079
- .4 Cyclic movement and measuring the minimum and maximum joint width of Architectural Joint Systems, ASTM E1399
- .5 Test Requirements: ASTM E2307, "Standard Test Method for Determining Fire Resistance of Perimeter Fire Barrier Systems Using Intermediate-Scale, Multi-Storey Test Apparatus"
- .6 Standard Tests Method for Surface Burning Characteristics of Building Materials, CAN/ULC S102M or ASTM E84
- .7 Method for Fire tests of Building Construction and Materials CAN/ULC S101 or ASTM E119.
- .8 International Firestop Council Guidelines (IFC) for Evaluating Firestop Systems Engineering Judgements.
- .9 International Firestop Council (IFC) Inspection Guideline and ASTM E2174-04, Standard Practice for On-Site Inspection of Installed Firestop Systems and ASTM E2393-04,

Standard Practice for on-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers.

- .10 M.O.P. Manual of Practice, (MOP) Guideline as set out by the Firestop Contractors International Association (FCIA).
- .11 The National Research Council of Canada, Best Practice Guide On Firestops and Fire Blocks and Their Impact On Sound Transmission, 2007 3rd Draft.
- .12 National Building Code and the Provincial Building Code of the Province that the Authority Having Jurisdiction is responsible for.
- .13 NFPA 101-Life Safety Code
- .14 Canadian Electrical Code
- .15 Approval standard for approval of Firestop Contractor FM 4991, Factory Mutual Research Corporation.

1.6 QUALITY ASSURANCE

- .1 Work is to be undertaken by experienced Site Supervisor in their trade of material or system being used.
- .2 All workers including the site supervisor shall be certified by the manufacturer of the products and systems proposed for the Installation of this product. Proof of this certification will be required 48-hours after award of the project.
- .3 Firestop sub-trade to be a member of the Firestop Contractors International Association (FCIA) and be in good standing with this association. Contractor to provide within 48 hours after award of the project proof of their association of the FCIA.
- .5 Manufacturers shall provide a letter in writing within 48 hours after award of the project that the Engineered Judgements shall be provided by their Fire Protection Engineer(s) as required to suit building conditions. All Engineered Judgements shall conform to IFC guidelines and the manufacturer shall be a member in good standing with the IFC or FCIA. Proof of membership to the IFC or FCIA shall be submitted within 48 hours after award of the project.
- .6 A Manufacturer's Qualified National or Local representative to be on-site during initial mock-up installation of firestop systems to ensure the mock-ups have been installed based on the approved design system listings and to train appropriate sub-contractor personnel in proper selection and installation procedures.
- .7 Firestop Systems do not re-establish the structural integrity of load bearing partitions/assemblies, or support live loads and traffic. Installer shall consult the structural engineer prior to penetrating any load bearing assembly.
- .8 For those firestop applications that exist for which no ULC or cUL tested system is available through a manufacturer, a Manufacturer's Engineered Judgement derived from similar ULC or cUL system designs or other tests will be submitted to local Authorities Having Jurisdiction for their review and approval prior to installation. Engineered Judgement drawings must follow requirements set forth by the International Firestop Council Guidelines.

- .9 A single source of Manufacturer Product shall be used on this project. Materials of different manufacturers shall not be acceptable, unless the manufacturer can not provide a design listed system for a particular firestop installation, another manufacturer shall be used to avoid providing an Engineer Judgement.

1.7 SAMPLES

- .1 Submit samples in accordance with Section 01 00 10 – General Instructions.

1.8 SHOP DRAWINGS

- .1 Submit shop drawings in accordance with Section 01 00 10 – General Instructions.
- .2 Submit shop drawings to show proposed material, reinforcement, anchorage, fastenings and method of installation. Construction details should accurately reflect actual job conditions.
- .3 Submit Shop Drawings/Design System Listings, product data and Material Safety Data Sheets (MSDS) in accordance with Section 01 00 10 – General Instructions. All manufacturer product data and MSDS items must show that their information has been updated on a regular basis. The submitted literature must bear a date that is less than two (2) years old from the date received by the Departmental Representative, otherwise it will be rejected. Additionally, the following product data on each proposed product shall be submitted: .
 - .1 Technical data on out-gassing; off-gassing and age testing. .
 - .2 Curing time. .
 - .3 Chemical compatibility to other construction materials.
- .4 Provide 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.
 - .1 According to ASTM E595.
 - .2 Test Method: Environmental Protection Association, EPA Method 24.
 - .3 Indoor Environmental Quality: Volatile Content: below 250 g/l. .
 - .4 **DO NOT** use silicone firestops.
- .5 Design System Listings shall show proposed material, including technical data, reinforcement, anchorage, fastenings and method of installation. Construction details shall accurately reflect actual job conditions.
- .6 Manufacturer may submit product data for materials and prefabricated devices, provided that descriptions are sufficient for identification at job site. Include Manufacturer's printed instructions for installation.
- .7 Provide ULC or cUL Design System Listings complete with product literature and MSDS sheets on each system for each application, for each area as indicated.
- .8 When more than one product is specified for the firestop Design Listing System or more than one backing/daming material is indicated, the firestop trade shall circle the item that they have chosen to use on this project.

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- .9 Provide a list (matrix) of products, identifying the following for each.
- .1 Product name. .
 - .2 Shelf life (expiry date). .
 - .3 Life expectancy. .
 - .4 Temperature range for installation. .
 - .5 Humidity range for installation.
- .10 Where there is no specific tested Design System Listings available by the chosen Project Manufacturer for particular firestop configuration, the Firestopping Sub-Trade shall review all other manufacturers in North America to attempt to obtain a Design System Listing, failing to obtain a system, the Firestopping Sub-Trade shall obtain from the Manufacturer an Engineered Judgement (EJ) for submittal. Each EJ shall come with a drawing of the proposed system, a description of the system, Project Name and Room Name/Number that the EJ is located in, copies of all referenced Design Listings and signed/dated by the Manufacturer's Fire Protection Engineer. Note: Once the EJ has been reviewed, the Contractor shall submit the EJ to the Authority Having Jurisdiction (AHJ) for final approval.
- .11 Engineering Judgements (EJ's)
- .1 EJ's shall be issued in lieu of tested systems when a tested Design Listing is not available for the current on site conditions.
 - .2 EJ's shall be issued only by firestop manufacturer's qualified technical personnel or, in concert with the manufacturer, by a knowledgeable registered Professional Engineer, or Fire Protection Engineer, or an independent testing agency that provides listing services for firestop systems.
 - .3 EJ's shall be based upon interpolations of previously tested firestop systems that are either sufficiently similar in nature or clearly bracket the conditions upon which the judgement is to be given. Additional knowledge and technical interpretations based upon accepted engineering principles, fire science and fire testing guidelines (e.g. ASTM E2031- Standard Guide for Extension of Data from Fire Endurance Tests) may also be used as further support data.
 - .4 EJ's shall be based upon full knowledge of the elements of the construction to be protected and understanding of the probable behavior of that construction and the recommended firestop system protecting it were they to be subjected to the appropriate Firestop Standard Fire Test method for the required fire rating duration.
 - .5 EJ's shall be limited to the specific conditions and configuration upon which the engineering judgement was rendered and should be based upon reasonable performance expectations for the recommended firestop system under those conditions.
 - .6 EJs 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.
 - .7 EJ's shall be accepted in jurisdictions that permit Alternative Methods per applicable building Codes.
- .12 Submit design listings / shop drawings as follows:
- .1 Submit design listing/ shop drawings in accordance with section 01 00 10 – General Instructions.

- .2 Bind shop drawings in a minimum of seven (7) vinyl hard covered Acco Customized three D-ring binders for 215 x 280mm size paper. Note: Binders not to be more than 2/3 full.
- .3 Enclose title sheet, labelled "Fire and Smoke Stop System Drawing Design System Listings", project name, date and installation company name and Manufacturer of products name. Insert title in front and spine of binder.
- .4 Include a Table of Contents at the front of each binder.
- .5 Provide a list of each proposed Design Listing and corresponding service penetration type or joint type in a matrix spreadsheet schedule, indicating floor and wall system, including rating for each.
- .6 Provide a list of each proposed Design Listing with approximate total quantity or amounts of each listing per floor on separate sheet.
- .7 Each penetration shall be numbered corresponding to the exact same number of the plate penetration no. that is identified in Item No. 2.1.12.
- .8 Organize each floor, wall and ceiling area indicating each room number, labelled with tabs of celluloid covers fastened to hard paper dividing sheets.
- .9 Provide copies of all fire and smoke stop system ULC or cUL Design No. listings for each penetration type for all areas located.
- .10 Provide product data, MSDS and all other technical data information required as indicated in Item No. 1.6.
- .11 Provide certifications of each installer proposed on working on the Project.

1.9 PRODUCT DATA

- .1 Submit product data in accordance with Section 01 00 10 – General Instructions.
- .2 Submit manufacturer's product data for materials and prefabricated devices, providing descriptions are sufficient for identification at job site. Include manufacturer's printed instructions for installation.

1.10 DELIVERY, STORAGE AND HANDLING

- .1 Deliver materials undamaged in manufacturer's clearly labelled, unopened containers, identified with brand, type, and ULC or cUL label, complete with batch number, manufacturing date and shelf life expiry date.
- .2 All products that are delivered to site, must have a minimum of 75% of it's shelf life still remaining on it, from date of delivery on site, otherwise the product will be rejected and removed from the site.
- .3 Coordinate delivery of materials with scheduled installation date to allow minimum storage time at job-site.
- .4 Store materials under cover and protect from weather and damage in compliance with manufacturer's requirements, including temperature restrictions.
- .5 Comply with recommended procedures, precautions or remedies described in Material Safety Data Sheets (MSDS) as applicable.
- .6 Do not use damaged or expired material.

1.11 ENVIRONMENTAL REQUIREMENTS

- .1 Do not install firestopping when ambient or substrate temperatures are outside limits permitted by Manufacturers or when substrates are wet, due to rain, frost, condensation, or other causes.
- .2 Maintain this minimum temperature before, during and for three (3) days after installation of materials.
- .3 Ventilate firestopping per Manufacturers' instructions by natural means or, where this is inadequate, forced air circulation.
- .4 During installation, provide masking and drop sheets to prevent firestopping materials from contaminating any adjacent surfaces.
- .5 Do not use materials that contain flammable solvents.
- .6 Water based products are unacceptable in wet areas or areas that may be subject to occasional flooding.

1.12 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 00 10 – General Instructions.
- .2 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan.

1.13 SUBMITTALS

- .1 Submit the following documentation to support Sustainable Considerations:
 - .1 Product Data. – MSDS,, Spec Sheet, Product Label, , post consumer and post industrial recycled content, weight, VOC compliance, Environmental Certification if available. (materials)

1.14 MOCK-UP

- .1 Submit Mock-Ups in accordance with Section 01 00 10 – General Instructions.
- .2 After Design System Listings Shop Drawings are reviewed by the Departmental Representative, the Pre-Construction meeting is held and one-week prior to actual commencement of construction, provide field sample mock-up of each proposed ULC or cUL system for this project for Departmental Representative review. This mock-up shall also include if required, work by other trades, to provide the required finish work, such as steel stud / gypsum board trade framing out multi-penetrations openings.
- .3 Mock-up locations shall be directed by the Departmental Representative.
- .4 Once mock-ups have been completed and materials have had adequate time to properly cure, notify the Departmental Representative to perform their review. Minimum 48 hours is required to be given to the Departmental Representative.

- .5 Reviewed mock-ups shall become the standards of workmanship and material against which installed work will be checked. Reviewed and approved mock-ups may be used in final construction.
- .6 Install identification penetration plate no. adjacent to each penetration.
- .7 Local or National representation from the manufacturer shall be present during the Departmental Representative mock-up review.
- .8 The Departmental Representative shall provide Observation and Destructive Tests to each Mock-Up to ensure the mock-up firestop system meets or exceeds the approved Design System Listing. The Firestop Sub-Trade to include for all costs of these mock-ups, including cutting or removing the system to allow for visual review and then the replacement or re-installation of the system.
- .9 Upon completion of the review, the National and Local representative shall provide in writing to the Departmental Representative that their review finds the mock-ups acceptable by the manufacturer and meets or exceeds the ULC or UL design system listing requirements for each mock-up application.
- .10 Retain and maintain mock-ups during construction in an undisturbed condition as a standard for judging completed unit of work. Accepted mock-ups in an undisturbed condition at time of Substantial Performance may become part of completed unit of work.

1.15 DEFINITIONS

- .1 **Firestops:** specially tested materials or combination of materials used to establish or re-establish the integrity of a fire rated wall, floor, ceiling or roof assembly or other partition after the structure has been breached for the through-penetration of building service items or to close off openings left due to construction methods to prevent or limit the spread of fire, heat, gasses and smoke.
- .2 **Through-penetration:** opening or foreign material, pipes, conduits, ducts, cable trays, cable, wire, structural components or any other element passing completely through an opening in a fire rated barrier/assembly such that the full thickness of the rated material(s) is breached either in total or in part.
- .3 **Membrane penetration:** any penetration of a fire rated barrier that breaches one side but does not pass completely through to the other side, including recessed electrical devices.
- .4 **System:** the combination of specific materials and/or devices, including the penetrating item(s) required to complete the firestop, as tested by an independent third party test facility.
- .5 **Barrier/Assembly:** a wall, floor, ceiling or roof assembly or other partition with a fire-smoke rating of 0,1, 2, 3 or up to 4-hours.
- .6 **Fire Resistive Joint:** any joint or opening, whether static or dynamic, within or between adjacent sections of fire rated interior or exterior walls, floors, ceilings or roof decks.
- .7 **Fireblocking:** Building materials installed to resist the free passage of flame, smoke and noxious gases to other areas of the building through concealed spaces.

- .8 **Perimeter Fire Barrier System:** The perimeter joint protection that provides fire resistance to prevent the passage of fire from floor to floor within the building at the opening between the exterior wall assembly and the floor assembly.
- .9 **Intumescent:** Materials that expand with that to seal around objects threatened by fire.
- .10 **F-Rating:** the time a firestop, penetrating item, building, material, firestop material, can withstand direct flame without a burn through as tested to CAN4-S115 /ULC-S115 or ASTM E814/UL 1479.
- .11 **T-Rating:** the amount of time a through-penetration firestop limits the temperature rise on the cold side-outside the test furnace – as tested to CAN4-S115 /ULC-S115 or ASTM E814/UL 1479.
- .12 **L-Rating Water Leakage Test:** introduced by Underwriters Laboratories on August 9, 2004 for systems tested and listed in accordance with ANSI/UL 1479.
- .13 **Non-Rated Fire Separations:** to be a separation that prevents the passage of fire and smoke for time period that allows the fire suppression system to be activated and contain the fire. For the purpose of this project, all Non-Rated Fire Separations as indicated on drawings to be assigned a minimum time of 60-minutes Fire Resistance Rating and shall be fire stopped on both sides of the fire separation.
- .14 **Single Penetration:** one service penetration through a fire separation.
- .15 **Multi-Penetration:** two or more service penetration through a fire separation where the minimum space between pipes must exceed 50mm and where sizes of pipe are larger than 50mm, the space must be larger than the largest pipe between. (Example, one – 100mm diameter pipe and one – 150mm diameter pipe, the space between pipes must be greater than 150mm or otherwise the penetration will be considered a multi-penetration, when passing through a fire rated gypsum board partition.) These gypsum board partitions must be framed out on all four sides with studs to match the ULC Design Wall of Floor System and the annular space must be boarded with rated gypsum board to match the ULC Design Wall or Floor System.

1.16 DAILY WORK SHEETS

- .1 Firestop sub-trade, superintendent shall keep a daily log of all activities on site during the course of construction. The Departmental Representative to distribute a copy of proposed sample sheet for firestop sub-trade to utilize during the course of construction at the start up meeting.
- .2 Departmental Representative shall make periodic reviews of these worksheets during the course of construction.

1.17 AS-BUILTS

- .1 Firestop sub-trade, shall provide as-built drawings, project manual schedules and firestop drawing details on site and make them available for periodic review by the Departmental Representative.
- .2 These drawings, schedules and details shall be marked up on weekly basis showing all alterations, changes and confirmation of each Design Listing in relationship to the project schedules when provided as part of the bid document.

- .3 The sample sheet schedule for floors, walls and ceilings are attached to this section pages PRIOR TO THE END OF THE SPECIFICATION SECTION
- .4 All service penetrations or joints through each reference wall, floor and ceiling shall be indicated in the corresponding schedules. All information shall be recorded by indicating and imputing all required descriptions for each column based on the actual on-site condition. These schedules shall be turned over to the Departmental Representative at the end of the project for electronic imputing for the owner maintenance use.
- .5 Submit as-builts as per Section 01 00 10 – General Instructions.

1.18 MAINTENANCE DATA AND MATERIAL

- .1 Provide Operation and Maintenance Data and Material for Fire and Smoke-Stop Systems to incorporate into the Manual as specified in Section 01 00 10 – General Instructions.
- .2 Incorporate the following materials in the Operation and Maintenance Manual:
 - .1 Material Safety Data Sheets (MSDS)
 - .2 Product literature of each product used on this project.
 - .3 Approved Design Listings and Engineer Judgements
 - .4 Matrix schedule indicating all Design Listings and EJs and matching them to the penetration or joint type. Included in this schedule shall be a quantity of each Design Listing/EJ on each floor.
 - .5 Daily Worksheets.
 - .6 Certification:
 - .1 Manufacturers Certification cards of each installer that performs installation on the project.
 - .2 Written certification of FCIA Association.
 - .3 Written letters from the Manufacturers accepting installing during:
 - .1 Mock-ups
 - .2 Substantial Performance
 - .7 Warranty: .1 Manufacturers warranty .2 Fire Stop Sub-Trade warranty
 - .8 Life expectancy of each product installed on this project. List date of installation for each product and when the month / year of the expected expiration of each product.
 - .9 Firestopping schedules when applicable with the incorporation of all assembly identification penetration plate numbers and all Design Listings indicated. (Hard copies and electronic format, CD).
 - .10 Construction and progress photographs Section 01 10 00.
- .3 Contractors to provide a mark-up as-built of all schedules when applicable, to the Departmental Representative two (2) weeks prior to requesting total performance on the Project. The Departmental Representative will incorporate these changes to the schedule (including adding assembly identification penetration plate numbers and Design Listings) and provide back to the contractor, an electronic CD format copy and a hard copy for submission of Operation and Maintenance Manual.

Part 2 Products**2.1 MATERIALS**

- .1 Fire stopping and smoke seal systems: in accordance with ULC-S115-11: Fire Tests of Firestop Systems or ASTM E814..
 - .1 Asbestos-free materials and systems capable of maintaining an effective barrier against flame, smoke, water and gases in compliance with requirements of ULC-S115-11 or ASTM E814 and not to exceed opening sizes for which they are intended, in accordance with ULC or cUL Design Numbers or other Design System Listings acceptable to the Authority having Jurisdiction.
 - .2 Firestop system rating: shall be flexible to allow for movement of building structure (refer to architectural and structural drawings) and penetrating items without affecting the adhesion or integrity of the system.
- .2 Fire-stop Methods:
 - .1 Method 1 : non-combustible, semi-rigid, felt; minimum density 65 kg per cu/m³; depth 100 mm, length 1200 mm; width as required. Blanket type fire-stop to be listed, and labelled in accordance with file Guide 40-U19.13. Impale - clips; galvanized wire or 25 mm x 0.65 mm thick galvanized steel Z-clips with dimensions to match location of fire stop material and width of opening being sealed.
 - .2 Method 2: as per Method 1, without impale - clips.
 - .3 Method 3: Hose stream UL/cUL (Underwriters Laboratories USA) labelled.
 - .4 Method 4: Hose stream, fluid, gas and fire resistant elastomeric seal or non-shrink foam cement mortar proprietary certified assembly of a listed manufacturer.
 - .5 Methods 1 to 4: Methods used can be as per manufacturer's instructions, provided that their system employed meets or exceed the requirements of ULC/CAN4-S115-M2005 or ASTM E814
- .3 Mechanical or Electrical service: penetration assemblies; certified by ULC in accordance with CAN4S115-M2005 or ASTM E814 and listed in the ULC Guide No. 40 U19.
- .4 Service-penetration firestop components: certified by ULC in accordance with CAN4S115-M2005 or ASTM E814 and listed in the ULC Guide No. 40 U19.
- .5 Sleeves shall only be used in concrete block and cast-in-place concrete assemblies and then only if the sleeve is built into the assembly. Sleeves shall not be installed where penetrations are made following construction of an assembly.
- .6 All firestop material is to be from one manufacturer.
- .7 The firestop installer is to be registered in good standing with the Firestop Contractors International Association (FCIA) or CFFM approved equivalent for at least two years prior to contract award.
- .8 Fire-resistance rating of installed fire-stopping assembly not less than fire-resistance rating of surrounding substrate assembly (floor/wall etc). Fire-resistance rating of installed fire stopping assembly in accordance with NBC.
- .9 In addition to NBC requirements Department Representatives require firestopping to be installed at :
 - .1 Head of wall joints;

- .2 The point of intersections between dissimilar fire separation assemblies- ie between concrete block and gypsum
- .3 Penetrations through any membrane forming part of a fire separation
- .4 Structural penetrations and
- .5 Floor-perimeter firestop systems. Until ULC listed firestop systems are available for curtain-wall installation. UL listed systems are acceptable for this application.
- .10 Fire stopping and smoke seals at openings intended for ease of re-entry such as cables: elastomeric seal, or non-shrink foam cement mortar: do not use cementitious or rigid seal at such locations.
- .11 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal. Do not use a cementitious or rigid seal at such locations.
- .12 Primers: to manufacturer's recommendation for specific material, substrate, and end use.
- .13 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.
- .14 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.
- .15 Sealants for vertical joints: non-sagging and having a flame spread of not more than 25 and a maximum smoke development classification of 100 for walls and 50 for ceilings.
- .16 Assembly identification penetration plate all fire/smoke stop systems that are installed are required to be identified by assembly adhesive label over a piece of 0.9 mm (20 gauge) aluminium metal backer plate; all plates to be adhered to walls/floors by acceptable adhesive to the backside of the plate. Lettering on all plates shall be printed as follows:
 - .1 Plate Penetration No.:
 - .2 Floor Level:
 - .3 Room no.:
 - .4 Product:
 - .5 ULC or cUL System
 - .6 Fire Rating Required: hour(s)
 - .7 Firestopping Contractor's Name:
 - .8 Phone no. of Firestopping Contractor:
 - .9 Installer's Name:
 - .10 Date of Installation:
 - .11 Re-penetration by:
- .17 Penetration plate shall state that the fill material around the penetration is a fire stop system and it shall not be disturbed except by authorized personnel.
- .18 Fire Separation (Barrier) Markings: All vertical fire separations within ceiling spaces to be identified by continuously painted red 75mm high stencil along upper wall. Marking to be

painted 600 mm below horizontal fire separation or roof structure unless otherwise indicated. Final location to be determined on-site. Refer to drawings for locations of fire separations and rating required. Each rating shall be indicated every 6000 mm o.c. with 75 mm high red painted line in between. A schedule of Fire separations/and Symbol to designate Fire Resistant rating is to be used.

Schedule of Fire Separations

| | Symbol | Fire Resistance Rating |
|----|---------------|-------------------------------|
| .1 | -- N/R -- | Non-Rated Fire Separation |
| .2 | -- 1.0 -- | 1 Hour Fire Separation |
| .3 | -- 1.5 -- | 1.5 Hour Fire Separation |
| .4 | -- 2.0-- | 2 Hour Fire Separation |
| .5 | -- 3.0 -- | 3 Hour Fire Separation |
| .6 | -- 4.0 -- | 4 Hour Fire Separation |

2.2 PRODUCT SYSTEMS

- .1 Single source responsibility: obtain firestop systems for each kind of penetration and construction condition indicated from a single manufacturer.
 - .1 Materials of different manufacturers shall not be intermixed on the project.

2.3 ACCEPTABLE FIRE STOP APPLICATORS

- .1 *Departmental Representative to provide acceptable fire stop applicators in Ottawa Area.*

Part 3 Execution

3.1 EXAMINATION

- .1 Verify substrate conditions, previously installed are acceptable for product installation in accordance with manufacturer's instructions and approved design system listings for each condition.
- .2 Ensure that opening / annular space does not exceed the maximum and minimum size or dimensions that is indicated on the approved Design Listing.
- .3 Verify that all joints, service penetrating elements and supporting devices/hangers have been properly installed as indicated on Approved Design Listings. All temporary lines and markings have been removed to meet the approved Design System Listings for condition has been identified.
- .4 Verify that the proposed Firestopping system is composed of components that are compatible with each other, the substrates forming the openings, and the items, if any, penetrating the firestopping under conditions of application and service, as demonstrated by firestopping manufacturer based on testing and field experience.
- .5 Ensure no additional items have been installed through opening that does not appear on the approved Design Listing.

- .6 Ensure areas that are to be firestopped are accessible for proper application and conditions are suitable for installation of a firestop system. All areas must also be accessible for inspection.
- .7 Report in writing to the Departmental Representative any defective surfaces or conditions affecting the firestop system installation, immediately and prior to commencing any installations.
- .8 Proceed only when defected surfaces or conditions have been corrected.
- .9 Ensure temperature within the areas of installation meets or exceeds the minimum temperature range for the products that will be installed in those areas, as based on the manufacturer's recommendations for a minimum two days prior and three days after installation.
- .10 Beginning of installation means acceptance of site conditions.

3.2 PREPARATION

- .1 Protect adjacent work areas and finish surfaces from damage during product installation.
- .2 Provide drop sheets or other satisfactory coverings for protection of adjacent areas in accordance with safe and good work practices.
- .3 In areas to be fire stopped ensure that substrate and service penetrations are clean, dry and frost free.
- .4 Use masking tape to prevent firestopping from contacting adjoining surfaces that will remain exposed upon completion of work. Remove tape as soon as it is possible to do so without disturbing the firestopping seal with substrates.
- .5 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials.
- .6 Prepare surfaces in contact with firestopping materials and smoke-seals to manufacturer's instructions.
- .7 Maintain insulation around pipes and ducts penetrating fire separation. Confirm that fire stop system has been tested with actual pipe or duct insulation penetrating fire separation that is indicated in the approved ULC or UL Design System Listing.
- .8 Surfaces to which firestop materials are to be installed, shall be free of dirt, grease, oil, rust, laitance, release agents, water repellents, and any other substances that may affect proper adhesion.
- .9 Ensure that multi-penetration openings have been framed and boarded out, all around the annular openings as indicated in the Firestopping Detail Drawings prior to preparing the opening.
- .10 Confirm that the temperature and humidity conditions during and after installation are being maintained as per manufacturers' recommendations.
- .11 One certified Fire-Stopping installer is to install all fire-stopping on this project. Co-ordinate all requirements with all penetrations, including structural locations, mechanical and electrical locations.

- .12 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials. Ensure that substrates and surfaces are clean, dry and frost free.
- .13 Prepare surfaces in contact with fire stopping materials and smoke seals to manufacturer's instructions.
- .14 Maintain insulation around pipes and ducts penetrating fire separation.
- .15 Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

3.3 INSTALLATION

- .1 Install fire stopping and smoke seal material and components in accordance with manufacturer's instructions and rated system as tested to ULC/CAN4-S115, and ULC or UL Design System Listings.
- .2 Coordinate with other Sub-Trades to assure that all pipes, conduit, cable and other items which penetrate fire separations have been permanently installed prior to installation of firestop systems.
- .3 Schedule the work to assure that fire separations and all other construction that conceals penetrations are not erected prior to the installation of fire and smoke stop systems.
- .4 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.
- .5 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.
- .6 Tool or trowel exposed surfaces to a neat finish.
- .7 Remove excess compound promptly as work progresses and upon completion.
- .8 Seal all voids between new fire rated wall assemblies and new or existing building walls to form a draft-tight barrier and act to retard the passage of flame, toxic gases and smoke.
- .9 Install firestop material to obtain fire resistance rating not less than the fire resistance rating of surrounding floor and wall assembly.

3.4 INSPECTION

- .1 Notify Department Representative when ready for inspection and prior to concealing or enclosing firestopping materials and service penetration assemblies.
- .2 Examination of all fire stopping required by Certified personnel contracted by the contractor.
- .3 An examination of the fire-stopping system shall determine if the assembly is installed as per its ULC listing
- .4 Firestopping is to be inspected and evaluated as per ASTM2174 Standard Practice for On-Site Inspection of Installed Firestops. Reports shall be submitted to the Departmental Representative for review and that the standard has been met.

- .5 Destructive testing is to be included, and subsequent repair of installation of fire-stopping, so that the standards are met.
- .6 The reviews and inspections are to occur, and be reported to the Departmental Representative prior to “close-up” to confirm assembly components and installation configuration.
- .7 The firestopping sub-trade shall do all cutting and removal of the systems for visual review from the Departmental Representative and local manufacturer’s Representative. Once the review is completed and accepted the firestopping sub-trade shall replace the firestop system with new. All costs for cutting removing and replacement shall be included in the base bid.
- .8 Firestopping Sub-Trade shall include for a minimum of 2% of each Design Listing for each area of 90m2 (based on ASTM E2174) for such exploratory reviews per approved Design System Listings. Perimeter Joints shall have a minimum cut test every 15 meters (based on ASTM #2393). Bottom and top of wall joints, wall to wall joints and building expansion joints shall have a minimum cut test every 15 meters.

3.5 SCHEDULE

- .1 Firestop and smoke seal at:
 - .1 Penetrations through fire-resistance rated masonry, concrete, and gypsum board partitions and walls.
 - .2 Top of fire-resistance rated masonry and gypsum board partitions.
 - .3 The point of intersection between dissimilar fire separation assemblies.
 - .4 Intersection of fire-resistance rated masonry and gypsum board partitions.
 - .5 Control and sway joints in fire-resistance rated masonry and gypsum board partitions and walls.
 - .6 Penetrations through fire-resistance rated floor slabs.
 - .7 Penetrations through any membrane forming part of a fire separation
 - .8 Structural penetrations.
 - .9 Head of wall joints.
 - .10 Openings and sleeves installed for future use through fire separations.
 - .11 Around mechanical and electrical assemblies penetrating fire separations.
 - .12 Rigid ducts: greater than 129cm²: fire stopping to consist of bead of fire stopping material between retaining angle and fire separation and between retaining angle and duct, on each side of fire separation.
 - .13 Around electrical boxes that penetrate through the membrane of a fire separation as required under NBC 2010.

3.6 INSTALLING FIRESTOP JOINT SYSTEMS

- .1 Install joint fillers to provide support of firestop materials during application and at the position required to provide the cross-sectional shapes and depths of installed firestop material relative to joint widths that allow optimum sealant movement capability and develop fire-resistance rating required.

- .2 Install systems by proven techniques that result in firestop materials as recommended by the manufacturer:
 - .1 directly containing and fully wetting joint substrates.
 - .2 completely filling recesses provided for each joint configuration, .
- 3 providing uniform, cross-sectional shapes and depths relative to joint width that optimize movement capability.
- .4 Tool non-sag firestop materials immediately after their application and prior to the time skinning begins. Form smooth, uniform beads of configuration indicated or required to:
 - .1 produce fire-resistance rating
 - .2 to eliminate air pockets
 - .3 to ensure contact and adhesion with sides of joint.

3.7 INSTALLATION OF ASSEMBLY IDENTIFICATION PENETRATION PLATE

- .1 Install adjacent to all through wall/floor service penetrations firestopped and at joint penetrations. Provide one assembly identification plate per penetration opening and one assembly identification plate at every 6000mm along wall/floor joints.
- .2 Penetration plate shall be completely filled out and installed prior to requesting substantial performance.
- .3 Clean substrate prior to applying penetration plate.
- .4 Securely apply penetration plate to substrate, by providing adequate adhesive.

3.8 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. Cause no damage to the balance of the seal.
- .3 Ensure that surfaces to be sealed are clean and dry. Install materials in accordance with specified installation requirements herein. Use only materials approved by manufacturer as suitable for repair of original seal. Do not mix different manufacturer's products.

3.9 MANUFACTURER'S FIELD QUALITY

- .1 Representative from Manufacturer shall perform periodic observations of firestopping systems:
 - .1 Examine firestop penetration seals for proper installation, labelling, adhesion and curing as may be appropriate for the respective seal material.
 - .2 Keep areas of work accessible and notify Departmental Representative, code authorities and/or designated inspectors of work completion released for Departmental Representative review.
 - .3 Document completion and observation as required.

3.10 CLEAN UP

- .1 Remove excess materials and debris and clean adjacent surfaces immediately after application.
- .2 Remove temporary dams after initial set of fire stopping and smoke seal materials.

3.11 SAMPLE FIRESTOPPING SCHEDULE

| Ref No. | Drwg No. | Room No. | Wall type | ID Plate No. | Photo Number | Description | Size | FS No. | Design No. | Penetration Notes |
|---------|----------|----------|-----------|--------------|--------------|-------------|------|--------|------------|-------------------|
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END OF SECTION