



# HVAC EQUIPMENT INSULATION

## General Specification Guide **SECTION 23 07 16**

---

### **GUIDE SPECIFICATIONS**

**PROJECT ENGINEER RESPONSIBILITY:** This is a general specification guide, intended to be used by experienced construction professionals, in conjunction with good construction practice and professional judgment. This guide is to aid in the creation of a complete building specification that is to be fully reviewed and edited by the engineer. Sections of this guide should be included, edited, or omitted based on the requirements of a specific project. It is the responsibility of both the specifier and the purchaser to determine if a product or system is suitable for its intended use. Neither Owens Corning, nor any of its subsidiary or affiliated companies, assume any responsibility for the content of this specification guide relative to actual projects and specifically disclaim any and all liability for any errors or omissions in design, detail, structural capability, attachment details, shop drawings or other construction related details, whether based upon the information provided by Owens Corning or otherwise.

### **SECTION 23 07 16 HVAC EQUIPMENT INSULATION PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section Includes: Provide insulation for the following HVAC equipment:

Note to Specifier: The following temperature ranges are typical for these systems. However, if project requirements call for service temperatures outside the ranges listed, consult the manufacturer's published data to determine operating temperature limitations of the insulation product or products under consideration.

1. Chilled water systems from 35°F (2°C) to 65°F (18°C).
2. Heating systems (steam, steam condensate, hot water), ambient up to 450°F (232°C).
3. Domestic and service hot water systems, ambient up to 180°F (82°C).

#### **1.2 REFERENCES**

- A. Materials shall meet the property requirements of one or more of the following specifications as applicable to the specific product or end use:
1. American Society for Testing of Materials (ASTM):
    - a. ASTM C553, Standard Specification for Mineral Fiber Blanket Insulation for commercial and Industrial Applications.
    - b. ASTM C612, Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
    - c. ASTM C1136, Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation.
    - d. ASTM C1393, Standard Specification for Perpendicularly Oriented Mineral Fiber Roll and Sheet Thermal Insulation for Pipes and Tanks.
    - e. ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
  2. Underwriters Laboratories (UL)
    - a. UL 723, Test for Surface Burning Characteristics of Building Materials.

#### **1.3 DEFINITIONS**

- A. The term "mineral fiber" as defined by the above specifications includes fibers manufactured of glass, rock, or slag processed from a molten state, with or without binder.

#### **1.4 SYSTEM PERFORMANCE**

- A. Insulation materials furnished and installed hereunder should meet the minimum thickness requirements of American Society of Heating, Refrigeration, and Air Conditioning Engineers ASHRAE 90.1 (2010), "Energy Efficient Design of New Buildings." However, if other factors such as condensation control or personnel protection are to be considered, the selection of the thickness of insulation should satisfy the controlling factor.

#### **1.5 SUBMITTALS**

- A. Product Data: Submit product characteristics, performance criteria, and limitations, including installation instructions, for each type of product indicated.
1. For adhesives and sealants, submit documentation including printed statement of VOC content.
- B. Sustainable Design Submittals: Submit manufacturer's sustainable design certifications as specified.



## **16 DELIVERY AND STORAGE OF MATERIALS**

- A. Delivery: Deliver materials in manufacturer's original packaging.
- B. Storage: Store and protect products in accordance with manufacturer's instructions. Store in a dry indoors location. Protect insulation materials from moisture and soiling.
- C. Inspection: Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.
- D. Do not install insulation that has been damaged or wet. Remove it from jobsite.
  - 1. An exception may be allowed in cases where the contractor is able to demonstrate that wet insulation when fully dried out (either before installation or afterward following exposure to system operating temperatures) will provide installed performance that is equivalent in respects to new, completely dry insulation. In such cases, consult the insulation manufacturer for technical assistance.

## **PART 2 - PRODUCTS**

### **21 MANUFACTURER**

- A. Owens Corning Insulating Systems, LLC, Toledo, OH 43659; [www.owenscorning.com](http://www.owenscorning.com).

### **22 HVAC EQUIPMENT INSULATION**

- A. General:
  - 1. Industrial Blankets and Boards: Rigid, resin bonded fibrous glass with no facing or with a damage-resistant, flame retardant, reinforced aluminum foil (FRK) or all-service jacket (ASJ) facing.
  - 2. Owens Corning pipe insulation is not known to contain penta-, octa-, or deca-brominated diphenyl flame retardant substances, such as deca-Bromine (deca-BDE).
- B. Certifications:
  - 1. Owens Corning Fiberglas™ 700 Series Insulation is certified by SCS Global Services to contain a minimum of 53% recycled glass content, 31% pre-consumer and 22% post-consumer (except FLEXWRAP® Insulation).
  - 2. All Owens Corning pipe products are UL listed and labeled (except FLEXWRAP® Insulation and Pipe and Tank Insulation)
- C. HVAC Equipment Insulation: Comply with ASTM C553, ASTM C612, or ASTM C1393 for sizes required in the particular system, of a type suitable for installation on equipment systems indicated. Provide the following:
  - 1. For indoor systems operating at temperatures from 0°F (-18°C) to +450°F (230°C):
    - a. Owens Corning® Fiberglas™ 700 Series Insulation, in semi-rigid or rigid board form, unfaced or with ASJ or FRK facing.
  - 2. For systems operating at temperatures to +650°F (340°C) where moderate abuse resistance is required:
    - a. Owens Corning® Fiberglas™ Pipe and Tank Insulation with end grain factory-applied ASJ all-service jacket.
  - 3. For systems operating at temperatures to +850°F (450°C) and always above the ambient temperature:
    - a. Owens Corning® Fiberglas™ Insul-Quick® Insulation, rated for maximum operating temperature of 850°F (450°C) may be installed using appropriate fastening systems and then covered with metal jacketing or otherwise jacketed and/or finished in accordance with details shown.
    - b. Owens Corning™ FLEXWRAP® Pipe and Tank Wrap.
  - 4. For systems operating at temperatures up to +1000°F (540°C) and always above the ambient temperature:
    - a. Owens Corning TIW Insulation Types I & II, installed directly on heated flat and curved surfaces by attaching with welded pins or studs and finished with sheet metal or metal mesh and insulating cement, then canvassed and painted.
- D. Insulate equipment located outdoors and exposed to the weather as indicated above except the thickness shall be determined according to the worst weather extremes expected. The insulation shall then be protected with one of the following weatherproof finishes as indicated on Contract Documents:
  - 1. Metal Jacketing: 0.016 in (0.4 mm) minimum aluminum or stainless steel with moisture barrier, secured in accordance with the jacket manufacturer's recommendations. Lap joints to shed water and seal joints completely.
  - 2. If required, score boards to allow them to conform to curved and irregular surfaces.
  - 3. Mechanical fasteners to hold insulation to surfaces with bands as required to conform to curved or irregular surfaces.
  - 4. Support rings to support the top head insulation where required.
  - 5. Outdoor installations require a weather resistant barrier for protection of the insulation material.
- E. Accessories: Provide accessories per insulating system manufacturer's recommendations, including the following:
  - 1. Closure Materials: Butt strips, bands, wires, staples, mastics, adhesives; pressure-sensitive tapes.
  - 2. Field-Applied Jacketing Materials: Sheet metal, plastic, canvas, fiberglass cloth, insulating cement, PVC fitting covers.
  - 3. Support Materials: Hanger straps, hanger rods, saddles, support rings.



- F. Adhesives For Indoor Applications: VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Verify that materials and accessories can be installed in accordance with Contract Documents and material manufacturers' recommendations.
- B. Verify, by inspecting product labeling, submittal data, and/or certifications which may accompany the shipments, that materials and accessories to be installed on the project comply with applicable specifications and standards and meet specified thermal and physical properties.
- C. Before starting work under this section, carefully inspect the site and installed work of other trades and verify that such work is complete to the point where installation of materials and accessories under this section can begin.

#### **3.2 PREPARATION**

- A. Ensure that surfaces over which insulation is to be installed are clean and dry.
- B. Ensure that insulation is clean, dry, and in good mechanical condition with factory-applied vapor or weather barriers intact and undamaged. Wet, dirty, or damaged insulation shall not be acceptable for installation.
- C. Ensure that pressure testing of piping and fittings has been completed prior to installing insulation.

#### **3.3 SAFETY PRECAUTIONS**

- A. Insulation contractor's employees shall be properly protected during installation of insulation. Protection shall include proper attire when handling and applying insulation materials, and shall include, but not be limited to, disposable dust respirators, gloves, hard hats, and eye protection.

#### **3.4 INSTALLATION**

- A. General: Install insulation materials and accessories in accordance with Contract Documents and manufacturer's published instructions to ensure that it will serve its intended purpose.
1. Install insulation on piping subsequent to installation of heat tracing, painting, and acceptance tests.
  2. Install insulation materials with smooth and even surfaces. Do not use cut pieces or scraps abutting each other. Butt insulation joints firmly to ensure complete, tight fit over surfaces. Apply insulation using staggered joint method for both single and double layer installations, applying each layer of insulation separately.
  3. Maintain the integrity of factory-applied vapor barrier jacketing on insulation, protecting it against puncture, tears or other damage. Staples used on cold insulation shall be coated with suitable sealant to maintain vapor barrier integrity.
  4. Where specified on contract drawings, coat insulated surfaces with layer of insulating cement, troweled in a workmanlike manner, leaving a smooth and continuous surface. Fill in seams, broken edges, and depressions. Cover over wire mesh and joints with cement sufficiently thick to remove surface irregularities.
- B. Removable Insulation: Provide removable insulation sections to cover parts of equipment which must be opened periodically or maintenance, such as vessel covers, fasteners, flanges, frames and accessories.
- C. Areas Left Uninsulated: Items such as boiler manholes, handholds, clean-outs, ASME stamp, and manufacturers' nameplates, may be left uninsulated, unless omitting insulation would cause a condensation problem. When such is the case, appropriate tagging shall be provided to identify the presence of these items. Provide neatly beveled edges at interruptions of insulation.
- D. Accessory Materials (Midwest): Install in conformance with the current edition of the Midwest Insulation Contractors Association (MICA) "Commercial & Industrial Insulation Standards."

#### **3.5 FIELD QUALITY ASSURANCE**

- A. Upon completion of insulation work covered by this specification, visually inspect the work and verify that it has been correctly installed. This may be done while work is in progress, to assure compliance with requirements herein to cover and protect insulation materials during installation.

#### **3.6 PROTECTION**

- A. Replace damaged insulation, which cannot be satisfactorily repaired, including insulation with vapor barrier damage and moisture-saturated insulation.
- B. The insulation contractor shall advise the general and the mechanical contractor as to requirements for protection of the insulation work during the remainder of the construction period, to avoid damage and deterioration of the finished insulation work.