**SECTION 07 21 00**

**THERMAL INSULATION**

## PART 1 – GENERAL

### 1.01 Summary

A. Section Includes:
   1. Foam-plastic board insulation.
   2. Glass-fiber blanket insulation.

### 1.02 Action Submittals

A. Product Data: For each type of product indicated.

## PART 2 – PRODUCTS

### 2.01 Foam-Plastic Board Insulation

A. Extruded-Polystyrene Board Insulation: ASTM C 578, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work included, but are not limited to, the following:
      a. Owens Corning.
      b. Dow
      c. Requests for substitutions will be considered in accordance with the provisions of the specifications.

   2. Type X, 15 psi, Foamular 150.
   3. Type IV, 25 psi, Foamular 250 at Foundation Wall and Floor Slab.

### 2.02 Glass-Fiber Blanket Insulation

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   1. CertainTeed Corporation.
   2. Johns Manville.
   3. Owens Corning.
   4. Requests for substitutions will be considered in accordance with the provisions of the specifications.

B. Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

## PART 3 – EXECUTION

### 3.01 Installation, General

A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

**3.02 Protection**

A. On vertical surfaces, set insulation units using manufacturer's recommended adhesive according to manufacturer's written instructions.
   1. If not otherwise indicated, extend insulation a minimum of 48 inches below exterior grade line.

B. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

**3.03 Installation of Insulation for Framed Construction**

A. Foam-Plastic Board Insulation: Seal joints between units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.

B. Glass-Fiber or Mineral-Wool Blanket Insulation: Install in cavities formed by framing members according to the following requirements.
   1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
   2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
   3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
   4. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.

END OF SECTION

## SECTION 07 21 16

## METAL BUILDING INSULATION

### PART 1 - GENERAL

#### 1.01 Section Includes

A. Roof and wall insulation systems for metal buildings.

#### 1.02 Related Sections

A. Section 13 34 19 - Pre-Engineered Metal Building.

#### 1.03 References

A. ASTM C991 - Specification for Flexible Fibrous Glass Insulation for Metal Buildings.

B. ASTM E84 - Standard Test Methods for Surface Burning Characteristics of Building Materials.

C. ASTM E96 - Test Method for Water Vapor Transmission of Materials.

D. ASTM E136 - Standard Test Method for Behavior of Material in a Vertical Tube Furnace at $750^0$C.

#### 1.04 Submittals

A. Submit manufacturer's product brochures and data for insulation fabric, steel strap and accessories.

B. Submit manufacturer's installation instructions.

#### 1.05 Product Delivery, Storage, and Handling

A. Deliver materials in manufacturer's unopened packaging with labels intact.

B. Clearly identify manufacturer, contents, brand name, applicable standard and R-value.

C. Protect materials from weather, condensation, and damage.

### PART 2 - PRODUCTS

#### 2.01 Manufacturer

A. Simple Saver System® by Thermal Design.

B. Energy Saver FP™ by Guardian Building Products.

C. Approved equal.

#### 2.02 Materials

A. An insulation system that includes double layer roof insulation, wall insulation, vapor barrier liner fabric, thermal breaks, straps, and other components. System shall be OSHA compliant for leading edge fall protection.

B. Roof Insulation:

1. Formaldehyde-free fiberglass batt or blanket, unfaced, meeting requirements of ASTM C991, Type I.
2. Insulation shall have a flame spread rating of 25 or less and a smoke developed rating of 50 or less when tested in accordance with ASTM E84.
3. Minimum R-30 with an installed thickness of 10 inches. Note Insulation depth on plans.
4. The entire depth of the purlin shall be filled.

C. Wall Insulation:
1. Formaldehyde-free fiberglass batt or blanket, unfaced, meeting requirements of ASTM C991, Type I.
2. Insulation shall have a flame spread rating of 25 or less and a smoke developed rating of 50 or less when tested in accordance with ASTM E84.
3. Minimum R-19 with an installed thickness of 6 inches. Note Insulation depth on plans.
4. The entire depth of the girt shall be filled.

D. Strap: Sheet steel, 100 KSI minimum yield high tensile strength or ASTM Grade 50, Class 1, galvanized, primed and painted. Minimum size shall be 0.2” x 1” x continuous length. Color shall be white.

E. Fasteners: Plated self-drilling screws with sealing washers painted to match steel strap color. Use No. 12 x 3/4” for fastening to light gauge steel (up to 20 gauge purlin) and No. 12 x 1-1/4” for fastening to heavier gauge steel (up to 3/8” purlin/bar joist).

F. Vapor Barrier Liner Fabric:
1. Fabric woven of reinforced high density polyethylene yarns coated on both sides with a continuous white polyethylene film.
2. Fabric shall function as a vapor barrier with a perm rating of 0.02 in accordance with ASTM E96
3. Fabric shall have a flame spread rating of 25 or less and a smoke developed rating of 50 or less when tested in accordance with ASTM E84.
4. Pieces shall be fabricated using extrusion welding to substantially fit large defined building areas with minimum practical sealing to be done at the job site.
5. Manufacturer shall certify the fabric for free fall protection.

G. Sealants: Sealants shall be fast-tack solvent based vapor barrier sealant or double sided vapor barrier tape approved by the fabric manufacturer.

H. Insulation Hangers: Manufacturer’s standard hangers for supporting insulation between roof purlins in roof pitches over 4:12.

I. Thermal Break: 3/16” X 3” wide white, closed cell polyethylene foam with pre-applied adhesive film and peel-off backing or 1” x 3” extruded polystyrene.

J. Wall Insulation Hangers: Galvanized steel strips approximately 32 inches long with barbed arrows every 8 inches along its length.

## PART 3 - EXECUTION

### 3.01 Installation - General

A. Install building insulation system in accordance with the manufacturer’s installation instructions and the approved shop drawings.

B. Install in exterior spaces without gaps or voids. Do not compress insulation.

C. Trim insulation to fit spaces. Insulate miscellaneous gaps and voids.

D. Fit insulation tight to spaces and tight to exterior side of the sealed liner fabric and around mechanical and electrical services within plane of insulation.

### 3.02 Roof Insulation Installation

A. Straps:
1. Cut straps to length and install in the pattern and spacing indicated on the shop drawings.
2. Tension straps to required value.

B. Vapor Barrier Fabric:
1. Install vapor barrier fabric in large one-piece custom fabricated pieces to substantially fit defined building areas with minimum practical job site sealing.
2. Position pre-folded fabric on the strip platform along one eave purlin.
3. Clamp the two bottom corners at the eave and also at the center bay.
4. Pull the other end of the pleat-folded fabric across the building width on the strap platform, pausing only at the ridge to fasten the straps and fabric in position where plane of roof changes and to release temporary fasteners on the opposite ridge purlins.
5. Once positioned, install fasteners from the bottom side at each strap/purlins intersection.
6. Trim edges and seal around the rafters.
7. All seams must be completely sealed. Do not staple.

C. Insulation:
1. Unpack, and shake to a thickness exceeding the specified thickness.
2. Ensure the cavities are filled completely with insulation.
3. Place on the vapor barrier liner fabric without voids or gaps.
4. Place top layer of insulation over and perpendicular to the purlins without voids or gaps, as roof sheathing is applied.
5. Place thermal block on top of purlins
6. Place insulation between purlins at the thickness for the R-value specified.

D. Seal vapor barrier fabric to the wall fabric and elsewhere as required to provide a continuous vapor barrier.

### 3.03 Wall Insulation Installation

A. Insulation:
1. Install thermal break to exterior surface of girts as wall sheathing is applied.
2. Position and secure hangers to girts on the inside face of the wall sheathing.
3. Cut insulation to required lengths to fit vertically between girts.
4. Fluff the insulation to the full specified thickness.
5. Ensure the cavities are filled completely with insulation.

B. Vapor Barrier Fabric:
1. Install vapor barrier fabric in large one-piece fabricated pieces to substantially fit defined building areas with minimum practical job site sealing.
2. Apply the vapor barrier fabric by clamping it in position over eave strap and installing fasteners through the eave strap into each roof strap, permanently clamping the wall fabric between them.
3. Once in position, draw the vapor barrier fabric down over the column flanges to the base angle and install vertical strips along each column and maximum 5’-0” on center, fastening to each girt to retain system permanently in place.
4. All seams must be completely sealed. Do not staple.

C. Seal wall fabric to roof fabric, to the base angle and up the columns to provide a continuous vapor barrier.

### 3.04 Cleaning

A. Clean dirt or exposed sealant from the exposed vapor barrier fabric.

END OF SECTION

**SECTION 07 25 00**

**VAPOR BARRIERS**

## PART 1 – GENERAL

### 1.01 Section Includes

A. Vapor Retarders

### 1.02 Submittals

A. Product Data: Provide data on material characteristics.

## PART 2 – PRODUCTS

### 2.01 Vapor Retarder Materials

A. Interior Vapor Retarder Sheet: ASTM D4397 polyethylene film reinforced with glass fiber square mesh, clear.

1. Thickness: 8 mil, as detailed.
2. Water Vapor Permeance: As required by referenced standard for thickness specified.
3. Seam and Perimeter Tape: Polyethylene self-adhering type, mesh reinforced, 2 inches wide, compatible with sheet material.

### 2.02 Accessories

A. Sealants, Tapes, and Accessories for Sealing Weather Barrier and Sealing Weather Barrier to Adjacent Substrates: As specified or as recommended by weather barrier manufacturers.

## PART 3 – EXECUTION

### 3.01 Installation

A. Install materials in accordance with manufacturer's instructions.

B. Vapor Retarders: Install continuous airtight barrier over surfaces indicated, with sealed seams and with sealed joints to adjacent surfaces.

C. Mechanically Fastened Sheets - Vapor Retarder On Interior:

1. When insulation is to be installed in assembly, install vapor retarder over insulation.
2. Seal seams, laps, perimeter edges, penetrations, tears, and cuts with self-adhesive tape, making airtight seal.
3. Locate laps at a framing member; at laps fasten one sheet to framing member then tape overlapping sheet to first sheet.
4. Seal entire perimeter to structure, window and door frames, and other penetrations.
5. Where conduit, pipes, wires, ducts, outlet boxes, and other items are installed in insulation cavity, pass vapor retarder sheet behind item but over insulation and maintain airtight seal.

END OF SECTION

## SECTION 07 71 23

## GUTTERS AND DOWNSPOUTS

### PART 1 - GENERAL

#### 1.01 Section Includes

A. Furnishing and installation of gutters and downspouts.

#### 1.02 References

A. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

B. ASTM B 209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

C. SMACNA - Architectural Sheet Metal Manual.

#### 1.03 Design/Performance Requirements

A. American Architectural Manufacturers Association (AAMA) Specification 1405.1 "Specification for Aluminum Raincarrying Systems".

#### 1.04 Submittals

A. Product Data: Manufacturer's catalog data, detail sheets, and specifications.

B. Shop Drawings: Show dimensions of downspouts and accessories, fastening details and connections and interface with other products.

C. Selection Samples: For each finish product specified, set of color chips representing manufacturer's full range of available colors

#### 1.05 Quality Assurance

A. Installer/Fabricator Qualifications: A firm regularly engaged in the type of work specified with a minimum five year’s experience.

B. Perform Work in accordance with SMACNA Manual.

#### 1.06 Delivery, Storage, and Handling

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store products to prevent twisting, bending, and abrasion, and to provide ventilation. Slope stored materials to drain.

C. During storage prevent contact with materials capable of causing discoloration, staining, or other damage.

### PART 2 - PRODUCTS

#### 2.01 Components

A. Gutters: Kynar-Finish painted, ASTM A653.

1. Style: K-style.
2. Thickness: 24 gauge.
3. Size: 6 inch. X 4.5

B. Downspouts: Kynar-Finish painted steel, ASTM A653.
1. Style: Plain square.
2. Thickness: 26 gauge.
3. Size: 4”x6”.

C. End Caps: Kynar-Finish painted steel, ASTM A653, 24 gauge.

D. Elbows: Kynar-Finish painted steel, ASTM A653, 26 gauge.

E. Downspout Anchors: Provide types required to suit project requirements.

F. Gutter Hangers and Anchors: Kynar-Finish painted steel. Provide types required to suit project requirements.

G. Steel Finish: Kynar-Finish painted. Color as selected from manufacturer’s standard colors.

H. Downspout Adapters: Polyethylene, ADS or equal.

**2.02 Fabrication**

A. Continuously form seamless gutters to the profiles and sizes specified

B. Form downspouts of profiles and sizes specified.

C. Hem exposed edges of metal.

**PART 3 - EXECUTION**

**3.01 Examination**

A. Do not begin installation until substrates have been properly prepared.

B. Verify governing dimensions at building.

C. Verify surfaces are ready to receive gutters and downspouts.

D. If substrate preparation is the responsibility of another installer, notify Engineer of unsatisfactory preparation before proceeding.

**3.02 Preparation**

A. Clean surfaces thoroughly prior to installation.

B. Clean and repair if necessary any adjoining work on which this work is in any way dependent for its proper installation.

**3.03 Installation**

A. Install in accordance with manufacturer's instructions.

B. Install gutters using appropriate hangers to allow normal expansion and contraction.

C. Install gutter hangers using two 1-1/4 inch screw shank nails and fastened into solid lumber.

D. All gutters shall be in continuous length for each elevation (run). No end laps are allowed.

E. Exercise care in placing aluminum in contact with other dissimilar metals or materials that are not compatible with aluminum.

F. Providing adequate insulation/separation where ever necessary, such as by painting or otherwise protecting when they are in contact with aluminum or when drainage from them passes over aluminum surfaces.

G. Install sealants to clean dry surfaces only without skips or voids.

**3.04 Protection**

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

**SECTION 07 92 00**

**JOINT SEALANTS**

## PART 1 – GENERAL

### 1.01 Summary

A. Section Includes:
   1. Silicone joint sealants.
   2. Urethane joint sealants.
   3. Latex joint sealants.

### 1.02 Action Submittals

A. Product Data: For each joint-sealant product indicated.

B. Joint-Sealant Schedule: Include the following information:
   1. Joint-sealant application, joint location, and designation.
   2. Joint-sealant manufacturer and product name.
   3. Joint-sealant formulation.
   4. Joint-sealant color.

## PART 2 – PRODUCTS

### 2.01 Materials, General

A. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
   1. Suitability for Immersion in Liquids. Where sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247. Liquid used for testing sealants is deionized water, unless otherwise indicated.

B. Stain-Test-Response Characteristics: Where sealants are specified to be non-staining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

C. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

### 2.02 Silicone Joint Sealants

A. Mildew-Resistant Silicone Joint Sealant: ASTM C920:

   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Tremco Incorporated.
   2. Type: Single component (S) or multicomponent (M).
   3. Grade: Pourable (P) or nonsag (NS).
   4. Class: 100/50 50 25.
   5. Uses Related to Exposure: Traffic (T) Nontraffic (NT).

### 2.03 Urethane Joint Sealants

A. Urethane Joint Sealant: ASTM C920.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Tremco Incorporated.
   2. Type: Single component (S) or multicomponent (M).
   3. Grade: Pourable (P) or nonsag (NS).
   4. Class: 100/50 50 25.
   5. Uses related to exposure: Traffic (T) Nontraffic (NT).

**2.04 Latex Joint Sealants**

A. Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C834, Type OP, Grade NF.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Tremco Incorporated.

**2.05 Joint Sealant Backing**

A. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) Type O (open-cell material) Type B (bicellular material with a surface skin) or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

B. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer.

**2.06 Miscellaneous Materials**

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials.

C. Masking Tape: Non-staining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

**PART 3 – EXECUTION**

**3.01 Preparation**

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer’s written instructions.
   1. Remove laitance and form-release agents from concrete.
   2. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by

cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

### 3.02 Installation

A. Sealant Installation Standard: Comply with recommendations in ASTM C1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

B. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

D. Install sealants using proven techniques that comply with the following and at the same time backings are installed.

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint profile per Figure 8A in ASTM C1193, unless otherwise indicated.

F. Acoustical Sealant Installation: Comply with ASTM C 919 and with manufacturer's written recommendations.

G. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

### 3.03 Joint-Sealant Schedule

A. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Locations:
   a. Control and expansion joints in unit masonry.
   b. Joints in exterior insulation and finish systems
   c. Perimeter joints between materials listed above and frames of doors, windows, and louvers.
2. Joint Sealant: Silicone.

3. Joint Sealant: Urethane
4. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

B. Joint-Sealant Application: Interior joints in horizontal traffic surfaces.

1. Joint Locations:
   a. Isolation joints in cast-in-place concrete slabs.
2. Joint Sealant: Silicone.
3. Joint Sealant: Urethane.
4. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

C. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Locations:
   a. Control and expansion joints on exposed interior surfaces of exterior walls.
   b. Perimeter joints between interior wall surfaces and frames of interior doors, windows, and elevator entrances.
2. Joint Sealant: Latex.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

D. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Locations:
   a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
2. Joint Sealant: Silicone.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION