

SECTION 07 21 00

INSULATION

PART 1: GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, Details of Construction and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work specified in this section.

1.02 SUMMARY

- A. Section includes product specification of the following:
 - 1. Cavity wall insulation used primarily as cavity wall insulation in masonry.
 - 2. Rigid wall insulation used primarily with metal 'Z' furring on sheathed and masonry walls.
 - 3. Batt insulation used with interior stud wall construction.
 - 4. Vapor barriers used under slab, and in combination with batt insulation in walls.
- B. Installation of insulation specified in other sections:
 - 1. Unit Masonry – Section 04 20 00/04 27 13
 - 2. Carpentry – Section 06 10 53
 - 3. Gypsum Board – Section 09 21 16
 - 4. Acoustical Ceilings – Section 09 51 00
 - 5. Membrane Waterproofing – Section 07 13 00
- C. Related work specified in other sections:
 - 1. Roofing Insulation – Applicable sections in Div. 7
 - 2. Polyurethane Foam Insulation – Section 07 21 29

1.03 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver material to the site in unopened packages, with identification labels intact.
- B. Store under water-resistant cover and protect from weather and direct sunlight.
- C. Remove damaged materials from site.

1.04 ENVIRONMENTAL REQUIREMENTS

- A. Do not install rigid insulation (on vertical surfaces with adhesive) when temperature is below 40° F., during rain or wet weather, or when surfaces are wet.

1.05 SCHEDULING

- A. Coordinate installation with other trades whose work may be affected or have effect.

PART 2: PRODUCTS

2.01 MATERIALS

A. Rigid Board Insulation: Rigid closed cell extruded polystyrene thermal board insulation as manufactured by Amoco Foam Products, Diversifoam Products, Dow Chemical, Pactiv Building Products and Owens Corning.

1. Thermal Resistance: Aged R-value per inch of 5 at 75° F mean temperature per ASTM C518.

a. Perimeter Insulation and Cavity Wall Insulation:

- 1) Conforming to ASTM C578-95 type IV.
- 2) Compressive strength: 25 psi per ASTM C203.
- 3) Minimum per rating at 2" thickness: .55

b. Rigid Wall Insulation:

- 1) Conforming to ASTM C578-95 type X.
- 2) Compressive strength: 15 psi per ASTM C203.

c. Traffic Deck Insulation:

- 1) Conforming to ASTM C578-95 type VII.
- 2) Compressive strength: 60 psi per ASTM C203.

B. Batt Insulation: Unfaced fiberglass batt as manufactured by Certain Teed, Johns Manville, and Owens Corning.

1. Thermal resistance: Minimum R-value of 3.3 per inch per ASTM C518.
2. Conforming to property requirements of ASTM C665, type 1 and ASTM E136.

C. Masonry Core Insulation: Core-Fill 500 as manufactured by Tailored Chemical Products (1-800-627-1687/www.core-fill500.com) or equal. Two component system containing a plastic resin and a catalyst foaming agent surfactant together with compressed air to produce a foam insulaton with the following minimum performance standards:

1. Shrinkage: 2% maximum.
2. Surface Burning Classification and Characteristics (ASTM E 84)
 - a. Class A
 - b. Maximum flame spread: 25
 - c. Smoke developed: less than 450
3. Minimum Thermal Values: ASTM C-177
 - a. "R" Value of 4.0/inch at 75 degrees F mean.
 - b. "R" Value of 4.7/inch at 32 degrees F mean.
4. Sound Abatement
 - a. Minimum Sound Transmission Class ("STC") rating of 50 for 8" masonry wall

F. Vapor Barriers:

1. Walls: Glass reinforced or laminated polyethylene sheet, minimum perm rating, 0.1 when tested in accordance with ASTM-E96, Procedure A.
 - a. Manufacturers/Products: Fortifiber "Moistop", Rufco SS-300, Glas-Krafat, inc.

- b. Vapor Barrier Tape: Compatible polyethylene self adhesive tape recommended by vapor barrier manufacturer.
- c. Adhesive: Manufacturers vapor-proofing mastic.

2. Vapor Barrier Accessories:

- a. Seam tape and vapor proofing mastic conforming to the following property and as recommended by vapor barrier manufacturer:
 - 1) Water Vapor Transmission Rate per ASTM E96 or ASTM F1249: 0.3 perms or lower.
- b. Pipe boots constructed from vapor barrier material, pressure sensitive tape and/or mastic per manufacturer's instructions.

D. Building Wrap:

- 1. Tyvek Commercial "D" Wrap by E.I. duPont Company, Wilmington, DE or equal.
- 2. High Performance Spunbonded olefin, non-woven, non-perforated with the following performance characteristics:
 - a. Air Penetration: Type 1 when tested in accordance with ASTM E 1677.
 - b. Water Vapor Transmission: 30 perms, when tested in accordance with ASTM E96, Method B.
 - c. Water Penetration Resistance: 235 cm when tested in accordance with AATCC Test Method 127.
 - d. Basis Weight: 2.4 oz/yd², when tested in accordance with TAPPI Test Method T-410.
 - e. Air Infiltration Resistance: Air infiltration at >750 seconds, when tested in accordance with TAPPI Test Method T-460.
 - f. Tensile Strength: 33/41 lbs/in., when tested in accordance with ASTM D 822, Method A.
 - g. Tear Resistant (Trapezoid) 6/9 lbs when tested in accordance with ASTM D1117.
 - h. Surface Burning Characteristics: Class A, when tested in accordance with ASTM E 84. Flame Spread: 15, Smoke Developed: 25.
 - i. UV Exposure: Up to 270 days/9 months without harming performance characteristics.
- 3. Seam Tape: 3" DuPont™ Tyvek® Tape.
- 4. Fasteners, adhesive and sealants as recommended by building wrap manufacturer.

PART 3: EXECUTION

3.01 INSTALLATION

- A. Refer to specific specification sections for installation.

END OF SECTION 07 21 00

SECTION 07 51 15

ROOF PATCHING

PART 1: GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, Details of Construction and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work specified in this section.

1.02 SUMMARY

- A. Maintain existing warranty issued by Tremco mfg. (At boiler room roof). Roofer must be certified by manufacturer to work on warranted roof.
- B. Existing roof at locker room does not carry a warranty.
- C. Scope of work includes cutting in and patching of vents, curbs, drains and/or any other miscellaneous work identified on Architectural, Mechanical or Electrical plans.
- D. Provide either asphalt bitumen or cold tar type built-up roofing system, including insulation or SBS Modified Bitumen Built-Up Roofing system. Contractor responsible to determine suitable system to be compatible with existing roofing system.

1.03 SUBMITTALS

- A. Submit in accordance with Section 01 33 00.
 - 1. Submit roofing contractors letter certifying roof has been inspected and composition of existing roof determined.
 - 2. Submit roofing manufacturer's letter certifying roof has been inspected and existing warranty has been maintained.

1.04 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle and store materials in accordance with manufacturer's instructions.
- B. FM Class I, UL Class A, Class 90 wind uplift.

1.05 WARRANTY

- A. Maintain existing Tremco (mfg) unknown duration yr NDL warranty, verify with owner prior to work commencing.

PART 2: PRODUCTS

2.01 MATERIALS

- A. Asphalt system:
 - 1. Slip sheet: 5 lb. rosin-sized paper if recommended by manufacturer.
 - 2. Base ply: 28 lb. glass fiber base sheet.

3. Ply felts: 2 plies of Type 4 asphalt glass fiber felts.
 4. Interply bitumen: Roofing asphalt, ASTM D 312, type as required by slope.
 5. Deck primer at concrete deck.
 6. Aggregate: Clean, smooth river gravel, ASTM D 1863.
 7. Insulation: Rigid glass fiber boards with integrally bonded top covering of saturated felt or Kraft paper.
 8. Walkway protection boards (if required): Mineral surfaced bituminous composition boards; Carey-Tread by Celotex Corp. or approved equal.
- B. Coal-Tar System; Koppers, Allied Signal or approved equal.
1. Slip sheet: 5 lb. rosin-sized paper if recommend by manufacturer.
 2. Base ply: 1 ply coated base sheet.
 3. Ply felts: 3 plies coated ply sheet.
 4. Interply bitumen: Coal Tar Pitch, ASTM D 450-78, type as required by slope.
 5. Deck primer at concrete deck.
 6. Tape: Fiberglass roof tape.
 7. Temperature limitations:
 - a. Maximum 400°F.
 - b. Minimum 300°F.
 - c. Recommended 375°F. (350°F max. in kettle storage)
 8. Envelopes as required.
 9. Follow precautions contained in NIOSH Publication DHEW 78-107.
- C. SBS Modified System
1. Insulation (Base and tapered): Polyisocyanurate roof insulation faced with a universal fiber glass reinforced facer as approved by roofing manufacturer to maintain warranty. (ASTM C1289).
 2. Cap Sheet: DynaKap FR fiberglass and polyester reinforced with fire retardant additives. UL Class A.
 3. Ply Felts: Asphalt coated fiberglass felt complying with ASTM-D-2178 Type VI.
 4. Interply and Flood Coat Bitumen Asphalt, Type III, ASTM-D-312.
 5. Base Flashing: Reinforced Modified Bitumen membrane flashing consisting of a fiberglass scrim, two polyester mats, an elastomeric base material of SBS rubber and asphalt, with a white ceramic granule surface.
 6. Flashing Cement: Modified Bitumen flashing cement as recommended by roofing manufacturer.
 7. Steep Asphalt: ASTM-D-312, Type III or Type IV per manufacturer's requirements.
 8. Reinforced Modified Bitumen membrane flashing consisting of 180 g/m² nonwoven polyester mat saturated and coated with a blend of SBS rubber and asphalt, with a white ceramic granule surface.
 9. Roof Walk: Dynaflex Composition Flashing material, cut to length and mopped in hot, steep asphalt.
 10. Cant Strip: Perlite ASTM-D-728 5-5/8 inches face (4 x 4 inches).
- D. EPDM
1. Insulation (Based and Tapered): Polyisocyanurate insulation faced with a universal fiber glass reinforced facer as approved by roofing manufacturer.
 2. EPDM membrane: 60 mil at fully adhered, 45 mil at ballasted.
 3. Protection board: ½" high density wood fiberboard with non-asphaltic binders.
 4. Provide products for use with specified roofing system including, but not limited to taper primer/wash, bonding cement, lap cement, seam tape, peel and stick tape, flashing, lap caulk, sealing mastic, pourable sealer, prefabricated flashing, termination bar, fasteners / anchors, and pipe boots.

PART 3: EXECUTION

3.01 INSTALLATION

- A. Inspect substrate and report unsatisfactory conditions in writing. Beginning work means acceptance of substrate. Coordinate installation with other trades, including carpentry, flashing and penetrating work.

- B. Comply with NRCA Roofing and Waterproofing Manual and manufacturer's installation instructions.
- C. Clean, prime and prepare substrate.
- D. Install insulation in one layer with tightly butted joints and neatly fitted around penetrations.
- E. Install walkway protection membrane at locations indicated and where required to provide access to roof mounted equipment.
- F. Restore or replace damaged components. Protect work from damage.

END OF SECTION 07 51 15

SECTION 07 53 23

BALLASTED MEMBRANE ROOFING

PART 1: GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, Details of Construction and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work specified in this section.

1.02 SUMMARY

- A. Section includes:

1. Vapor barrier, roof insulation, EPDM elastic sheet roofing, ballast, membrane flashing, splicing cement, lap sealant and all accessories and labor necessary for a complete insulated elastic sheet roofing system.
2. Removal of existing coping, wood curbing as shown on drawings, cants, built-up roofing system and insulation down to existing deck.
3. Clean-up and re-sodding of any damaged lawns.

- B. Related work specified elsewhere:

1. Flexible wall flashing - Section 07 65 00/13.
2. Wood curbs, nailers - Section 06 10 53.

1.03 QUALITY ASSURANCE

- A. Installer: Currently approved, in writing, by manufacturer of system prior to awarding of roofing contract.

1.04 PRE-ROOFING CONFERENCE

- A. Hold roofing pre-construction conference at project site not more than one week prior to beginning roofing.
- B. Attendance is mandatory for roofing contractor, roofing foreman, roofing manufacturer's representative, Architect's representative, Owner's representative, sheet metal subcontractor, and anyone else responsible for items penetrating or in contact with the roof.
- C. Agenda:
1. Review in detail Architect's specifications, roof plans and all roof and flashing details.
 2. If a manufacturer's specification is used, review and resolve all deviations or differences from Architect's specifications.
 3. If Factory Mutual or Underwriters Laboratories requirements are part of specification, review and understand these requirements, and resolve all conflicts between the FM or UL specifications and Architect's/manufacturer's specifications.
 4. Review roof plans; for slope, deck type, drainage, membrane attachment, expansion joints flashing and details. Resolve all conflicts between what is considered good roofing practice and specifications.

5. Review proposed roofing system and recommended work practices for its installation.
6. Study all plans to determine whether different roof areas have different requirements.
7. Designate which areas on site will be available for use as storage and working areas.
8. Review procedure to be followed to provide proper protection of roof system during and after construction of roof.
9. On occupied structures, review means and methods to be utilized to maintain structure weathertight during reroofing.

1.05 SUBMITTALS

A. Submit in accordance with Section 01 33 00.

1. Shop Drawings:

- a. Plans indicating roof size, location and type of penetrations, roof insulation make-up and layout indicating slopes and crickets.
- b. Coordinate with other trades and indicate on plans, camber of roof structure and location of roof drains. Indicate potential drainage problem areas due to insulation layout, camber and roof drain locations.
- c. Base flashings and membrane terminations.
- d. Penetration details
- e. If deviations or modifications to indicated details are desired, clearly indicate for architects review.

2. Samples: Submit samples of stone ballast and insulation together with manufacturer's written acceptance.

3. Installer certificates: Signed by roofing system manufacturer certifying that Installer is approved, authorized, or licensed by manufacturer to install specified roofing system.

4. Warranty: Submit sample copy of manufacturer's warranty for EPDM elastomeric sheet roofing stating obligations, remedies, limitations, and exclusions of warranty.

5. Maintenance Data: For roofing system to include the maintenance manuals specified in Division 1.

6. Inspection Report: Copy of roofing system manufacturer's inspection report of completed and manufacturer certified roofing installation.

B. At Substantial Completion, submit final warranty and letter from manufacturer stating warranty has been activated.

1.06 PRODUCT HANDLING, STORAGE AND DELIVERY

A. Deliver elastic sheet roofing material, insulation in manufacturer's protective containers, and comply with manufacturer's instructions for storage and handling.

B. Deliver materials requiring fire resistance classification and/or flame spread rating with labels intact.

C. Handle rolled goods to prevent damage.

D. Store all materials on clean raised platforms with weather protective covering.

E. Remove wet materials from site.

F. Protect materials from storage traffic.

- G. Do not store concentrated loads on roof deck.

1.07 JOB CONDITIONS

- A. Weather conditions: Proceed with elastic sheet roofing work only when weather conditions comply with manufacturer's recommendations, and will permit materials to be applied and cured in accordance with those recommendations. Do not exceed temperature limitations recommended by roofing manufacturer.

- 1. Cold Weather Installation:

- a. The following are guidelines for EPDM installation when temperatures fall below 40 degrees Fahrenheit. Consult roofing manufacturer for more specific requirements.
 - 1) Store all adhesives, tapes and sealants at room temperatures (60 to 80 degrees) prior to application.
 - 2) Stir adhesives thoroughly before and during application.
 - 3) Be conscious of changes in adhesive, such as thickening and return to heated environment.
 - 4) Use roofing sheet sizes with the least amount of factory folds.
 - 5) Do not apply adhesive when combinations of temperatures and humidity cause water condensation on the adhesive during the drying process.
 - 6) Prevent adhesive, tapes and sealant materials from freezing at all times.

1.08 WARRANTY

- A. Manufacturer's warranty includes materials and workmanship to maintain roof in watertight condition.
- B. Provide single source, single responsibility warranty including membrane, insulation, bituminous flashing, walkways, and expansion joint covers.
- C. Provide 15 year No Dollar Limit total roofing system Warranty, from manufacturer; warranty to run from date of substantial completion.
- D. Submit in accordance to Section 01 78 23.

1.09 SITE CONDITIONS

- A. Access to roof from exterior only.

PART 2: PRODUCTS

2.01 INSULATION

- A. Base Insulation: Polyisocyanurate with conditioned R-value of 6.0 per inch. At areas not covered by tapered insulation, supply with perlite bonded to the face. Manufacturer as acceptable to roof manufacturer to maintain warranty.
- B. Tapered Insulation
 - 1. Polyisocyanurate, same as base insulation. Manufacturer as acceptable to roof manufacturer to maintain warranty. Provide gypsum thermal barrier if required by manufacturer to meet FM or UL requirements.
- C. Receive roofing material manufacturer's written approval of proposed insulation materials.

2.02 ELASTOMERIC SHEET ROOFING SYSTEM

- A. Type and manufacturer: Carlisle Syn Tec Systems Sure-Seal Design B loose laid elastic sheet roofing system is specified. Comparable systems are acceptable as manufactured by Firestone Building Products Co., Versico Incorporated, Gen Flex, Johns Manville.
- B. Elastomeric sheet membrane: Sure-Seal 0.045" thick EPDM (Ethylene Propylene Diene Monomer) compounded elastomer membrane, largest sheet size possible as determined by membrane manufacturer.
- C. Elastomeric flashing: Sure-Seal 0.060" thick Elastoform Flashing. Provide longest pieces of flashing practicable.
- D. Bonding adhesive, splicing cement, lap sealant, water cut-off mastic, prefabricated pipe seals, nite seal and pourable sealer: As recommended by sheet roofing manufacturer.
- E. Nailer strip: Carlisle Sure Seal R.F.S. #3 solid rubber nailer, with manufacturer's recommended fasteners.
- F. Stone Ballast
 - 1. Washed, rounded and smooth stone ranging in size from 3/4" to 1-1/2" in diameter, acceptable to membrane manufacturer and Architect.
 - 2. Crushed stone conforming to ASTM 57 is acceptable provided a protective mat, equal to Carlisle HP protective mat, is installed between the membrane and ballast. Install mat strictly according to manufacturer's written instructions.
- G. Expansion Joint Backer: Neoprene Sponge Tubing.
- H. Grease Protection: Carlisle Epichlorohydrin Sheet.
- I. Splash Blocks and Walkway Pads: Westile ballast paver, 11-3/4" x 16-1/2" x 1-1/2" thick, over protective mat or additional layer of elastic sheet roofing or Carlisle Walkway Pad (contractor option).
- J. Roofing System to carry a Class B fire rating.
- K. Vapor Barrier: 6 mil.

PART 3: EXECUTION

3.01 SUBSTRATE PREPARATION

- A. Comply with sheet membrane manufacturer's instructions for preparation of substrate to receive elastomeric sheet roofing. Clean substrate of dust, debris and other substances detrimental to elastic sheet roofing work.
- B. Do not begin the Work of this Section until all existing conditions have been accepted. Report unsatisfactory conditions to Contractor, Architect in writing.
- C. Verify proper placement of roof drainage systems, back-up overflow systems in relationship to finished roof elevations; this includes:
 - 1. Proper placement of roof drains, roof drain clamps. Finished roof surface elevation shall not be lower than lowest inlet point on drain.
 - 2. Proper placement of overflow roof drains and/or overflow scuppers.
- D. Be responsible for verification of proper elevations of roof drains, drain clamps, and back-up overflow systems.

- E. Install vapor barrier and lap joints 6' minimum. Secure in place with adhesive.

3.02 ROOF INSULATION

- A. Loosely lay each layer of roof insulation with end joints staggered. Stagger joints between layers. Insulation joints shall be 1/4" or less in width. Neatly cut and fit insulation around roof penetrations, projections and electrical conduit.
- B. Minimum thickness of first insulation layer shall be 1".
- C. Overlay base layer of insulation with prefabricated tapered insulation.
- D. Provide saddles between drains and crickets, as needed, to insure no ponded water.

3.03 ELASTOMERIC SHEET ROOFING

- A. Install elastomeric sheet roofing in accordance with manufacturer's printed instructions. If required by manufacturer place approved slip sheet over insulation to separate membrane.
- B. Loosely lay sheet membrane over roof insulation and allow the membrane to relax before fastening or splicing. Apply adjoining sheets by lapping the edges and splicing. Mechanically fasten the membrane and around penetrations using continuous nailer strip and recommended fasteners.
- C. Complete splice between flashing and sheet roofing before bonding the flashing to vertical surface. Adhesively apply flashing and nail at top of flashing. Flash all penetrations passing through the sheet membrane.
- D. Where elastomeric flashing laps under flexible wall flashing, insure proper lap and seal watertight with manufacturer's recommended adhesive.
- E. Secure and seal flash at reglets, copings and scuppers as shown on Drawings.
- F. At parapet or roof edge condition, carry flashing over top of parapet blocking and seal to face of wall. Secure with sheet metal keeper strip by Section 07 62 00.
- G. Place manufacturer approved protection sheet over membrane to underlay walkway pads.
- H. Ballast: Apply a uniform coarse of stone ballast as recommended by membrane manufacturer with not less than 10 lbs. per square foot average over the gross area of the roof. Exercise care not to damage the membrane. Keep ballast away from area to receive walkway system.

3.04 MISCELLANEOUS

- A. Install splash blocks and walkway pads as shown on Drawings, over protective mat or directly adhere manufacturer supplied walkway pads.
- B. Install grease protection over roof membrane at kitchen exhaust fan and as shown on Drawings, strictly according to manufacturer's instructions.

3.05 CLEANING

- A. During course of work, inspect surrounding grounds for debris and trash. Remove at the end of each day's work.
- B. Upon completion, leave roof areas and surrounding grounds clean of debris and trash.

END OF SECTION 07 53 23

SECTION 07 65 13

FLASHING AND VAPOR-IMPERMEABLE WEATHER BARRIER

PART 1: GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, Details of Construction and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work specified in this section.

1.02 SUMMARY

- A. Section includes product specification of the following:
1. Flexible and metal flashing used in masonry, exterior finish materials and exterior openings.
 2. Fluid applied vapor impermeable weather barrier on back-up behind masonry. Provide all auxiliary materials including liquid membrane for detailing wall primer, flexible membrane, joint reinforcing strips, transition membranes, substrate patching membrane, and foam sealant for a complete installation.
- B. Installation of flashings installed in other sections:
1. Unit Masonry – Section 04 20 00.
 2. Gypsum Sheathing – Section 06 16 43.
 3. Joint Sealants – Section 07 92 00.
 4. Louvers – Section 08 91 00.

1.03 SUBMITTALS

- A. Submit in accordance with Section 01 33 00.
1. Product Data: Include manufacturer's written instructions for evaluating, preparing, and treating substrate; technical data; and tested physical and performance properties of weather barrier.
 2. Shop Drawings: Show locations and extent of weather barrier. Include details for substrate joints and cracks, counterflashing strip, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
 - a. Include details of interfaces with other materials that form part of weather barrier.
 - b. Include details of mockups.
 3. Samples: Submit representative samples of the following for approval:
 - a. Fluid applied membrane
 - b. Transition Membrane
 - c. Through Wall Flashing
 4. Product Certificates: For weather barriers, certifying compatibility of weather barrier and accessory materials with Project materials that connect to or that come in contact with the barrier; signed by product manufacturer.
 5. Qualification Data: For Applicator.

6. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for weather barriers, submit certified test report showing compliance with requirements specified for ASTM E2178.

1.04 PERFORMANCE REQUIREMENTS

- A. General: Weather barrier shall be capable of performing as a continuous vapor-impermeable weather barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Weather barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

1.05 REFERENCES

- A. The following standards and publications are applicable to the extent referenced in the text. The most recent version of these standards is implied unless otherwise stated.
- B. American Society for Testing and Materials (ASTM)
 1. C836 Standard Specification for High Solids, Cold Liquid-Applied Elastomeric.
 2. D412 Standard Test Methods for Rubber Properties in Tension
 3. D903 Standard Test Methods for Peel or Stripping Strength of Adhesive Bonds.
 4. D1644 Test Methods for Non-Volatile Content of Varnishes.
 5. D1970 Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
 6. D4541 Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
 7. D3767 Standard Practice for Rubber – Measurements of Dimensions.
 8. E96 Test Methods for Water Vapor Transmission of Materials
 9. E283 Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
 15. E2178 Standard Test Method for Air Permeance of Building Materials
 16. E2357 Standard Test Method for Determining Air Leakage of Air Barrier Assemblies

1.06 QUALITY ASSURANCE

- A. Manufacturer: Weather barrier systems shall be manufactured and marketed by a firm with a minimum of 5 years experience in the production and sales of flashing and weather barriers.
- B. Source Limitations: Obtain primary weather-barrier material and through wall flashing through one source from a single manufacturer.
- C. Applicator Qualifications: A firm experienced in applying weather barrier materials similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.
- D. Mockups: Before beginning installation of weather barrier, provide weather barrier work for exterior wall assembly mockups, incorporating backup wall construction, external cladding, window, door frame and sill, insulation, and flashing to demonstrate surface preparation, crack and joint treatment, and sealing of gaps, terminations, and penetrations of weather barrier membrane.
 1. Coordinate construction of mockup to permit inspection by Owner's testing agency of weather barrier before external insulation and cladding is installed.
 2. If Architect determines mockups do not comply with requirements, reconstruct mockups and apply weather barrier until mockups are approved.

- E. **Pre-Installation Conference:** A pre-installation conference shall be held prior to commencement of field operations to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work. Preinstallation conference shall include the Contractor, installer, Architect, and system manufacturer's field representative. Agenda for meeting shall include but not be limited to the following:
1. Review of submittals.
 2. Review of surface preparation, minimum curing period and installation procedures.
 3. Review of special details and flashings.
 4. Sequence of construction, responsibilities and schedule for subsequent operations.
 5. Review of mock-up requirements.
 6. Review of inspection, testing, protection and repair procedures.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials and products in labeled packages. Store and handle in strict compliance with manufacturer's instructions, recommendations and material safety data sheets. Protect from damage from sunlight, weather, excessive temperatures and construction operations. Remove damaged material from the site and dispose of in accordance with applicable regulations.
- B. Do not double-stack pallets of fluid applied membrane components on the job site. Provide cover on top and all sides, allowing for adequate ventilation.
- C. Protect fluid-applied membrane components from freezing and extreme heat.
- D. Sequence deliveries to avoid delays, but minimize on-site storage.

1.08 PROJECT CONDITIONS

- A. **Environmental Limitations:** Apply weather barrier within the range of ambient and substrate temperatures recommended by weather barrier manufacturer. Protect substrates from environmental conditions that affect performance of weather barrier. Do not apply weather barrier to a wet substrate or during snow, rain, fog, or mist.

PART 2: PRODUCTS

2.01 MATERIALS

- A. Products by WR Grace Construction products are specified.
1. Similar products by the following manufacturers are acceptable
 - a. Carlisle Coatings and Waterproofing
 - b. Henry Company
 - c. WR Meadows
 - d. Tremco

2.02 WEATHER BARRIER

- A. **Fluid-Applied, Fully-Adhered, Vapor-Impermeable Membrane Air Barrier, Basis of Design:** Subject to compliance with requirements, provide the following:
1. Two part, self curing, synthetic rubber based membrane: Perm-A-Barrier Liquid.

B. Physical and Performance Properties: Provide products with the following minimum properties:

Property	Test Method	Typical Value
Cured Film Thickness	ASTM D 3767 Method A	0.060 in. nominal
Solids Content	ASTM D 1644	100%
Air Permeance at 75Pa (0.3 in. water) Differential Pressure	ASTM E 2178	<0.0002 cfm/ft ²
Assembly Air Permeance at 75Pa (0.3 in. water) Differential Pressure	ASTM E 2357	<0.0008 cfm/ft ²
Water Vapor Permeance	ASTM E 96, Method BW	Less than 0.08 perms
Pull Adhesion to Concrete Block (CMU)	ASTM D 4541-02	35 psi
Pull Adhesion to Glass Faced Wall Board	ASTM D 4541-02	18 psi
Peel Adhesion to Concrete	ASTM D 903 Modified	5 lb./in.
Elongation	ASTM D 412	500% minimum
Pliability, 180° Bend over 1 in. Mandrel at -23°F	ASTM D 1970	Unaffected
Low Temperature Flexibility and Crack Bridging 1/8 in. crack cycling at -15°F	ASTM C836	Pass
Extensibility over 1/4 in. crack after heat aging	ASTM C836	Pass

2.02 AUXILIARY MATERIALS

- A. General: Auxiliary materials recommended by air barrier manufacturer for intended use and compatible with air barrier membrane. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
- B. Liquid Membrane for substrate patching, details and terminations. Two part, elastomeric, trowel grade material designed for use with self-adhered membranes and tapes. 10g/l max. VOC content. Provide Bituthene Liquid Membrane.
- C. Wall Primer (for Use with Throughwall Flashing and Tapes Applied to Substrate): Perm-A-Barrier WB Primer liquid waterborne primer recommended for substrate by manufacturer of air barrier material.
1. Flash Point: No flash to boiling point
 2. Solvent Type: Water
 3. VOC Content: Not to exceed 10 g/l
 4. Application Temperature: -4°C (25°F) and above
 5. Freezing point (as packaged): -7°C (21°F)
- D. Flexible Flashing: Perm-A-Barrier Wall Flashing manufactured of 32 mils of self-adhesive rubberized asphalt integrally bonded to 8 mil of cross-laminated, high-density polyethylene film to provide a min. 40 mil thick membrane. Membrane shall be interleaved with disposable silicone-coated release paper until installed, conforming with the following:
1. Water Vapor Transmission: ASTM E96, Method B: 2.9 ng/m²sPa (0.05 perms) max.
 2. Water Absorption: ASTM D570: max. 0.1% by weight
 3. Puncture Resistance: ASTM E154: 356 N (80 lbs.) min.
 4. Tear Resistance
 - a. Initiation ASTM D1004: min. 58 N (13.0 lbs.) M.D.
 - b. Propagation ASTM D1938: min. 40 N (9.0 lbs.) M.D.

5. Lap Adhesion at -4°C (25°F): ASTM D1876: 880 N/m (5.0 lbs./in.) of width
 6. Low Temperature Flexibility ASTM D1970: Unaffected to -43°C (-45°F)
 7. Tensile Strength: ASTM D412, Die C Modified: min. 5.5 MPa (800 psi)
 8. Elongation, Ultimate Failure of Rubberized Asphalt: ASTM D412, Die C: min. 200%.
9. Wall Flashing Accessories:
- a. Surface Conditioner:
 - 1) Perm-A-Barrier Surface Conditioner: Water based latex liquid for substrate preparation conforming with the following:
 - (1.) Flash Point: No flash to boiling point
 - (2.) Solvent Type: Water
 - (3.) VOC Content: Not to exceed 125 g/L
 - (4.) Application Temperature: -4°C (25°F) and above
 - (5.) Freeze/Thaw Stability: 5 cycles min.
 - (6.) Freezing point (as packaged): -10°C (14°F)
 - b. Termination Mastic:
 - 1) Bituthene® Mastic: Rubberized asphalt-based mastic with 20 g/L max. VOC Content.
 - c. Optional Primers:
 - 1) Bituthene Primer WP-3000: Water-based latex primer with 110 g/L max. VOC Content.
 - 2) Bituthene Primer B2: Rubber-based primer in solvent with 440 g/L max. VOC Content.

E. Accessories

1. Metal Flashing: 24 ga. G-90 hot dipped galvanized steel, prefinished with Kynar 500 or Hylar 5000 fluorocarbon coating.
 - a. Color: See various technical sections for colors.
 - b. Provide 20 year warranty covering color fade, chalking and film integrity.
 - c. Provide factory applied protective film. Do not remove until after fabrication and installation is complete.
2. Rope Wicks: 1/4" cotton sash cord.
3. Flashing Termination Bar and Fasteners.
 - a. Termination bar: TB-100 termination bar with sealant ledge, .100" thick x 1" wide extruded aluminum with 1/4" x 3/8" slotted holes at 8" o.c. as manufactured by Tru-Fast Corp. (800-443-9602) or equal.
 - b. Fasteners to be #14 x 1 1/4" stainless steel Crete Flex SS4, hex head with silver stalgard finish as manufactured by ELCO Fastening Systems or equal.

- F. Joint Reinforcing Strip: Air barrier manufacturer's approved tape.

- G. Transition Membrane: Perm-A-Barrier Detail Membrane 36 mils of self-adhesive rubberized asphalt integrally bonded to 4 mil of cross-laminated, high-density polyethylene film to provide a min. 40 mil thick membrane. Membrane shall be interleaved with disposable silicone-coated release paper until installed, conforming with the following:
1. Water Vapor Transmission: ASTM E96, Method B: 2.9 ng/m²sPa (0.05 perms) max.
 1. Air Permeance at 75 Pa (0.3 inch water), pressure difference: 0.0006 L/(s.m²), (0.00012 cfm/ft²).
 3. Puncture Resistance: ASTM E154: 178 N (40 lbs.) min.
 4. Lap Adhesion at -4°C (25°F): ASTM D1876: 880 N/m (5.0 lbs./in.) of width
 5. Low Temperature Flexibility ASTM D1970: Unaffected to -43°C (-45°F)
 6. Tensile Strength: ASTM D412, Die C Modified: min. 2.7 MPa (400 psi)
 7. Elongation, Ultimate Failure of Rubberized Asphalt: ASTM D412, Die C: min. 200%.

PART 3: EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance.
1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
 2. Verify that concrete has cured and aged for minimum time period recommended by air barrier manufacturer.
 3. Verify that concrete is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D4263.
 4. Verify that masonry joints are struck flush and completely filled with mortar.
 5. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 SURFACE PREPARATION

- A. Refer to manufacturer's literature for requirements for preparation of substrates. Surfaces shall be sound and free of voids, spalled areas, loose aggregate and sharp protrusions. Remove contaminants such as grease, oil and wax from exposed surfaces. Remove dust, dirt, loose stone and debris. Use repair materials and methods that are acceptable to manufacturer of the fluid-applied air barrier system.
- B. Exterior sheathing panels: Ensure that the boards are sufficiently stabilized with corners and edges fastened with appropriate screws. Pre-treat all board joints with 2-3 in. wide, manufacturer's recommended self-adhesive tape or fiberglass mesh style wallboard tape. Gaps greater than 1/4 in. should be filled with mastic or caulk, allowing sufficient time to fully cure before application of the tape and fluid applied weather barrier system.
- C. Masonry Substrates: Apply weather barrier over concrete block and brick with smooth flush-cut mortar joints, struck full and flush. Fill all voids and holes, particularly in the mortar joints, with a lean mortar mix, non-shrinking grout or parge coat.
- D. Related Materials: Treat construction joints and install flashing as recommended by manufacturer.
- E. Clean, prepare, treat, and seal substrate according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for air barrier application.
- F. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.
- G. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

- H. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate patching membrane.
- I. Remove excess mortar from masonry ties, shelf angles, and other obstructions.
- J. At changes in substrate plane, apply sealant or Bituthene Liquid Membrane at sharp corners and edges to form a smooth transition from one plane to another.
- K. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for weather barrier.

3.03 JOINT TREATMENT

- A. Concrete and Masonry: Prepare, treat, rout, and fill joints and cracks in substrate according to ASTM C1193 and air barrier manufacturer's written instructions. Remove dust and dirt from joints and cracks complying with ASTM D4258 before coating surfaces.
 - 1. Prime substrate as required.

3.04 WEATHER BARRIER MEMBRANE INSTALLATION

- A. Apply weather barrier membrane to achieve a continuous air barrier according to weather barrier manufacturer's written instructions.
- B. Apply weather barrier membrane within manufacturer's recommended application temperature ranges.
- C. Application of Fluid Applied Membrane:
 - 1. Spray or trowel apply a continuous uniform film at min. 60 mils dry film thickness using multiple, overlapping passes.
 - 2. When spraying use a cross-hatching technique (alternating horizontal and vertical passes) to ensure even thickness and coverage.
 - 3. When spraying use high pressure, multi-component, airless spray equipment approved by material manufacturer.
 - 4. Carry membrane into any openings a minimum of 2 in.
 - 5. Seal all brick-ties and other penetrations as work progresses.
- D. Do not cover weather barrier until it has been tested and inspected by Owner's testing agency.
- E. Correct deficiencies in or remove weather barrier that does not comply with requirements; repair substrates and reapply weather barrier components.

3.05 TRANSITION MEMBRANE INSTALLATION

- A. After allowing the Fluid Applied Membrane to cure to tack-free, apply transition membrane with a minimum overlap of 3 in. onto each surface at all beams, columns and joints as indicated in detail drawings.
- B. Tie into window and door frames, spandrel panels, roof and floor intersections and changes in substrate.
- C. Use pre-cut, easily handled lengths for each location.
- D. Remove silicone-coated release paper and position membrane flashing carefully before placing it against the surface.
- E. When properly positioned, place against surface by pressing firmly into place by hand roller.

- F. Overlap adjacent pieces 2 inches and roll all seams with a hand roller.
- G. Seal top edge of flashing with termination mastic.
- H. When transition flashing is pre-installed prior to application of Fluid Applied Membrane, apply transition flashing as above. Spray or trowel a continuous uniform film of Fluid Membrane at min. 60 mils dry film thickness using multiple , overlapping passes, with a minimum overlap of 3 inches onto transition flashing. For sill condition, spray or trowel Fluid Membrane onto pre-installed sill flashing and onto horizontal section of sill.
- I. Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fishmouths and blisters. Patch with transition strips extending 6 inches (150 mm) beyond repaired areas in strip direction.

3.06 INSTALLATION FOR FLEXIBLE FLASHINGS AND ACCESSORIES

- A. See various technical sections listed in paragraph 1.02.B for installation of flashings.
- B. Flexible flashings for weather barrier:
 - 1. Precut pieces of flashing to easily handled lengths for each location.
 - 2. Remove silicone-coated release paper and position flashing carefully before placing it against the surface.
 - 3. When properly positioned, place against surface by pressing firmly into place by hand roller. Fully adhere flashing to substrate to prevent water from migrating under flashing.
 - 4. Overlap adjacent pieces 2 in. and roll all seams with a hand roller.
 - 5. Trim bottom edge ½ in. back from exposed face of the wall. Flashing shall not be permanently exposed to sunlight.
 - 6. At heads, sills and all flashing terminations, turn up ends a minimum of 2 in. and make careful folds to form an end dam, with the seams sealed.
 - 7. Apply a bead or trowel coat of mastic along top of termination bar, seams, cuts, and penetrations.
 - 8. Do not allow the rubberized asphalt surface of the flashing membrane to come in contact with poly-sulfide sealants, creosote, uncured coal tar products or EPDM.

3.07 CLEANING AND PROTECTION

- A. Protect weather barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.
- B. Schedule work to ensure that the weather barrier system is covered as soon as possible after installation. Protect weather barrier system from damage during subsequent operations. If the weather barrier system cannot be covered within 60 days after installation, apply temporary UV protection such as dark plastic sheet or tarpaulins.
- C. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended by manufacturer of affected construction.
- D. Remove masking materials after installation.

3.08 FIELD QUALITY CONTROL

- A. Testing Agency: Owner may engage a qualified testing agency to perform tests and inspections and prepare test reports.
- B. Inspections: Weather barrier materials and installation are subject to inspection for compliance with requirements. Inspections may include the following:
 - 1. Continuity of weather barrier system has been achieved throughout the building envelope with no gaps or holes.
 - 2. Continuous structural support of weather barrier system has been provided.

3. Masonry and concrete surfaces are smooth, clean and free of cavities, protrusions, and mortar droppings.
 4. Site conditions for application temperature and dryness of substrates have been maintained.
 5. Maximum exposure time of materials to UV deterioration has not been exceeded.
 6. Surfaces have been primed, if applicable.
 7. Laps in strips and transition strips have complied with minimum requirements and have been shingled in the correct direction (or mastic has been applied on exposed edges), with no fishmouths.
 8. Termination mastic has been applied on cut edges.
 9. Strips and transition strips have been firmly adhered to substrate.
 10. Compatible materials have been used.
 11. Transitions at changes in direction and structural support at gaps have been provided.
 12. Connections between assemblies (membrane and sealants) have complied with requirements for cleanliness, preparation and priming of surfaces, structural support, integrity, and continuity of seal.
 13. All penetrations have been sealed.
- C. Tests: Testing to be performed will be determined by Owner's testing agency from among the following tests:
1. Qualitative Testing: Weather barrier assemblies will be tested for evidence of air leakage according to ASTM E1186, smoke pencil with pressurization or depressurization.
- D. Remove and replace deficient weather barrier components and retest as specified above.

END OF SECTION 07 65 13

SECTION 07 65 16

FLASHING AND VAPOR-PERMEABLE WEATHER BARRIER

PART 1: GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, Details of Construction and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work specified in this section.

1.02 SUMMARY

- A. Section includes product specification of the following:
1. Flexible and metal flashing used in exterior finish materials and exterior openings.
 2. Fluid applied vapor permeable weather barrier on exterior sheathing behind other exterior finishes. Provide all auxiliary materials including liquid membrane for detailing wall primer, flexible membrane, joint reinforcing strips, transition membranes, substrate patching membrane, and foam sealant for a complete installation.
- B. Installation of flashings installed in other sections:
1. Gypsum Sheathing – Section 06 16 43.
 2. Joint Sealants – Section 07 92 00.
 3. Louvers – Section 08 91 00.

1.03 SUBMITTALS

- A. Submit in accordance with Section 01 33 00.
1. Product Data: Include manufacturer's written instructions for evaluating, preparing, and treating substrate; technical data; and tested physical and performance properties of weather barrier.
 2. Shop Drawings: Show locations and extent of weather barrier. Include details for substrate joints and cracks, counterflashing strip, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
 - a. Include details of interfaces with other materials that form part of weather barrier.
 - b. Include details of mockups.
 3. Samples: Submit representative samples of the following for approval:
 - a. Fluid applied membrane
 - b. Transition Membrane
 - c. Through Wall Flashing
 4. Product Certificates: For weather barriers, certifying compatibility of weather barrier and accessory materials with Project materials that connect to or that come in contact with the barrier; signed by product manufacturer.
 5. Qualification Data: For Applicator.
 6. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for weather barriers, submit certified test report showing compliance with requirements specified for ASTM E2178.

1.04 PERFORMANCE REQUIREMENTS

- A. General: Weather barrier shall be capable of performing as a continuous vapor-permeable weather barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Weather barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

1.05 REFERENCES

- A. The following standards and publications are applicable to the extent referenced in the text. The most recent version of these standards is implied unless otherwise stated.
- B. American Society for Testing and Materials (ASTM)
1. C920 Specification for Elastomeric Joint Sealants
 2. C1193 Guide for Use of Joint Sealants
 3. D412 Standard Test Methods for Rubber Properties in Tension
 4. D570 Test Method for Water Absorption of Plastics
 5. D1004 Test Method for Initial Tear Resistance of Plastic Film and Sheeting
 6. D1876 Test Method for Peel Resistance of Adhesives
 7. D1938 Test Method for Tear Propagation Resistance of Plastic Film and Sheeting
 8. D1970 Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
 9. D4258 Practice for Surface Cleaning Concrete for Coating
 10. D4263 Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method
 11. E96 Test Methods for Water Vapor Transmission of Materials
 12. E154 Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slab, on Walls, or as Ground Cover
 13. E162 Test Method for Surface Flammability of Materials Using a Radiant Heat Source
 14. E1186 Practice for Air Leakage Site Detection in Building Envelopes and Air Retarder Systems
 15. E2178-01 Standard Test Method for Air Permeance of Building Materials
 16. E2357 Standard Test Method for Determining Air Leakage of Air Barrier Assemblies

1.06 QUALITY ASSURANCE

- A. Manufacturer: Weather barrier systems shall be manufactured and marketed by a firm with a minimum of 5 years experience in the production and sales of flashing and weather barriers.
- B. Source Limitations: Obtain primary weather-barrier material and through wall flashing through one source from a single manufacturer.
- C. Applicator Qualifications: A firm experienced in applying weather barrier materials similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.
- D. Mockups: Before beginning installation of weather barrier, provide weather barrier work for exterior wall assembly mockups, incorporating backup wall construction, external cladding, window, door frame and sill, insulation, and flashing to demonstrate surface preparation, crack and joint treatment, and sealing of gaps, terminations, and penetrations of weather barrier membrane.
1. Coordinate construction of mockup to permit inspection by Owner's testing agency of weather barrier before external insulation and cladding is installed.
 2. If Architect determines mockups do not comply with requirements, reconstruct mockups and apply weather barrier until mockups are approved.

- E. Pre-Installation Conference: A pre-installation conference shall be held prior to commencement of field operations to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work. Preinstallation conference shall include the Contractor, installer, Architect, and system manufacturer's field representative. Agenda for meeting shall include but not be limited to the following:
1. Review of submittals.
 2. Review of surface preparation, minimum curing period and installation procedures.
 3. Review of special details and flashings.
 4. Sequence of construction, responsibilities and schedule for subsequent operations.
 5. Review of mock-up requirements.
 6. Review of inspection, testing, protection and repair procedures.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials and products in labeled packages. Store and handle in strict compliance with manufacturer's instructions, recommendations and material safety data sheets. Protect from damage from sunlight, weather, excessive temperatures and construction operations. Remove damaged material from the site and dispose of in accordance with applicable regulations.
- B. Do not double-stack pallets of fluid applied membrane components on the job site. Provide cover on top and all sides, allowing for adequate ventilation.
- C. Protect fluid-applied membrane components from freezing and extreme heat.
- D. Sequence deliveries to avoid delays, but minimize on-site storage.

1.08 PROJECT CONDITIONS

- A. Environmental Limitations: Apply weather barrier within the range of ambient and substrate temperatures recommended by weather barrier manufacturer. Protect substrates from environmental conditions that affect performance of weather barrier. Do not apply weather barrier to a wet substrate or during snow, rain, fog, or mist.

PART 2: PRODUCTS

2.01 MATERIALS

- A. Products by WR Grace Construction products are specified.
 1. Similar products by the following manufacturers are acceptable
 - a. Carlisle Coatings and Waterproofing
 - b. Henry Company
 - c. WR Meadows
 - d. Tremco

2.02 WEATHER BARRIER

- A. Fluid-Applied, Fully-Adhered, Vapor-Permeable Membrane Air Barrier, Basis of Design: Subject to compliance with requirements, provide the following:
 1. Single Component Acrylic membrane: Perm-A-Barrier VP.

- B. Physical and Performance Properties: Provide products with the following minimum properties:

Property	Test Method	Typical Value
Air Permeance at 75Pa (0.002 L/sx sq. m) Differential Pressure	ASTM E 2178	≤0.0004 cfm/ft ² @ 1.57-lbf/sq. ft
Assembly Air Performance at 75Pa (0.3 in. water) Differential Pressure	ASTM E 2357	<0.0008 cfm/ft ²
Membrane Vapor Permeance	ASTM E 96	Not Less than 11.2 Perms
UV Exposure Limit	ASTM D412 and ASTM E96 Method B	Not More than 180 Calendar Days

2.02 AUXILIARY MATERIALS

- A. General: Auxiliary materials recommended by air barrier manufacturer for intended use and compatible with air barrier membrane. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
- B. Liquid Membrane for substrate patching, details and terminations. Two part, elastomeric, trowel grade material designed for use with self-adhered membranes and tapes. 10g/l max. VOC content. Provide Bituthene Liquid Membrane.
- C. Wall Primer (for Use with Throughwall Flashing and Tapes Applied to Substrate): Perm-A-Barrier WB Primer liquid waterborne primer recommended for substrate by manufacturer of air barrier material.
1. Flash Point: No flash to boiling point
 2. Solvent Type: Water
 3. VOC Content: Not to exceed 10 g/l
 4. Application Temperature: -4°C (25°F) and above
 5. Freezing point (as packaged): -7°C (21°F)
- D. Flexible Flashing: Perm-A-Barrier Wall Flashing manufactured of 32 mils of self-adhesive rubberized asphalt integrally bonded to 8 mil of cross-laminated, high-density polyethylene film to provide a min. 40 mil thick membrane. Membrane shall be interleaved with disposable silicone-coated release paper until installed, conforming with the following:
1. Water Vapor Transmission: ASTM E96, Method B: 2.9 ng/m²sPa (0.05 perms) max.
 2. Water Absorption: ASTM D570: max. 0.1% by weight
 3. Puncture Resistance: ASTM E154: 356 N (80 lbs.) min.
 4. Tear Resistance
 - a. Initiation ASTM D1004: min. 58 N (13.0 lbs.) M.D.
 - b. Propagation ASTM D1938: min. 40 N (9.0 lbs.) M.D.
 5. Lap Adhesion at -4°C (25°F): ASTM D1876: 880 N/m (5.0 lbs./in.) of width
 6. Low Temperature Flexibility ASTM D1970: Unaffected to -43°C (-45°F)
 7. Tensile Strength: ASTM D412, Die C Modified: min. 5.5 MPa (800 psi)
 8. Elongation, Ultimate Failure of Rubberized Asphalt: ASTM D412, Die C: min. 200%.
 9. Wall Flashing Accessories:
 - a. Surface Conditioner:
 - 1) Perm-A-Barrier Surface Conditioner: Water based latex liquid for substrate preparation conforming with the following:
 - (1.) Flash Point: No flash to boiling point

- (2.) Solvent Type: Water
- (3.) VOC Content: Not to exceed 125 g/L
- (4.) Application Temperature: -4°C (25°F) and above
- (5.) Freeze/Thaw Stability: 5 cycles min.
- (6.) Freezing point (as packaged): -10°C (14°F)

b. Termination Mastic:

- 1) Bituthene® Mastic: Rubberized asphalt-based mastic with 20 g/L max. VOC Content.

c. Optional Primers:

- 1) Bituthene Primer WP-3000: Water-based latex primer with 110 g/L max. VOC Content.
- 2) Bituthene Primer B2: Rubber-based primer in solvent with 440 g/L max. VOC Content.

E. Accessories

1. Metal Flashing: 24 ga. G-90 hot dipped galvanized steel, prefinished with Kynar 500 or Hylar 5000 fluorocarbon coating.
 - a. Color: See various technical sections for colors.
 - b. Provide 20 year warranty covering color fade, chalking and film integrity.
 - c. Provide factory applied protective film. Do not remove until after fabrication and installation is complete.
2. Rope Wicks: 1/4" cotton sash cord.
3. Flashing Termination Bar and Fasteners.
 - a. Termination bar: TB-100 termination bar with sealant ledge, .100" thick x 1" wide extruded aluminum with 1/4" x 3/8" slotted holes at 8" o.c. as manufactured by Tru-Fast Corp. (800-443-9602) or equal.
 - b. Fasteners to be #14 x 1 1/4" stainless steel Crete Flex SS4, hex head with silver stalgard finish as manufactured by ELCO Fastening Systems or equal.

F. Joint Reinforcing Strip: Air barrier manufacturer's approved tape.

G. Transition Membrane: Perm-A-Barrier Detail Membrane 36 mils of self-adhesive rubberized asphalt integrally bonded to 4 mil of cross-laminated, high-density polyethylene film to provide a min. 40 mil thick membrane. Membrane shall be interleaved with disposable silicone-coated release paper until installed, conforming with the following:

1. Water Vapor Transmission: ASTM E96, Method B: 2.9 ng/m²sPa (0.05 perms) max.
1. Air Permeance at 75 Pa (0.3 inch water), pressure difference: 0.0006 L/(s.m²), (0.00012 cfm/ft²).
3. Puncture Resistance: ASTM E154: 178 N (40 lbs.) min.
4. Lap Adhesion at -4°C (25°F): ASTM D1876: 880 N/m (5.0 lbs./in.) of width
5. Low Temperature Flexibility ASTM D1970: Unaffected to -43°C (-45°F)
6. Tensile Strength: ASTM D412, Die C Modified: min. 2.7 MPa (400 psi)
7. Elongation, Ultimate Failure of Rubberized Asphalt: ASTM D412, Die C: min. 200%.

H. Joint Sealant: ASTM C920, single component, neutral-curing silicone, Class 100/50 (low-modulus), Grade NS, use NT related to exposure, and as applicable to joint substrates indicated, use O.

PART 3: EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance.
 - 1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
 - 2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 SURFACE PREPARATION

- A. Refer to manufacturer's literature for requirements for preparation of substrates. Surfaces shall be sound and free of voids, and sharp protrusions. Remove contaminants such as grease, oil and wax from exposed surfaces. Remove dust, dirt, and debris. Use repair materials and methods that are acceptable to manufacturer of the fluid-applied air barrier system.
- B. Exterior sheathing panels: Ensure that the boards are sufficiently stabilized with corners and edges fastened with appropriate screws. Pre-treat all board joints with 2-3 in. wide, manufacturer's recommended self-adhesive tape or fiberglass mesh style wallboard tape. Gaps greater than 1/4 in. should be filled with mastic or caulk, allowing sufficient time to fully cure before application of the tape and fluid applied weather barrier system.
- C. Related Materials: Treat construction joints and install flashing as recommended by manufacturer.
- D. Clean, prepare, treat, and seal substrate according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for air barrier application.
- E. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.
- F. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
- G. At changes in substrate plane, apply sealant or Bituthene Liquid Membrane at sharp corners and edges to form a smooth transition from one plane to another.
- H. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for weather barrier.

3.03 JOINT TREATMENT

- A. Gypsum Sheathing: Fill joints greater than ¼ inch with sealant according to ASTM C1193 and with air barrier manufacturer's written instructions. Apply tape to joint prior to installing fluid air barrier membrane.

3.04 WEATHER BARRIER MEMBRANE INSTALLATION

- A. Apply weather barrier membrane to achieve a continuous air barrier according to weather barrier manufacturer's written instructions.
- B. Apply weather barrier membrane within manufacturer's recommended application temperature ranges.
- C. Application of Fluid Applied Membrane:
 - 1. Apply a continuous uniform unbroken film at min. 90 mil wet film thickness, 45 mil dry film thickness.

- D. Do not cover weather barrier until it has been tested and inspected by Owner's testing agency.
- E. Correct deficiencies in or remove weather barrier that does not comply with requirements; repair substrates and reapply weather barrier components.

3.05 TRANSITION MEMBRANE INSTALLATION

- A. Install strips, transition membrane, and auxiliary materials according to air barrier manufacturer's written instructions to form a seal with adjacent construction and maintain a continuous air barrier.
 - 1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
 - 2. Install strip on roofing membrane or base flashing so that a minimum of 3 inches of coverage is achieved over both substrates.
 - 3. Install all flashings only after application of air barrier.
- B. Apply primer to substrates to receive transition membrane at required rate and allow to dry. Limit priming to areas that will be covered by transition tape in same day. Reprime areas exposed for more than 24 hours.
 - 1. Prime glass-fiber-surfaced gypsum sheathing not covered with air membrane material with number of prime coats needed to achieve required bond, with adequate drying time between coats.
- C. Connect and seal exterior wall air barrier membrane continuously to roofing membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.
- D. At end of each working day, seal top edge of strips and transition strips to substrate with termination mastic.
- E. Apply joint sealants forming part of air barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- F. Wall Openings: Prime concealed perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply transition strip so that a minimum of 3 inches of coverage is achieved over both substrates. Maintain 3 inches of full contact over firm bearing to perimeter frames with not less than 1 inch.
 - 1. Transition Membrane: Roll firmly to enhance adhesion.
- G. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of air barrier membrane with foam sealant.
- H. Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fishmouths and blisters. Patch with transition strips extending 6 inches (150 mm) beyond repaired areas in strip direction.

3.06 INSTALLATION FOR FLEXIBLE FLASHINGS AND ACCESSORIES

- A. See various technical sections listed in paragraph 1.02.B for installation of flashings.
- B. Flexible flashings for weather barrier:
 - 1. Precut pieces of flashing to easily handled lengths for each location.
 - 2. Remove silicone-coated release paper and position flashing carefully before placing it against the surface.
 - 3. When properly positioned, place against surface by pressing firmly into place by hand roller. Fully adhere flashing to substrate to prevent water from migrating under flashing.
 - 4. Overlap adjacent pieces 2 in. and roll all seams with a hand roller.

5. Trim bottom edge ½ in. back from exposed face of the wall. Flashing shall not be permanently exposed to sunlight.
6. At heads, sills and all flashing terminations, turn up ends a minimum of 2 in. and make careful folds to form an end dam, with the seams sealed.
7. Apply a bead or trowel coat of mastic along top of termination bar, seams, cuts, and penetrations.
8. Do not allow the rubberized asphalt surface of the flashing membrane to come in contact with poly-sulfide sealants, creosote, uncured coal tar products or EPDM.

3.07 CLEANING AND PROTECTION

- A. Protect weather barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.
- B. Schedule work to ensure that the weather barrier system is covered as soon as possible after installation. Protect weather barrier system from damage during subsequent operations. If the weather barrier system cannot be covered within 150 days after installation, apply temporary UV protection such as dark plastic sheet or tarpaulins. Remove and replace weather barrier exposed for more than 150 days.
- C. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended by manufacturer of affected construction.
- D. Remove masking materials after installation.

3.08 FIELD QUALITY CONTROL

- A. Testing Agency: Owner may engage a qualified testing agency to perform tests and inspections and prepare test reports.
- B. Inspections: Weather barrier materials and installation are subject to inspection for compliance with requirements. Inspections may include the following:
 1. Continuity of weather barrier system has been achieved throughout the building envelope with no gaps or holes.
 2. Continuous structural support of weather barrier system has been provided.
 4. Site conditions for application temperature and dryness of substrates have been maintained.
 5. Maximum exposure time of materials to UV deterioration has not been exceeded.
 6. Surfaces have been primed, if applicable.
 7. Laps in strips and transition strips have complied with minimum requirements and have been shingled in the correct direction (or mastic has been applied on exposed edges), with no fishmouths.
 8. Termination mastic has been applied on cut edges.
 9. Strips and transition strips have been firmly adhered to substrate.
 10. Compatible materials have been used.
 11. Transitions at changes in direction and structural support at gaps have been provided.
 12. Connections between assemblies (membrane and sealants) have complied with requirements for cleanliness, preparation and priming of surfaces, structural support, integrity, and continuity of seal.
 13. All penetrations have been sealed.
- C. Tests: Testing to be performed will be determined by Owner's testing agency from among the following tests:
 1. Qualitative Testing: Weather barrier assemblies will be tested for evidence of air leakage according to ASTM E1186, smoke pencil with pressurization or depressurization.
- D. Remove and replace deficient weather barrier components and retest as specified above.

END OF SECTION 07 65 13

SECTION 07 84 00

FIRESTOPPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, Details of Construction and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work specified in this section.

1.02 DEFINITIONS

- A. Firestopping: Material or combination of materials used to retain integrity of fire-rated construction by maintaining an effective barrier against the spread of flame, smoke, and hot gases through penetrations in, or construction joints between, fire rated wall and floor assemblies.

1.03 GENERAL DESCRIPTION OF THE WORK OF THIS SECTION

- A. Only tested firestop systems shall be used in specific locations as follows:
 - 1. Penetrations for the passage of duct, cable, cable tray, conduit, piping, electrical busways and raceways through fire-rated vertical barriers (walls and partitions), horizontal barriers (floor/ceiling assemblies), and vertical service shaft walls and partitions.
 - 2. Safing slot gaps between edge of floor slabs and curtain walls.
 - 3. Openings between structurally separate sections of wall or floors.
 - 4. Gaps between the top of walls and ceilings or roof assemblies.
 - 5. Expansion joints in walls and floors.
 - 6. Openings and penetrations in fire-rated partitions or walls containing fire doors.
 - 7. Openings around structural members which penetrate floors or walls.

1.04 RELATED WORK OF OTHER SECTIONS

- A. Coordinate work of this section with work of other sections as required to properly execute the work and as necessary to maintain satisfactory progress of the work of other sections, including:
 - 1. Section 04 20 00 - Masonry Work
 - 2. Section 09 21 16 - Gypsum Drywall Systems
 - 3. Division 23 - HVAC
 - 4. Division 21 - Fire Protection
 - 5. Division 22 - Plumbing
 - 6. Division 26 - Electrical

1.05 REFERENCES

- A. Test Requirements: ASTM E 814, "Standard Method of Fire Tests of Through Penetration Fire Stops"
- B. Test Requirements: UL 1479, "Fire Tests of Through-Penetration Firestops"

- C. Test Requirements: UL 2079, "Tests for Fire Resistance of Building Joint Systems"
- D. Underwriters Laboratories (UL) of Northbrook, IL publishes tested systems in their "FIRE RESISTANCE DIRECTORY" that is updated annually.
 - 1. UL Fire Resistance Directory:
 - a. Firestop Devices (XHJI)
 - b. Fire Resistance Ratings (BXRH)
 - c. Through-Penetration Firestop Systems (XHEZ)
 - d. Fill, Voids, or Cavity Material (XHHW)
 - e. Forming Materials (XHKU)
 - f. Joint Systems (XHBN)
 - g. Perimeter Fire Containment Systems (XHDG)
 - 2. Alternate Systems: "Omega Point Laboratories Directory" (updated annually).
- E. Test Requirements: ASTM E 1966, "Standard Test Method for Fire Resistive Joint Systems"
- F. Test Requirements: ASTM E 2307, "Standard Test Method for Determining Fire Resistance of Perimeter Fire Barrier Systems Using Intermediate-Scale, Multi-story Test Apparatus"
- G. Inspection Requirements: ASTM E 2174, "Standard Practice for On-site Inspection of Installed Fire Stops"
- H. ASTM E 84, "Standard Test Method for Surface Burning Characteristics of Building Materials"
- I. International Firestop Council Guidelines for Evaluating Firestop Systems Engineering Judgments
- J. International Building Code as modified by local jurisdiction.
- K. NFPA 101 - Life Safety Code
- L. NFPA 70 - National Electric Code

1.06 QUALITY ASSURANCE

- A. A manufacturer's direct representative to be on-site during initial installation of firestop systems to train appropriate contractor personnel in proper selection and installation procedures. This will be done per manufacturer's written recommendations published in their literature and drawing details.
- B. Firestop System installation must meet requirements of ASTM E 814, UL 1479 or UL 2079 tested assemblies that provide a fire rating equal to that of construction being penetrated.
- C. Proposed firestop materials and methods shall conform to applicable governing codes having local jurisdiction.
- D. Firestop Systems do not reestablish 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.
- E. For those firestop applications that exist for which no UL tested system is available through a manufacturer, an engineering judgment derived from similar UL system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineering judgment drawings must follow requirements set forth by the International Firestop Council.

1.07 SUBMITTALS

- A. Submit in accordance with Section 01 33 00.
 - 1. Product Data: Manufacturer's specifications and technical data for each material including the composition and limitations, documentation of UL firestop systems to be used and manufacturer's installation instructions.
 - 2. Manufacturer's engineering judgment identification number and drawing details when no UL system is available for an application. Engineering judgment must include both project name and contractor's name who will install firestop system as described in the assembly drawing.
 - 3. Material safety data sheets provided with product delivered to job-site.
 - 4. Documentation from manufacturer that all firestopping installations on-site meet their requirements.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials undamaged in manufacturer's clearly labeled, unopened containers, identified with brand, type, and UL label where applicable.
- B. Coordinate delivery of materials with scheduled installation date to allow minimum storage time at job-site.
- C. Store materials under cover and protect from weather and damage in compliance with manufacturer's requirements, including temperature restrictions.
- D. Comply with recommended procedures, precautions or remedies described in material safety data sheets as applicable.
- E. Do not use damaged or expired materials.

1.09 PROJECT CONDITIONS

- A. Do not use materials that contain flammable solvents.
- B. Schedule installation of firestopping after completion of penetrating item installation but prior to covering or concealing of openings.
- C. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.
- D. Weather conditions: Do not proceed with installation of firestop materials when temperatures exceed the manufacturer's recommended limitations for installation printed on product label and product data sheet.
- E. During installation, provide masking and drop cloths to prevent firestopping materials from contaminating any adjacent surfaces.

PART 2 - PRODUCTS

2.01 FIRESTOPPING, GENERAL

- A. Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by the firestopping manufacturer based on testing and field experience.

- B. Provide components for each firestopping system that are needed to install fill material. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.
- C. Firestopping Materials are either “cast-in-place” (integral with concrete placement) or “post installed.” Provide cast-in-place firestop devices prior to concrete placement.

2.02 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with through penetration firestop systems (XHEZ), joint systems (XHBN), and perimeter firestop systems (XHDG) listed in Volume 2 of the UL Fire Resistance Directory: Products specified are by Hilti, Inc., Tulsa, Oklahoma, 800-879-8000/www.us.hilti.com
 - 1. Equivalent products by 3M Fire Protection Products 800-328-1687/www.3m.com are acceptable.

2.03 MATERIALS

- A. Use only firestop products that have been UL 1479, ASTM E 814 or UL 2079 tested for specific fire-rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire-rating involved for each separate instance.
- B. L-Rated Systems: Where through-penetration firestop systems are indicated in smoke barriers, provide through-penetration firestop systems with L-ratings of not more than 5.0 cfm/sq. ft. at both ambient temperatures and 400 deg F.
- C. Cast-in place firestop devices for use with noncombustible and combustible pipes (closed and open systems), conduit, and cable bundles penetrating concrete floors, the following products are acceptable:
 - 1. HILTI
 - a. CP 680 Cast-In Place Firestop Device
 - 1) Add Aerator adaptor when used in conjunction with aerator (“sovent”) system.
 - b. CP 682 Cast-In Place Firestop Device for use with noncombustible penetrants
- D. Sealants, caulking materials, or foams for use with non-combustible items including steel pipe, copper pipe, rigid steel conduit and electrical metallic tubing (EMT), the following products are acceptable:
 - 1. HILTI
 - a. FS-ONE Intumescent Firestop Sealant
 - b. CP 604 Self-leveling Firestop Sealant
 - c. CP 620 Fire Foam
 - d. CP 606 Flexible Firestop Sealant
 - e. CP 601s Elastomeric Firestop Sealant
- E. Sealants or caulking materials for use with sheet metal ducts, the following products are acceptable:
 - 1. HILTI
 - a. CP 601s Elastomeric Firestop Sealant
 - b. CP 606 Flexible Firestop Sealant
 - c. FS-ONE Intumescent Firestop Sealant

- F. Sealants, caulking or spray materials for use with fire-rated construction joints and other gaps, the following products are acceptable:
 - 1. HILTI
 - a. CP CFS-SP WB Joint Spray
 - b. CP 601s Elastomeric Firestop Sealant
 - c. CP 606 Flexible Firestop Sealant
 - d. CP 604 Self-leveling Firestop Sealant

- G. Pre-formed mineral wool designed to fit flutes of metal profile deck and gap between top of wall and metal profile deck; as a backer for spray material.
 - 1. HILTI
 - a. CP 777 Speed Plugs
 - b. CP 767 Speed Strips

- H. Intumescent sealants, caulking materials for use with combustible items (penetrants consumed by high heat and flame) including insulated metal pipe, PVC jacketed, flexible cable or cable bundles and plastic pipe, the following products are acceptable:
 - 1. HILTI
 - a. FS-ONE Intumescent Firestop Sealant

- I. Foams, intumescent sealants, or caulking materials for use with flexible cable or cable bundles, the following products are acceptable:
 - 1. HILTI
 - a. FS-ONE Intumescent Firestop Sealant
 - b. CP 620 Fire Foam
 - c. CP 601s Elastomeric Firestop Sealant
 - d. CP 606 Flexible Firestop Sealant

- J. Non-curing, re-penetrable intumescent putty or foam materials for use with flexible cable or cable bundles, the following products are acceptable:
 - 1. HILTI
 - a. CP 618 Firestop Putty Stick
 - b. CP 658T Firestop Plug

- K. Wall opening protective materials for use with U.L. listed metallic and specified nonmetallic outlet boxes, the following products are acceptable:
 - 1. HILTI
 - a. CP 617 Firestop Putty Pad

- L. Firestop collar or wrap devices attached to assembly around combustible plastic pipe (closed and open piping systems), the following products are acceptable:
 - 1. HILTI
 - a. CP 643N Firestop Collar
 - b. CP 644 Firestop Collar
 - c. CP 645/648 Wrap Strips

- M. Materials used for large openings and complex penetrations made to accommodate cable trays and bundles, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable:
1. HILTI
 - a. CP 637 Firestop Mortar
 - b. FS 657 FIRE BLOCK
 - c. CP 620 Fire Foam
 - d. CP 675T Firestop Board
- N. Non curing, re-penetrable materials used for large size/complex penetrations made to accommodate cable trays and bundles, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable:
1. HILTI
 - a. FS 657 FIRE BLOCK
 - b. CP 675T Firestop Board
- O. Sealants or caulking materials used for openings between structurally separate sections of wall and floors, the following products are acceptable:
1. HILTI
 - a. CP CFS-SP WB Joint Spray
 - b. CP 601s Elastomeric Firestop Sealant
 - c. CP 606 Flexible Firestop Sealant
 - d. CP 604 Self-Leveling Firestop Sealant
- P. For blank openings made in fire-rated wall or floor assemblies, where future penetration of pipes, conduits, or cables is expected, the following products are acceptable:
1. HILTI
 - a. FS 657 FIRE BLOCK
 - b. CP 658T Firestop Plug
- Q. For data and communication penetrations in fire and smoke rated assemblies. (Allows for ease of re-penetration without the use of sealants or caulking.)
1. HILTI
 - a. CP 653 2" Speed Sleeve
 - b. CP 653 4" Speed Sleeve.
- R. Provide a firestop system with a "F" Rating as determined by UL 1479 or ASTM E814 which is equal to the time rating of construction being penetrated.
- S. Provide a firestop system with an Assembly Rating as determined by UL 2079 which is equal to the time rating of construction joint assembly.
- T. Identification Labels
1. Pressure-sensitive, self adhesive, preprinted vinyl labels with the following verbiage:
 - a. "Warning: Fireblocking Application – Do Not Disturb. Notify Building Management of Any Damage"
 - b. Installing Contractor's name, address and phone number.
 - c. Date of installation.
 - d. Fireblocking/Stopping product manufacturer's name.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Verification of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.
 - 1. Verify penetrations are properly sized and in suitable condition for application of materials.
 - 2. Surfaces to which firestop materials will be applied shall be free of dirt, grease, oil, rust, laitance, release agents, water repellents, and any other substances that may affect proper adhesion.
 - 3. Provide masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.
 - 4. Comply with manufacturer's recommendations for temperature and humidity conditions before, during and after installation of firestopping.
 - 5. Do not proceed until unsatisfactory conditions have been corrected.

3.02 COORDINATION

- A. Coordinate location and proper selection of cast-in-place Firestop Devices with trade responsible for the work. Ensure device is installed before placement of concrete.
- B. Responsible trades to provide adequate spacing of field run pipes to allow for installation of cast-in-place firestop devices without interferences.

3.03 INSTALLATION

- A. Regulatory Requirements: Install firestop materials in accordance with UL Fire Resistance Directory or Omega Point Laboratories Directory.
- B. Manufacturer's Instructions: Comply with manufacturer's instructions for installation of through-penetration and construction joint materials.
 - 1. Seal all holes or voids made by penetrations to ensure an air and water resistant seal.
 - 2. Consult with mechanical engineer, project manager, and damper manufacturer prior to installation of UL firestop systems that might hamper the performance of fire dampers as it pertains to duct work.
 - 3. Protect materials from damage on surfaces subjected to traffic.
- C. Identification: Install identification labels no greater than 6 feet from penetration or 6 feet on center on continuous firestopping applications.

3.04 FIELD QUALITY CONTROL

- A. Examine sealed penetration areas to ensure proper installation before concealing or enclosing areas.
- B. Keep areas of work accessible until inspection by applicable code authorities.
- C. Inspection of through-penetration firestopping shall be performed in accordance with ASTM E 2174, "Standard Practice for On-Site Inspection of Installed Fire Stops" or other recognized standard.

- D. Perform under this section patching and repairing of firestopping caused by cutting or penetrating of existing firestop systems already installed by other trades.
- E. Manufacturer to inspect sealed penetrations for conformance with appropriate product data information for each contractor installing firestopping on site.

3.05 ADJUSTING AND CLEANING

- A. Remove equipment, materials and debris, leaving area in undamaged, clean condition.
- B. Clean all surfaces adjacent to sealed holes and joints to be free of excess firestop materials and soiling as work progresses.

END OF SECTION 07 84 00

SECTION 07 92 00

SEALANTS AND CAULKING

PART 1: GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, Details of Construction and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work specified in this section.

1.02 SUMMARY

A. Exterior colored sealants:

1. Joints in masonry, including architectural precast.
2. Miscellaneous joints where "sealant" or "caulk/caulking" is indicated on drawings.
3. Joints around mechanical, electrical and architectural penetrations of exterior masonry skin.

B. Interior colored sealants:

1. Note: Sealant on materials to be painted will be installed after painting is completed and shall match paint color. A "sacrificial" backer rod shall be installed prior to painting to protect joints from paint over spray. This backer rod may be pushed into the joint or removed prior to installation of final backer rod and sealant.
2. Interior joints in masonry.
3. Miscellaneous joints where "sealants" or "caulk/caulking" is indicated on Drawings.

C. Sealant replacement:

1. Removal of existing sealants and prepping of joints prior to placement of new sealants.

D. Related work specified in other sections:

1. Sealant for cavity wall insulation joints – Section 04 05 23.
2. Sealant for firestopping – Section 07 84 00.
3. Sealant for sheet metal joints – Section 07 62 00.
4. Sealants at tilework – Section 09 30 00.
5. Sealing at plumbing fixtures and mechanical penetrations through rated walls – Division 21-25.
6. Sealing of electrical penetrations through rated walls – Divisions 26-28.

1.03 REFERENCES

- A. ASTM C 920 – Specification for Elastomeric Joint Sealants.
- B. ASTM C 1193 – Standard Guide for Use of Joint Sealants.

1.04 SUBMITTALS

- A. Submit in accordance with Section 01 33 00.

- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods including joint design, surface preparation, and application instructions.
 - 4. Submit manufacturer's test reports indicating test results of adhesion and/or compatibility testing of samples of substrates which either come in contact with or are in close proximity to sealants.
- C. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors or samples of custom color matches for Architect's acceptance.
- D. Samples of Warranty.
- E. Manufacturer's approval of installer.

1.05 QUALITY ASSURANCE

- A. Applicator Qualifications
 - 1. Company specializing in performing work of this section with minimum three years documented experience, minimum three successfully completed projects of similar scope and complexity, and approved by manufacturer.
 - 2. Designate one individual as project foreman who shall be on site at all times during installation.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site in manufacturer's unopened original packaging. Inspect for damage.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.
 - 1. Store materials in a clean, dry area indoors in accordance with manufacturer's instructions.
 - 2. Store sealants within temperature range in accordance with manufacturer's instructions.
 - 3. Keep containers sealed until ready for use.
 - 4. Do not use materials after manufacturer's use-before date.

1.07 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.
 - 1. Do not apply sealants to surfaces that are wet, damp, or contain frost.
 - 2. Do not apply sealants when air or surface temperature is below 40 degrees F.
 - 3. Use caution when applying sealants when air or surface temperature is above 120 degrees F.

1.08 WARRANTY

- A. Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.

- B. Special Manufacturer's Warranty for Exterior Sealants: Manufacturer's standard form in which elastomeric sealant manufacturer agrees to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Ten years from date of Substantial Completion.

PART 2: PRODUCTS

2.01 EXTERIOR SEALANTS

- A. Silyl-Terminated Polyether Sealant: BASF/Sonneborn 150 w/ VLM Technology conforming to ASTM C 920, Type S, Grade NS, Class 50. Maximum VOC: 2 g/L.
 - 1. Colors: Custom colors to match material or finish sealant occurs in.

2.02 INTERIOR SEALANTS

- A. Polyurethane Sealant: Multi-component, high-performance polyurethane sealant conforming to ASTM C 920, Type M, Grade NS, Class 25. Maximum VOC: 25 g/L.
 - 1. Manufacturers/product:
 - a. Pecora, Dynatrol II
 - b. SIKA, SIKAFLEX 2-C
 - c. Sonneborn, Sonolastic NP2
 - d. Tremco, Dymeric 240/240FC
 - 2. Colors: Custom colors to match material or finish sealant occurs in.

2.03 ACCESSORIES

- A. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.
- B. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
- C. Joint Backing: Round foam rod compatible with sealant; oversized 25 to 50 percent larger than joint width; recommended by sealant manufacturer to suit application.
- D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.
- E. Masking Tape: Non-staining, non-absorbent tape product compatible with joint sealants and adjacent joint surfaces.

PART 3: EXECUTION

3.01 EXAMINATION

- A. Inspect joints for compliance with requirements for joint configuration, installation tolerance, and other conditions affecting joint sealant performance. Correct unsatisfactory conditions before proceeding.

3.02 PREPARATION

- A. Prepare joints in accordance with ASTM C 1193 and manufacturer's instructions.

- B. Clean out joints immediately before installing joint sealants (within 1 to 2 hours of sealant application), in accordance with joint sealant manufacturer's recommendations and the following requirements:
 - 1. Remove from joint substrates foreign material which could interfere with adhesion of joint sealant, including paints other than permanent protective coating tested and approved for sealant adhesion and compatibility by sealant manufacturer, oil, grease, waterproofing, water repellants, water dirt, and frost.
 - 2. Clean porous joint substrates using approved methods such as brushing, grinding, blast cleaning, mechanical abrading, and acid washing as appropriate, or a combination of these methods, to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
 - 3. Remove laitance and form-release agents from concrete.
 - 4. Clean metal and other nonporous substrates by using chemical cleaners or other means that neither are harmful to substrates nor leave residues capable of interfering with adhesion of joint sealants.
- C. Joint Priming: Prime joint substrates where indicated or where recommended by joint sealant manufacturer. Apply primer to comply with joint sealant manufacturer's recommendations. Confine primers to area of joint sealer bond; do not allow spillage or migration onto adjoining surfaces. Allow primer to dry before applying sealant.
- D. Masking Tape: Use masking tape where required to prevent contamination of adjacent surfaces; remove tape immediately after tooling and before sealants begin to cure without disturbing seal.

3.03 EXISTING WORK

- A. Mechanically remove existing sealants.
- B. Clean joint surfaces of residual sealant and other contaminants capable of affecting sealant bond to joint surface by mechanical means.
- C. Allow joint surfaces to dry before installing new sealant.

3.04 SEALANT INSTALLATION

- D. Comply with joint sealant manufacturer's printed installation instructions.
- E. Installation of Sealant Backings:
 - 1. Install joint filler to provide support of sealant during application and at position required to produce the cross-sectional shape and depth of installed sealant relative to joint width that allows optimum sealant movement capability.
 - a. Do not leave gaps between ends of joint fillers.
 - b. Do not stretch, twist, puncture, or tear joint fillers.
 - c. Remove fillers which have become wet prior to sealant application and replace with dry materials.
 - 2. Install bond breaker tape when joint depth is too shallow to allow backer rod.

F. Installation of Sealant:

1. Install sealants by proven techniques that result in direct contact with and full wetting of joint substrates by joint sealant, completely filling recesses provided and providing uniform cross-sectional shapes and depths relative to joint widths. Sealant depth to be $\frac{1}{2}$ the width of the joint and $\frac{1}{3}$ the width at the center, creating an hourglass shape. Maximum depth of caulk at center to be $\frac{3}{8}$ ". Air pockets or voids are not acceptable.
2. Immediately after sealant application and prior to the skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealant from surfaces adjacent to joint. Do not use tooling agents which discolor sealants or adjacent surfaces or which are not approved by sealant manufacturer.

3.05 PROTECTION AND CLEANING

- A. Protect joint sealers, during and after curing, from contamination or damage. Cut out and remove damaged or deteriorated sealers and replace with new materials.
- B. Clean excess sealants or sealant smears adjacent to joints as work progresses.

3.06 FIELD QUALITY CONTROL

- A. Perform adhesion tests on exterior sealant in accordance with manufacturer's instructions and ASTM C1193, Method A, Field-Applied Sealant Joint Hand-Pull Tab.
 1. Perform 5 tests for first 1,000 linear feet of applied exterior sealant and 1 test for each 1,000 feet of seal thereafter. If there is less than 1,000 feet, perform 1 test per floor per building elevation minimum.
 2. For sealant applied between dissimilar materials, test both sides of joint.
- B. Sealants failing adhesion test shall be removed, substrates cleaned, sealants re-installed, and re-testing performed.
- C. Maintain test log and submit report to Architect indicating tests, locations, dates, results, and remedial actions.

END OF SECTION 07 92 00

