

## SECTION 071416

### COLD FLUID-APPLIED WATERPROOFING

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Section Includes:
  - 1. Cold fluid-applied polyurethane membrane waterproofing.
  - 2. Protection board.
- B. Related Sections:
  - 1. Division 01: Administrative, procedural, and temporary work requirements.

##### 1.2 REFERENCES

- A. ASTM International (ASTM):
  - 1. C836 - Standard Specification for High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course.
  - 2. D412 - Standard Specification for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers - Tension.
  - 3. D4258 - Standard Practice for Surface Cleaning Concrete for Coating.
  - 4. E96/E96M - Standard Test Method for Water Vapor Transmission of Materials.

##### 1.3 SUBMITTALS

- A. Submittals for Review:
  - 1. Product Data: Manufacturer's data for waterproofing and drainage protection board including product description and performance characteristics.
  - 2. Samples: 3 x 3 inch waterproofing samples on representative backing.
  - 3. Warranty: Sample warranty form.
- B. Quality Control Submittals:
  - 1. Applicator's license certificate issued by manufacturer of waterproofing material.

##### 1.4 QUALITY ASSURANCE

- A. Applicator Qualifications:
  - 1. Minimum 3 years documented experience in work of this Section.
  - 2. Licensed or certified by waterproofing manufacturer.

##### 1.5 DELIVERY, STORAGE AND HANDLING

- A. Store materials at minimum 75 degrees F; prevent damage to containers. Do not store in direct sunlight.

##### 1.6 PROJECT CONDITIONS

- A. Environmental Conditions:
  - 1. Do not apply waterproofing when ambient or surface temperature is less than 40 degrees F or if precipitation is imminent.
  - 2. Do not apply material to wet surfaces.
- B. Substrate: Cured minimum 28 days prior to applying waterproofing.

## 1.7 WARRANTIES

- A. Furnish manufacturer's 5 year warranty providing coverage against water leakage through waterproofing system.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
  - 1. Kemper System America, Inc. ([www.kemper-system.com](http://www.kemper-system.com))
  - 2. Neogard Corporation. ([www.neogard.com](http://www.neogard.com))
  - 3. Tremco, Inc. ([www.tremcosealants.com](http://www.tremcosealants.com))
- B. Substitutions: Under provisions of Division 01.

### 2.2 MATERIALS

- A. Fluid Applied Waterproofing:
  - 1. Type: Single-component, bitumen modified, cold liquid applied moisture curing urethane complying with ASTM C836.
  - 2. Physical properties:
    - a. Elongation: Minimum 600 percent, tested to ASTM D412.
    - b. Tensile strength: Minimum 150 psi, tested to ASTM D412.
    - c. 100 percent modulus: Minimum 80 psi, tested to ASTM D412.
    - d. Crack bridging: Pass 1/16 inch with no loss of bond or cracking exhibited, cycled 10 times per 24 hours at 15 degrees F, tested to ASTM C836.
    - e. Moisture vapor permeability: Maximum 0.1 perm, tested to ASTM E96.
- B. Reinforcing Fabric: Waterproofing manufacturer's standard.

### 2.3 ACCESSORIES

- A. Surface Conditioner, Joint Sealers, and Patching Compounds: Type recommended by waterproofing manufacturer.
- B. Protection Board:
  - 1. Waterproofing manufacturer's standard product.
  - 2. Adhesive: Type recommended by protection board manufacturer.

## PART 3 EXECUTION

### 3.1 PREPARATION

- A. Clean surfaces to ASTM D4258.
- B. Clean exposed metals; apply surface conditioner and coat of waterproofing material to minimum 60 mils thickness. Extend preparatory coat minimum 3 inches onto adjacent surfaces and vertically to grade level.
- C. Clean cracks and joints in substrate less than 1/16 inch in width and apply preparatory coat of waterproofing material, minimum 60 mils wet film thickness; extend minimum 3 inches onto adjacent surfaces.
- D. Rout out cracks and joints over 1/16 inch in width to minimum 1/4 inch depth, and fill with waterproofing. Apply preparatory coat of waterproofing material, minimum 60 mils wet film thickness; extend minimum 3 inches onto adjacent surfaces.
- E. At changes in plane of substrate, form cant of waterproofing material, minimum 1 inch high.

F. Allow preparatory work to cure minimum 12 hours, then clean and apply surface conditioner.

### 3.2 APPLICATION OF WATERPROOFING

- A. Apply waterproofing system in accordance with manufacturer's instructions.
- B. Apply in as many coats as needed to achieve minimum 60 mils wet film thickness, excluding preparatory work.
- C. Extend membrane up vertical surfaces to grade level.
- D. Seal items projecting through membrane.
- E. Apply waterproofing with reinforcing fabric at locations of potential high movement, including intersections not structurally connected.

### 3.3 INSTALLATION OF PROTECTION BOARD

- A. Apply protection board the same day membrane is applied.
- B. Install in accordance with manufacturer's instructions.
- C. Apply adhesive at rates as recommended by manufacturer; set boards in adhesive with edges butted.
- D. Complete backfilling as soon as possible after application of protection board; within 7 days maximum.

### 3.4 FIELD QUALITY CONTROL

- A. Vertical Surfaces:
  - 1. Prior to applying protection course, inspect surfaces for voids, ruptures, and other damage.
  - 2. Repair damaged and defective areas.
- B. Horizontal Surfaces:
  - 1. Close drains and flood with minimum 1 inch of water prior to applying protection course.
  - 2. After 24 hours, check for leaks. If leaks are encountered, repair and repeat test.
  - 3. Drain water when proven watertight.

END OF SECTION

**SECTION 072113**  
**BOARD INSULATION**

**PART 1 GENERAL**

1.1 SUMMARY

- A. Section Includes:
  - 1. Board insulation at exterior walls.
- B. Related Sections:
  - 1. Division 01: Administrative, procedural, and temporary work requirements.

1.2 REFERENCES

- A. ASTM International (ASTM):
  - 1. C578 - Standard Specification for Rigid Cellular Polystyrene Thermal Insulation.
  - 2. E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
  - 3. E96/E96M - Standard Test Method for Water Vapor Transmission of Materials.
  - 4. E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees C.

1.3 SUBMITTALS

- A. Submittals for Review:
  - 1. Product Data: Indicate product composition and performance characteristics.
  - 2. Samples: 12 x 12 inch samples of each insulation.
- B. Quality Control Submittals:
  - 1. Certificates of Compliance: Certification from an independent testing laboratory that insulation meets fire hazard classification requirements.

1.4 QUALITY ASSURANCE

- A. Fire Hazard Classification:
  - 1. Noncombustible, tested to ASTM E136.
  - 2. Maximum flame spread/smoke developed rating of 25/50, tested to ASTM E84.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Store insulation in clean, dry, sheltered area, off ground or floor, until used. Protect against wetting and moisture absorption.

**PART 2 PRODUCTS**

2.1 MANUFACTURERS

- A. Acceptable Manufacturers - Polystyrene Insulation:
  - 1. Dow Chemical Co. ([www.dowbuildingmaterials.com](http://www.dowbuildingmaterials.com))
  - 2. Owens Corning. ([www.owenscorning.com](http://www.owenscorning.com))
- B. Substitutions: Under provisions of Division 01.

## 2.2 MATERIALS

- A. Board Insulation:
  - 1. ASTM C578, closed cell extruded polystyrene foam.
  - 2. Minimum compressive strength: 15 PSI.
  - 3. Thermal resistance: Minimum LTTR value of 7.8.
  - 4. Water vapor permeance: Maximum 1.5 perms for 1 inch thickness, tested to ASTM E96/E96M.

## 2.3 ACCESSORIES

- A. Adhesive:
  - 1. Type recommended by insulation manufacturer.
  - 2. Interior adhesives: Maximum volatile organic compound (VOC) content: 70 grams per liter.
- B. Metal Clips: Galvanized steel, L-shaped, 2 inches long.
- C. Fasteners: Type best suited to application, hot-dip galvanized or fluoropolymer coated steel.

## PART 3 EXECUTION

### 3.1 PREPARATION

- A. Substrate:
  - 1. Remove protrusions flush with adjacent surface.
  - 2. Remove dirt, dust, oil, grease, and other materials that could impair adhesion.

### 3.2 INSTALLATION

- A. Apply adhesive in continuous beads.
- B. Install boards on horizontally where indicated in the Drawings.
- C. Place boards in a method to maximize contact bedding.
- D. Butt edges and ends tight to adjacent boards, at perimeter, and around penetrations with maximum 1/4 inch gaps.
- E. Extend boards over control and expansion joints, unbonded to foundation 4 inches on one side of joint.

END OF SECTION

## SECTION 072115

### BATT INSULATION

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Section Includes:
  - 1. Batt insulation in exterior wall and ceiling assemblies.
- B. Related Sections:
  - 1. Division 01: Administrative, procedural, and temporary work requirements.

##### 1.2 REFERENCES

- A. ASTM International (ASTM):
  - 1. C665 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Wood Frame and Light Construction Buildings.
  - 2. E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
  - 3. E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 Degrees C.

##### 1.3 SUBMITTALS

- A. Quality Control Submittals:
  - 1. Certificates of Compliance: Certification from an independent testing laboratory that insulation meets fire hazard classification requirements.

##### 1.4 QUALITY ASSURANCE

- A. Fire Hazard Classification:
  - 1. Noncombustible, tested to ASTM E136.
  - 2. Flame spread/smoke developed rating of 25/50 or less, tested to ASTM E84.

##### 1.5 DELIVERY, STORAGE AND HANDLING

- A. Store insulation in clean, dry, sheltered area, off ground or floor, until used. Protect against wetting and moisture absorption.

##### 1.6 PROJECT CONDITIONS

- A. Do not install insulation until building is substantially water and weather tight.

#### PART 2 PRODUCTS

##### 2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
  - 1. Johns Manville. ([www.jm.com](http://www.jm.com))
  - 2. Knauf Insulation. ([www.knaufinsulation.us](http://www.knaufinsulation.us))
  - 3. Owens Corning. ([www.owenscorning.com](http://www.owenscorning.com))
- B. Substitutions: Under provisions of Division 01.

## 2.2 MATERIALS

- A. Thermal Batt Insulation:
  - 1. Type: ASTM C665, glass fiber composition.
  - 2. Facing: Unfaced.
  - 3. Stapling flanges: None.
  - 4. Thickness: Depth required to fill framing members.
  - 5. Thermal resistance:
    - a. 3-5/8 inches thick: R-value of 13.00.
    - b. 6-1/4 inches thick: R-value of 19.00.
    - c. 6-1/2 inches thick: R-value of 22.0.
- B. Auditorium Insulation:
  - 1. Source: SelectSound Black Acoustic Blanket by Owens Corning or approved substitute.
  - 2. Thicknesses: See Drawings.

## 2.3 ACCESSORIES

- A. Impale Fasteners:
  - 1. Steel impaling fasteners on metal base with lock washers, length to suit insulation thickness.
  - 2. Adhesive: Type recommended by fastener manufacturer.
- B. Tape: Minimum 2 inches wide, pressure sensitive, waterproof.

## PART 3 EXECUTION

### 3.1 INSTALLATION – THERMAL INSULATION

- A. Friction fit between framing members.
- B. Butt insulation to adjacent construction. Butt ends and edges.
- C. Carry insulation around pipes, wiring, boxes, and other components.
- D. Ensure complete enclosure of spaces without voids.

### 3.2 INSTALLATION – AUDITORIUM INSULATION

- A. Place impale fasteners within 4 inches of edges of boards and maximum 24 inches on center.
- B. Apply insulation and secure with lock washers.
- C. Stagger end joints.
- D. Butt edges and ends tight to adjacent boards, at perimeter, and around penetrations with maximum 1/4 inch gaps.
- E. Tape seal to perimeter and at joints between insulation pieces.

END OF SECTION

## SECTION 072400

### EXTERIOR INSULATION AND FINISH SYSTEM

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Section Includes:
  - 1. Composite wall cladding of rigid insulation and applied coating.
  - 2. Trim and accessories.
- B. Related Sections:
  - 1. Division 01: Administrative, procedural, and temporary work requirements.

##### 1.2 REFERENCES

- A. American National Standards Institute/EIFS Industry Manufacturers Association (ANSI/EIMA) 99A - Exterior Insulation and Finish Systems.
- B. ASTM International (ASTM):
  - 1. C578 - Standard Specification for Preformed Cellular Polystyrene Thermal Insulation.
  - 2. E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
  - 3. E2098 - Standard Test Method for Determining Tensile Breaking Strength of Glass Fiber Reinforcing Mesh for Use in Class PB Exterior Insulation and Finish Systems (EIFS) after Exposure to a Sodium Hydroxide Solution.
- C. EIFS Industry Manufacturers Association (EIMA) - Classification Paper.

##### 1.3 SYSTEM DESCRIPTION

- A. System Classification: EIMA Class PB, Standard impact resistance.
- B. Fire Hazard Classification: Maximum flame spread/smoke developed rating of 25/450, tested to ASTM E84.

##### 1.4 SUBMITTALS

- A. Submittals for Review:
  - 1. Shop Drawings: Indicate joint layout and dimensions, system penetration details, and termination details.
  - 2. Product Data: Include primary and secondary product descriptions, application instructions, performance criteria, and list of sealants approved for use with system.
  - 3. Samples:
    - a. 3 x 3 inch finish coat samples showing available colors.
    - b. 6 inch long trim samples.
  - 4. Warranty: Sample warranty form.
- B. Quality Control Submittals:
  - 1. Certificates of Compliance:
    - a. Manufacturer's certification that installed system complies with requirements of Contract Documents.
    - b. Certificate of approval by Code authorities having jurisdiction over Project.
    - c. Certification from an independent testing laboratory that system meets fire hazard classification requirements.

##### 1.5 QUALITY ASSURANCE

- A. Furnish EIFS system components from single manufacturer.



B. Manufacturer Qualifications: Minimum 3 years documented experience in work of this Section.

C. Installer Qualifications: Minimum 3 years documented experience in work of this Section.

#### 1.6 DELIVERY, STORAGE AND HANDLING

A. Store adhesives and coatings in protected, dry area until used, at temperature between 40 and 90 degrees F.

#### 1.7 PROJECT CONDITIONS

A. Do not apply adhesives and coatings if:

1. Ambient temperature is below 40 degrees F, or is expected to fall below that temperature within 24 hours after application.
2. Relative humidity is above 85 percent and surface temperature is lower than 5 degrees F below dew point.
3. Wind velocity is over 20 MPH.

#### 1.8 WARRANTIES

A. Furnish manufacturer's 10 year warranty providing coverage against air and water leakage through EIFS system.

### **PART 2 PRODUCTS**

#### 2.1 MANUFACTURERS

A. Acceptable Manufacturers:

1. BASF Wall Systems, Inc. ([www.wallsystems.basf.com](http://www.wallsystems.basf.com))
2. Dryvit System, Inc. ([www.dryvit.com](http://www.dryvit.com))
3. Parex, Inc. ([www.parex.com](http://www.parex.com))
4. Sto Corp. ([www.stocorp.com](http://www.stocorp.com))

B. Substitutions: Under provisions of Division 01.

#### 2.2 MATERIALS

A. Adhesive: Acrylic based; type recommended by system manufacturer.

B. Base Coat: Acrylic modified portland cement, glass fiber reinforced; type recommended by system manufacturer.

C. Finish Coat: EIMA Class PB; polymer base, texture and color to be selected from manufacturer's full color and texture range.

D. Rigid Insulation:

1. ASTM C578, Type I, molded polystyrene.
2. Edges: Square.

E. Reinforcing: Glass fiber mesh, balanced open weave, alkaline resistant, treated for improved bond with coating, tested to ASTM E2098 and classified to EIMA impact classification.

1. Standard impact mesh: Minimum 4.5 ounces per square yard.
2. Corner mesh: Minimum 20.0 ounces per square yard.

## 2.3 ACCESSORIES

- A. Trim:
  - 1. Galvanized steel, perforated attachment flanges, of longest practical length.
  - 2. Corner bead: Beaded edge, size and profile to suit application.
  - 3. Casing bead: Thickness governed by system thickness, square edge.
  - 4. Drainage casing: Thickness governed by system thickness, square edge, perforated for drainage.
  - 5. Control joint: Accordion profile with minimum 2 inch flanges each side, with attachment flanges.
- B. Insulation Fasteners: Hot-dip galvanized or fluoropolymer coated steel with minimum 1 inch diameter washers, minimum 5/8 inch penetration into framing, of type recommended by system manufacturer.
- C. Trim Fasteners: Hot-dip galvanized or fluoropolymer coated steel, type recommended by system manufacturer.
- D. Water: Clean and potable.

## 2.4 MIXES

- A. Base and Finish Coat: In accordance with manufacturer's instructions.

## **PART 3 EXECUTION**

### 3.1 APPLICATION OF INSULATION AND REINFORCING

- A. Install system in accordance with ANSI/EIMA 99A and manufacturer's instructions.
- B. Install insulation in most economical manner, with joints offset joints from those in substrate. Stagger end joints in adjacent rows minimum 12 inches. Cut panels to fit at perimeter and around penetrations.
- C. Mechanically fasten insulation to framing at maximum 16 inches on center.
- D. Apply minimum 1/16 inch layer of adhesive over insulation board.
- E. Fully embed reinforcement in adhesive, wrinkle free.
- F. Lap ends and edges 2 inches minimum.
- G. Wrap reinforcement and adhesive around insulation edge at reveals, control joints and where system abuts dissimilar materials or stops with edge exposed, except at bottom edges.
- H. Install corner mesh for minimum 12 inches on both sides of external corners.
- I. Install drainage casing over openings in walls. Seal corners and intersections.

### 3.2 APPLICATION OF FINISH COAT

- A. Apply in accordance with manufacturer's instructions.
- B. Work in continuous operation in each panel formed by trim and intersections to ensure even texture.
- C. Cut edges in clean and sharp where work joins other materials.
- D. Apply to uniform texture and color without streaks, laps, heavy buildups, and missed areas.
- E. Ensure consistent application and uniform appearance.

### 3.3 ADJUSTING

- A. Touch up finish coat as required to obtain uniform texture.

END OF SECTION

**SECTION 072600**  
**VAPOR RETARDERS**

**PART 1 GENERAL**

1.1 SUMMARY

- A. Section Includes:
  - 1. Sheet and sealant materials for controlling vapor diffusion at floors.
- B. Related Sections:
  - 1. Division 01: Administrative, procedural, and temporary work requirements.

1.2 REFERENCES

- A. ASTM International (ASTM): E1643 - Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.

1.3 SUBMITTALS

- A. Submittals for Review:
  - 1. Product Data: Include product description and performance characteristics.

**PART 2 PRODUCTS**

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
  - 1. Griffolyn, Division of Reef Industries. ([www.reefindustries.com](http://www.reefindustries.com))
  - 2. Raven Industries. ([www.rufco.com](http://www.rufco.com))
  - 3. Stego Industries. ([www.stegoindustries.com](http://www.stegoindustries.com))
  - 4. W.R. Meadows, Inc. ([www.wrmeadows.com](http://www.wrmeadows.com))
- B. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Vapor Retarder: Minimum 10 mil thick clear polyethylene film.

2.3 ACCESSORIES

- A. Pipe Boots: Vapor retarder manufacturer's standard pipe boot system.
- B. Adhesive: Compatible with vapor retarder and substrate, permanently non hardening.
- C. Joint Tape: Minimum 2 inches wide, pressure sensitive, waterproof, compatible with vapor retarder.

**PART 3 EXECUTION**

3.1 INSTALLATION - UNDER SLABS ON GRADE

- A. Install in accordance with manufacturer's instructions and ASTM E1643.
- B. Remove sharp rocks and objects that could puncture vapor retarder.
- C. Install vapor retarder without tears, voids, and holes.

- D. Lap ends and edges minimum 6 inches over adjacent sheets.
- E. Install pipe boots at pipe and conduit penetrations through vapor retarder.
- F. Tape seal lapped joints, tears, holes, perimeter, and other penetrations through vapor retarder.

### 3.2 REPAIR

- A. Inspect vapor retarder for damage just prior to covering.
- B. Clean damaged areas and cover with additional vapor retarder material cut minimum 6 inches larger than damaged area on all sides. Seal to main vapor retarder with continuous tape.

END OF SECTION

## SECTION 075400

### THERMOPLASTIC MEMBRANE ROOFING

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Section Includes:
  - 1. Rigid roof insulation.
  - 2. Cover board.
  - 3. Mechanically fastened single ply membrane roofing.
  - 4. Base flashings.
  - 5. Expansion joint covers.
  - 6. Walkway pads.
  
- B. Related Sections:
  - 1. Division 01: Administrative, procedural, and temporary work requirements.
  - 2. Section 061000 - Rough Carpentry.
  - 3. Section 076200 - Sheet Metal Flashing and Trim.

##### 1.2 REFERENCES

- A. American Society of Civil Engineers (ASCE) 7 - Minimum Design Loads for Buildings and Other Structures.
  
- B. ASTM International (ASTM):
  - 1. C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
  - 2. C1278/C1278M - Standard Specification for Fiber-Reinforced Gypsum Panel.
  - 3. C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
  - 4. D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
  - 5. D6878 - Standard Specification for Thermoplastic Polyolefin Based Sheet Roofing.
  - 6. E108 - Standard Test Methods for Fire Tests of Roof Coverings.
  
- C. Factory Mutual Insurance Co. (FM):
  - 1. 4470 - Approval Standard for Single-Ply, Polymer-Modified Bitumen Sheet, Built-Up Roof (BUR) and Liquid Applied Roof Assemblies for Use in Class 1 and Noncombustible Roof Deck Construction.
  - 2. Property Loss Prevention Data Sheet 1-28 - Design Wind Loads.
  - 3. Property Loss Prevention Data Sheet 1-49 - Perimeter Flashing.
  
- D. National Roofing Contractors Association (NRCA) - Roofing and Waterproofing Manual.

##### 1.3 SYSTEM DESCRIPTION

- A. Design Requirements: Design roofing system to resist minimum wind loads in accordance with ASCE 7 and wind loads indicated in structural drawings.

## 1.4 SUBMITTALS

- A. Submittals for Review:
  - 1. Shop Drawings: Indicate:
    - a. Setting plan for insulation.
    - b. Roof slopes.
    - c. Layout of seams.
    - d. Base flashing, termination, and special details.
    - e. Fastener types and locations.
  - 2. Product Data: Manufacturer's product specifications, installation instructions, and general recommendations for each product.
  - 3. Warranty: Sample warranty form.
- B. Quality Control Submittals:
  - 1. Certificates of Compliance: Certification from an independent testing laboratory that roofing system meets fire hazard and windstorm classification requirements.

## 1.5 QUALITY ASSURANCE

- A. Installer Qualifications:
  - 1. Minimum 3 years documented experience in work of this Section.
  - 2. Licensed or certified by roofing materials manufacturer.
- B. Roofing System:
  - 1. FM 1-120 Windstorm Resistance and SH Hail Resistance, tested to FM 4470.
  - 2. Perimeter flashings: In accordance with FM 1-49.
  - 3. Class A Fire Hazard Classification, tested to ASTM E108.

## 1.6 DELIVERY, STORAGE AND HANDLING

- A. Store materials, other than membrane, in protected, dry area, between 60 and 80 degrees F until used; provide proper ventilation.
- B. Protect sheet goods from damage and wetting.

## 1.7 PROJECT CONDITIONS

- A. Do not apply roofing to damp or frozen substrate.
- B. Do not apply roofing during inclement weather or at temperatures below 40 degrees F, or above 100 degrees F or if freezing weather is anticipated within 24 hours after application. Do not use frozen materials.

## 1.8 WARRANTIES

- A. Furnish manufacturer's 10 year warranty providing coverage against water leakage through roofing system.
  - 1. Make repairs to roofing system required due to defects in materials or workmanship resulting in water leakage into or through roofing system.
  - 2. Include cost of labor and materials necessary to make required repairs.
  - 3. Cover all roofing system components including roofing membrane, built-up and metal flashings, high wall waterproof flashings, roof insulation, and preflashed accessories.
  - 4. Not limited to specific dollar amount.
  - 5. Transferable to subsequent building owners during warranty period.
  - 6. Include coverage for:
    - a. Wind speeds up to 80 MPH.
    - b. Accidental puncture.
    - c. Damage by hail up to 1 inch in diameter.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. Acceptable Manufacturers - TPO Roofing System:
  - 1. Carlisle Syntec, Inc. ([www.carlisle-syntec.com](http://www.carlisle-syntec.com))
  - 2. Firestone Building Products Co. ([www.firestonebpc.com](http://www.firestonebpc.com))
  - 3. GAF Materials Corp. ([www.gaf.com](http://www.gaf.com))
  - 4. Genflex Roofing Systems. ([www.genflex.com](http://www.genflex.com))
  - 5. Johns Manville. ([www.jm.com](http://www.jm.com))
  - 6. Versico, Inc. ([www.versico.com](http://www.versico.com))
- B. Acceptable Manufacturers - Cover Board:
  - 1. GP Gypsum Corporation. ([www.gp.com](http://www.gp.com))
- C. Substitutions: Under provisions of Division 01.

### 2.2 MATERIALS

- A. Rigid Insulation:
  - 1. Type: ASTM C1289, Type II, rigid polyisocyanurate faced both sides with glass fiber mat facings.
  - 2. Edges: Square.
  - 3. Thermal resistance: Minimum LTTR value of 5.6 per inch.
  - 4. Thickness: As indicated on the Drawings; minimum 5 inches.
  - 5. Provide board tapered to 1/4 inch per foot.
- B. Cover Board:
  - 1. Type: ASTM C1177/C1177M or ASTM C1278/C1278M; 48 inches wide x 1/2 inch thick, maximum practical length, square cut ends and edges.
  - 2. Mold resistance: 10, tested to ASTM D3273.
- C. Roof Membrane:
  - 1. Type: ASTM D6878, reinforced thermoplastic polyolefin (TPO), ultraviolet resistant.
  - 2. Size: Maximum sheet size permitted by application and job conditions.
  - 3. Thickness: 60 mils.
  - 4. Color: White.
- D. Flashing Sheet: Manufacturer's standard flashing sheet, color to match membrane.

### 2.3 ACCESSORIES

- A. Batten Strips or Fastener Plates: Manufacturer's standard, hard rubber.
- B. Accessories: By manufacturer of roofing system, including adhesives, tapes, solvents, sealants, water cutoff mastic, and prefabricated pipe flashings.
- C. Walkway Pads: Preformed resilient pads, recommended by roofing manufacturer, minimum 1/2 inch thick.
- D. Fasteners: Hot-dip galvanized or fluoropolymer coated steel, approved by roofing system manufacturer, type and length suited to project conditions.
- E. Insulation Fasteners: Hot-dip galvanized or fluoropolymer coated steel, approved by FM and roofing system manufacturer, type and length suited to project conditions, with galvanized steel plates.
- F. Expansion Joint Covers: EPDM cover over closed cell foam insulation, bonded to galvanized steel flanges, with preformed corners and intersections.



- G. Nailers and Curbs:
  - 1. Preservative treated wood, specified in Section 061000.
  - 2. Nailers: 3-1/2 inch face dimension x insulation thickness.
- H. Metal Flashings: Specified in Section 076200.

### **PART 3 EXECUTION**

#### **3.1 PREPARATION**

- A. Remove projections that could puncture membrane from substrate.
- B. Clean substrate of loose and foreign material, oil, and grease.
- C. Complete roof penetrations and preparation for drains, flashings, and other penetrations prior to beginning roofing.
- D. Protect adjacent and underlying surfaces.

#### **3.2 INSTALLATION - GENERAL**

- A. Install roofing system in accordance with roofing system manufacturer's instructions, NRCA Manual, and approved Shop Drawings.

#### **3.3 INSTALLATION OF INSULATION**

- A. Apply top layer with long edges perpendicular to those of base layer, with joints staggered in adjacent rows. Offset joints from those in base layer.
- B. Mechanically fasten to substrate in FM manufacturer's recommended fastening pattern.
- C. Fit insulation to other boards and at perimeter and around penetrations with maximum 1/4 inch voids.

#### **3.4 INSTALLATION OF COVER BOARD**

- A. Apply panels with long edges continuous and perpendicular to direction of insulation. Stagger end joints in adjacent rows. Offset joints from those in insulation.
- B. Mechanically fasten to substrate in FM manufacturer's recommended fastening pattern.
- C. Fit panels to other panels and at perimeter and around penetrations with maximum 1/4 inch voids.

#### **3.5 INSTALLATION OF ROOF MEMBRANE**

- A. Position sheets without stretching; minimize wrinkles. Allow membrane to relax before proceeding.
- B. Provide minimum 5-1/2 inch lap at joints between adjacent sheets.
- C. Splice sheets by heat welding method.
- D. Attach membrane to decking with batten strips or fastener plates.
- E. Daily Seal:
  - 1. Ensure that water does not flow beneath completed sections of roof.
  - 2. Temporarily seal loose edge of membrane with night seal when weather is threatening.
  - 3. When work is resumed, pull sheet free before continuing installation.

### 3.6 INSTALLATION OF FLASHINGS

- A. Construct in accordance with roofing system manufacturer's standard details.
- B. Juncture of Horizontal and Vertical Surfaces:
  - 1. Use longest practical length flashing to minimize joints.
  - 2. Complete splice between flashing and main roof sheet before bonding flashing to vertical surface. Extend splice 3 inches beyond fasteners that attach membrane to horizontal surface.
  - 3. Adhere flashing to substrate with full bed of adhesive.
  - 4. Fasten top of flashing at 12 inches on center maximum, under metal flashing.
- C. Penetrations through Membrane:
  - 1. Flash pipe with premolded pipe flashings wherever possible.
  - 2. Where molded pipe flashings cannot be installed, use field fabricated pipe seals.
  - 3. Seal clusters of pipes and unusually shaped penetrations with minimum 2 inch high flashing containing pourable sealer.
- D. Expansion Joints:
  - 1. Complete roof membrane and flashing installation prior to installing expansion joint.
  - 2. Set joint cover on top of wood nailers; secure on each side through metal flange.
  - 3. Seal joint cover flanges to membrane as for sheet splice.
- E. Roof Drains:
  - 1. Taper insulation around drain to provide smooth transition from roof surface to drain clamping ring.
  - 2. Seal between membrane and drain base with water cutoff mastic.

### 3.7 INSTALLATION OF WALKWAY PADS

- A. Clean underside of pad; set pads in full adhesive bed.
- B. Leave 2 inch space between pieces.

END OF SECTION

## SECTION 076200

### SHEET METAL FLASHING AND TRIM

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Section Includes:
  - 1. Metal flashings and trim.
  - 2. Copings.
  - 3. Edge flashings.
  - 4. Counterflashings over membrane roof base flashings.
  - 5. Counterflashings at roof mounted equipment and utility penetrations.
- B. Related Sections:
  - 1. Division 01: Administrative, procedural, and temporary work requirements.
  - 2. Section 079200 - Joint Sealers.

##### 1.2 REFERENCES

- A. American Architectural Manufacturers Association (AAMA) 621 - Voluntary Specifications for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) and Zinc-Aluminum Coated Steel Substrates.
- B. American National Standards Institute/Single Ply Roofing Institute (ANSI/SPRI) ES-1 - Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems.
- C. ASTM International (ASTM):
  - 1. A755/A755M - Standard Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products.
  - 2. B32 - Standard Specification for Solder Metal.
- D. Sheet Metal and Air Conditioning Manufacturer's Association International (SMACNA) - Architectural Sheet Metal Manual.

##### 1.3 SUBMITTALS

- A. Submittals for Review:
  - 1. Shop Drawings: Show locations, types and thicknesses of metal, profiles, dimensions, fastening methods, provisions for expansion and contraction, and joint details.
  - 2. Samples:
    - a. Each flashing and trim profile, minimum 12 inches long. Include corners where applicable.
    - b. 3 x 3 inch prefinished metal samples in specified color.

##### 1.4 QUALITY ASSURANCE

- A. Fabricator and Installer Qualifications: Minimum 3 years documented experience in work of this Section.
- B. Design, fabricate, and install metal copings and edge flashings in accordance with ANSI/SPRI ES-1.

## **PART 2 PRODUCTS**

### **2.1 MATERIALS**

- A. Precoated Galvanized Steel Sheet:
  - 1. ASTM A755/A755M, Structural Quality, G90 galvanized coating class, 26 gage core steel unless noted otherwise.
  - 2. Finish: AAMA 621, fluoropolymer coating, containing minimum 70 percent PVDF resins, color to be selected from manufacturer's full color range.

### **2.2 ACCESSORIES**

- A. Solder: ASTM B32.
- B. Fasteners: Same material and finish as sheet metal, with neoprene gasketed washers where exposed.
- C. Joint Sealers: Specified in Section 07 9200.

### **2.3 FABRICATION**

- A. Fabricate components in accordance with SMACNA Manual.
- B. Solder shop formed joints except pop rivet and seal joints at prefinished metal. After soldering, remove flux and wash clean.
- C. Fabricate corners in single units with minimum 18 inch long legs.
- D. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.
- E. Form sections accurate to size and shape, square and free from distortion and defects.
- F. Provide for thermal expansion and contraction in sheet metal:
  - 1. Provide expansion joints in sheet metal exceeding 15 feet in running length.
  - 2. Place expansion joints at 10 feet on center maximum and maximum 2 feet from corners and intersections.
  - 3. Joint width: Consistent with types and sizes of materials, minimum width 1/4 inch.
- G. Fabricate expansion joints in metal copings and edge flashings with backing and cover plates formed to flashing profile, minimum 8 inches long.
- H. Unless otherwise indicated, provide minimum 3/4 inch wide flat lock seams; lap in direction of water flow.
- I. Fabricate cleats and starter strips of same material as sheet metal.

## **PART 3 EXECUTION**

### **3.1 INSTALLATION**

- A. Install flashing and sheet metal as indicated and in accordance with SMACNA Manual.
- B. Install cleats and starter strips before starting installation of sheet metal. Fasten at 6 inches on center maximum.

- C. Expansion Joints in Edge Flashings:
  - 1. Center backing plate between flashing pieces at end joints.
  - 2. Apply two continuous beads of joint sealer between backing plate and flashing sections at each end.
  - 3. Install flashing pieces with 1/2 inch expansion space at abutting ends; apply sealer to expansion space.
  - 4. Apply two continuous beads of joint sealer between cover plate and flashing sections at each end.
- D. Secure flashings with concealed fasteners where possible.
- E. Apply plastic cement between metal and bituminous flashings.
- F. Fit flashings tight, with square corners and surfaces true and straight.
- G. Seam and seal field joints.
- H. Separate dissimilar metals with bituminous coating or non-absorptive gaskets.
- I. Reglets:
  - 1. Install reglets true to line and level. Seal top of surface mounted reglet with joint sealer.
  - 2. Install flashings into reglets to form tight fit. Secure with lead or plastic wedges at 9 inches on center maximum. Seal remaining space with joint sealer.
- J. Apply joint sealers as specified in Section 07 9200.

### 3.2 CLEANING

- A. Clean sheet metal; remove slag, flux, stains, spots, and minor abrasions without etching surfaces.

END OF SECTION

**SECTION 076500**  
**FLEXIBLE FLASHINGS**

**PART 1 GENERAL**

1.1 SUMMARY

- A. Section Includes:
  - 1. Rubberized asphalt sheet for concealed wall flashings
- B. Related Sections:
  - 1. Division 01: Administrative, procedural, and temporary work requirements.

1.2 REFERENCES

- A. ASTM International (ASTM) D1970 - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.

1.3 SUBMITTALS

- A. Submittals for Review:
  - 1. Product Data: Manufacturer's descriptive data and installation instructions.
- B. Sustainable Design Submittals:
  - 1. Regional Materials.

1.4 PROJECT CONDITIONS

- A. Do not apply flashings at ambient or surface temperatures less than 40 degrees F.

**PART 2 PRODUCTS**

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
  - 1. Grace Construction Products. ([www.graceconstruction.com](http://www.graceconstruction.com))
  - 2. W.R. Meadows, Inc. ([www.wrmeadows.com](http://www.wrmeadows.com))
  - 3. Polyguard Products, Inc. ([www.polyguardproducts.com](http://www.polyguardproducts.com))
- B. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Rubberized Asphalt Flashing: ASTM D1970; minimum 32 mil thick butyl rubber modified asphalt laminated to 8 mil thick cross-laminated HDPE film, release paper facing, self adhering.

2.3 ACCESSORIES

- A. Termination Mastic: Type recommended by flashing manufacturer.

## **PART 3 EXECUTION**

### **3.1 INSTALLATION**

- A. Provide flexible flashings in exterior wall assemblies at:
  - 1. Base of walls.
  - 2. Heads of openings in walls.
  - 3. Top of walls under copings.
  - 4. Transitions between materials.
  - 5. Around openings and penetrations through walls.
- B. Lap ends 4 inches minimum.
- C. Press to full bond with substrate without voids, wrinkles, bridging, or fishmouths.
- D. Roll ends and edges with hand held roller; ensure tight seal.
- E. Apply trowel coat of mastic along flashing at top edge, seams, cuts, and penetrations.

END OF SECTION

## SECTION 077233

### ROOF HATCHES

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Section Includes:
  - 1. Prefabricated roof hatches with integral curbs and operating hardware.
  - 2. Safety railing system.
- B. Related Sections:
  - 1. Division 01: Administrative, procedural, and temporary work requirements.

##### 1.2 REFERENCES

- A. ASTM International (ASTM):
  - 1. A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
  - 2. B209 - Standard Specification for Aluminum-Alloy Sheet and Plate.

##### 1.3 SUBMITTALS

- A. Submittals for Review:
  - 1. Shop Drawings: Indicate locations, dimensions, materials, finishes, attachment, and relationship to adjacent construction.
  - 2. Product Data: Manufacturer's literature including description of materials, finishes, operation, and installation instructions.
  - 3. Warranty: Sample warranty form.

##### 1.4 QUALITY ASSURANCE

- A. Roof Hatches: Support minimum 40 PSF live load.

##### 1.5 WARRANTIES

- A. Furnish manufacturer's 5 year warranty providing coverage against defective materials and workmanship.

#### PART 2 PRODUCTS

##### 2.1 MANUFACTURERS

- A. Contract documents are based on products by Bilco Co. ([www.bilco.com](http://www.bilco.com))
- B. Substitutions: Under provisions of Division 01.

##### 2.2 MATERIALS

- A. Galvanized Steel Sheet: ASTM A653/A653M, Structural Quality, G90 coating class.
- B. Insulation: Rigid fiberboard.



## 2.3 MANUFACTURED UNITS

- A. Roof Hatch:
  - 1. Source: Type S roof hatch by Bilco Co., or approved substitute.
  - 2. Type: Single leaf, ladder access.
  - 3. Nominal opening size: 30 inches wide x 36 inches long.
  - 4. Frame:
    - a. Minimum 14 gage galvanized steel with 12 inch high curb, integral cap flashing, 3-1/2 inch wide flanges with attachment holes and 1 2 inch thick insulation bonded to exterior.
    - b. Minimum R-value: 12.
  - 5. Cover:
    - a. Minimum 14 gage galvanized steel exterior and 22 gage galvanized steel liner bonded to 1 2 inch thick insulation core.
    - b. Minimum R-value: 12.
  
- B. Ladder Extension: 42 inches high, telescoping steel tube, automatically locking when extended.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions and approved Shop Drawings.
- B. Set units plumb and level, without warp and rack.
- C. Secure to supporting construction.

END OF SECTION

## SECTION 079200

### JOINT SEALERS

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Section Includes:
  - 1. Joint backup materials.
  - 2. Joint sealers.
- B. Related Sections:
  - 1. Division 01: Administrative, procedural, and temporary work requirements.

##### 1.2 REFERENCES

- A. ASTM International (ASTM):
  - 1. C510 - Standard Test Method for Staining and Color Change of Single- or Multicomponent Joint Sealants.
  - 2. C719 - Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle).
  - 3. C794 - Standard Test Method for Adhesion-In-Peel of Elastomeric Joint Sealants.
  - 4. C834 - Standard Specification for Latex Sealing Compounds.
  - 5. C919 - Standard Practice for Use of Sealants in Acoustical Applications.
  - 6. C920 - Standard Specification for Elastomeric Joint Sealants.
  - 7. C1193 - Standard Guide for Use of Joint Sealants.
  - 8. C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants.
  - 9. C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants.
  - 10. C1472 - Standard Guide for Calculating Movement and Other Effects When Establishing Sealant Joint Width.
  - 11. C1521 - Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints.
  - 12. D2203 - Standard Test Method for Staining from Sealants.

##### 1.3 SUBMITTALS

- A. Submittals for Review:
  - 1. Product Data: Indicate sealers, primers, backup materials, bond breakers, and accessories proposed for use.
  - 2. Samples:
    - a. 1/2 x 1/2 x 3 inch long joint sealer samples in specified colors.
  - 3. Warranty: Sample warranty form.

##### 1.4 QUALITY ASSURANCE

- A. Applicator Qualifications: Minimum 3 years documented experience in work of this Section.
- B. Laboratory Pre-Construction Testing:
  - 1. Obtain representative samples of actual substrate materials.
  - 2. Test sealers and accessories for following:
    - a. Adhesion: Test to ASTM C794 and ASTM C719; determine surface preparation and required primer.
    - b. Compatibility: Test to ASTM C1087; determine that materials in contact with sealers do not adversely affect sealant materials or sealant color.
    - c. Staining: Test to ASTM D2203, ASTM C510, or ASTM C1248; determine that sealants will not stain joint substrates.

- d. Pre-construction testing is not required when sealant manufacturer furnishes data acceptable to Architect based on previous testing for materials matching those of this Project.

## 1.5 PROJECT CONDITIONS

- A. Do not apply sealers at temperatures below 40 degrees F unless approved by sealer manufacturer.

## 1.6 WARRANTIES

- A. Furnish manufacturer's applicator's 10 year warranty providing coverage for exterior sealers and accessories that fail to provide air and water tight seal, exhibit loss of adhesion or cohesion, or do not cure.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
  - 1. BASF Building Systems. ([www.buildingsystems.basf.com](http://www.buildingsystems.basf.com))
  - 2. Dow Corning Corp. ([www.dowcorning.com](http://www.dowcorning.com))
  - 3. GE Silicones. ([www.siliconeforbuilding.com](http://www.siliconeforbuilding.com))
  - 4. Pecora Corp. ([www.pecora.com](http://www.pecora.com))
  - 5. Sika Corp. ([www.sikausa.com](http://www.sikausa.com))
  - 6. Tremco, Inc. ([www.tremcosealants.com](http://www.tremcosealants.com))
- B. Substitutions: Under provisions of Division 01.

### 2.2 MATERIALS

- A. Joint Sealer Type 1:
  - 1. ASTM C920, Grade P, multiple component polyurethane type, self-leveling.
  - 2. Movement capability: Plus or minus 25 percent.
  - 3. Color: To be selected from manufacturer's full color range.
- B. Joint Sealer Type 2:
  - 1. ASTM C920, Grade NS, single component polyurethane type, non sag.
  - 2. Movement capability: Plus or minus 25 percent.
  - 3. Color: To be selected from manufacturer's full color range.
- C. Joint Sealer Type 3:
  - 1. ASTM C834, single component acrylic latex, non sag.
  - 2. Movement capability: Plus or minus 7-1/2 percent.
  - 3. Color: To be selected from manufacturer's full color range, black to be used at all visible joints in auditoriums.
- D. Joint Sealer Type 4:
  - 1. ASTM C920, Grade NS, single component silicone, non sag, mildew resistant.
  - 2. Movement capability: Plus or minus 25 percent.
  - 3. Color: To be selected from manufacturer's full color range.
- E. Joint Sealer Type 5:
  - 1. ASTM C834, single component acrylic latex, non sag, non-hardening, non-corrosive, recommended by manufacturer for acoustical applications.
  - 2. Movement capability: Plus or minus 7-1/2 percent.
  - 3. Color: Color to be selected, black to be used in visible joints in auditoriums.

## 2.3 ACCESSORIES

- A. Primers, Bondbreakers, and Solvents: As recommended by sealer manufacturer.
- B. Joint Backing:
  - 1. ASTM C1330, closed cell polyethylene foam, preformed round joint filler, non absorbing, non staining, resilient, compatible with sealer and primer, recommended by sealer manufacturer for each sealer type.
  - 2. Size: Minimum 1.25 times joint width.

## 2.4 MIXES

- A. Mix multiple component sealers in accordance with manufacturer's instructions.
  - 1. Mix with mechanical mixer; prevent air entrainment and overheating.
  - 2. Continue mixing until color is uniform.

## **PART 3 EXECUTION**

### 3.1 PREPARATION

- A. Remove loose and foreign matter that could impair adhesion. If surface has been subject to chemical contamination, contact sealer manufacturer for recommendation.
- B. Clean and prime joints in accordance with manufacturer's instructions.
- C. Protect adjacent surfaces with masking tape or protective coverings.
- D. Calculate joint dimensions in accordance with ASTM C1472.

### 3.2 APPLICATION

- A. Apply products in accordance with manufacturer's instructions.
- B. Install sealers and accessories in accordance with ASTM C1193.
- C. Install acoustical sealers and accessories in accordance with ASTM C919.
- D. Install joint backing to maintain required sealer dimensions. Compress backing approximately 25 percent without puncturing skin. Do not twist or stretch.
- E. Use bondbreaker tape where joint backing is not installed.
- F. Fill joints full without air pockets, embedded materials, ridges, and sags.
- G. Tool sealer to smooth profile.
- H. Apply sealer within manufacturer's recommended temperature range.

### 3.3 CLEANING

- A. Remove masking tape and protective coverings after sealer has cured.
- B. Clean adjacent surfaces.

### 3.4 SCHEDULE

JOINT LOCATION OR TYPE	SEALER TYPE
Exterior Joints:	
Joints in above-grade surfaces	2
Interior Joints:	
Joints in horizontal surfaces subject to pedestrian traffic	1
Joints in toilet rooms, countertops, kitchens	4
Joints in acoustical assemblies	5
Other joints	3

END OF SECTION