SECTION 07210

BUILDING INSULATION

For best results, display hidden notes to specifier.

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Thermal insulation in exterior walls, ceilings, and roofs.

B. Acoustical insulation.

1.2 RELATED SECTIONS

A. Section 07240—Exterior Insulation and Finish Systems: Insulation that is part of the finish system assembly.

B. Section 07260—Vapor Retarders: Vapor retarders that are separate from insulation.

C. Section 07410—Preformed Roof and Wall Panels: Insulation factory-installed in panels.

D. Section 07510—Built-Up Bituminous Roofing: Roof insulation.

E. Section 07530—Elastomeric Membrane Roofing: Roof insulation.

F. Section 07550—Modified Bituminous Membrane Roofing: Roof insulation.

G. Section 15086—Duct Insulation: Duct liner and duct wrap.

H. Section 15084—Equipment Insulation: Insulation on mechanical equipment.

I. Section 15811—Fibrous Glass Ducts.

1.3 REFERENCES

A. ASTM C 423—Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method; 2000.

B. ASTM C 518—Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 1998.

C. ASTM C 612—Standard Specification for Mineral Fiber Block and Board Thermal Insulation; 2000a.

D. ASTM C 665—Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 1998.

E. ASTM C 764—Standard Specification for Mineral Fiber Loose-Fill Thermal Insulation; 1999.

F. ASTM C 1136—Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation; 2000.

G. ASTM E 84—Standard Test Method for Surface Burning Characteristics of Building Materials; 2000a.

H. ASTM E 96—Standard Test Methods for Water Vapor Transmission of Materials; 2000.

I. ASTM E 136—Standard Test Method for Behavior of Materials in a Vertical Tube Furnace At 750 Degrees C; 1999.

J. NAIMA—Recommendations for Installation in Residential and Other Light-Frame Construction—Fiber Glass Building Insulation; North American Insulation Manufacturers Association; 1999.

K. NAIMA—Recommendations for Installation in Residential and Other Light-Frame Construction—Fiber Glass Loose Fill Insulation; North American Insulation Manufacturers Association; 1997.

L. TAPPI T 803—Puncture Resistance of Container Board; TAPPI; 1999.

1.4 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Submit manufacturer's literature describing the products to be used, showing compliance with specified requirements; include installation instructions.

1.5 DELIVERY, STORAGE AND HANDLING

A. Protect insulation from physical damage and from becoming wet, soiled, or covered with ice or snow. Comply with manufacturer's recommendations for handling, storage and protection during installation.

B. Label insulation packages to include material name, production date and/or product code.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Knauf Insulation, which is located at: One Knauf Dr. ; Shelbyville, IN 46176; Toll Free Tel: 800-825-4434; Fax: 317-398-3675; Email: bob.gardner@knaufinsulation.com ; Web: www.knaufinsulation.us.

B. Substitutions: Not permitted.

C. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 APPLICATIONS/SCOPE

A. Exterior Stud Walls: Batt type.
1. R-Value: _____.
2. Vapor Retarder: FSK-25 facing.
3. Vapor Retarder: Kraft facing.
4. Vapor Retarder: Separate.

B. Exterior Concrete and Masonry Walls: Rigid board type applied to interior face.
1. R-Value: _____.
2. Vapor Retarder: FSK facing.
3. Vapor Retarder: ASJ facing.

C. Basement Walls:
   1. R-Value: _____.
   2. Type: Extra wide batt type applied to interior face.
   3. Type: Batt type applied between furring strips.

D. Attic/Ceiling Rafters: Blown type.
   1. R-Value: _____.

E. Roof Rafters, With No Covering: Batt type.
   1. R-Value: _____.
   2. Vapor Retarder: FSK-25 facing.

F. Floor Joists Over Crawl Space: Batt type.
   1. R-Value: _____.
   2. Vapor Retarder: FSK-25 facing, with facing up (on warm side).
   3. Vapor Retarder: Kraft facing, with facing up (on warm side).

G. Cathedral Ceilings (Gypsum Board Covering): High density batt type.
   1. R-Value: _____.
   2. Vapor Retarder: Kraft facing.
   3. Vapor Retarder: None.

H. Above Soffits: Batt type.
   1. R-Value: _____.

I. Interior Partitions Indicated with STC Rating: Batt type.

J. Above Interior Ceilings: Batt type.
   1. Thickness: _____.

K. Theater—On Exposed Ceilings and Walls Above 8 Feet (2440 mm) Above Floor Level: Black acoustical insulation.
   1. Type: Batt type.
   2. Type: Board type.
   3. Thickness: _____.

2.3 MATERIALS

A. Rigid Board Insulation: Glass fiber thermal insulation complying with ASTM C 612, Type 1A or 1B; insulation exclusive of facing non-combustible when tested in accordance with ASTM E 136; Knauf Insulation Board.
   1. R-value as indicated when tested in accordance with ASTM C 518.
   2. 1 Inch (25 mm) Thickness: R-value of 4.3.
   3. 1-1/2 Inch (38 mm) Thickness: R-value of 6.5.
   4. 2 Inch (51 mm) Thickness: R-value of 8.7.
   5. 2-1/2 Inch (64 mm) Thickness: R-value of 10.9.
   6. 3 Inch (76 mm) Thickness: R-value of 13.0.
   7. 3-1/2 Inch (89 mm) Thickness: R-value of 15.2.
   8. 4 Inch (102 mm) Thickness: R-value of 17.4.
   9. Size: Maximum sizes available, to avoid jointing to greatest extent possible.
   10. Density: 2.25 lb/cu ft (36 kg/cu m) minimum.
   11. Density: 3.0 lb/cu ft (48 kg/cu m) minimum.
   12. Density: 4.25 lb/cu ft (68 kg/cu m) minimum.
   13. Density: 6.0 lb/cu ft (96 kg/cu m) minimum.
   14. Dimensional Stability: Linear shrinkage less than 0.3 percent.
   15. Facing: None, unfaced.
      a. Surface Burning Characteristics: Maximum flame spread of 25, maximum smoke developed of 50, when tested in accordance with ASTM E 84.

b. Noise Reduction Coefficient: 1.00, when tested on 2 inch (50 mm) samples in accordance with ASTM C 423.

16. Facing: Foil-scrim-kraft (FSK) vapor retarder faced.
    a. Surface Burning Characteristics: Maximum flame spread of 25, maximum smoke developed of 50, when tested in accordance with ASTM E 84.
    b. Noise Reduction Coefficient of 3.0 pcf (48 kg/cu m) Density Product: 0.75, when tested on 2 inch (50 mm) samples in accordance with ASTM C 423.
    c. Noise Reduction Coefficient of 6.0 pcf (96 kg/cu m) Density Product: 0.60, when tested on 2 inch (50 mm) samples in accordance with ASTM C 423.
    d. Vapor Retarder Perm Rating: Maximum 0.02 perms (1.1 ng/(Pa s sq m)) when tested in accordance with ASTM C 1136.
    e. Puncture Resistance: 25, when tested in accordance with TAPPI T 803.
17. Facing: All service jacket (ASJ) vapor retarder faced.
    a. Surface Burning Characteristics: Maximum flame spread of 25, maximum smoke developed of 50, when tested in accordance with ASTM E 84.
    b. Noise Reduction Coefficient of 3.0 pcf (48 kg/cu m) Density Product: 0.65, when tested on 2 inch (50 mm) samples in accordance with ASTM C 423.
    c. Noise Reduction Coefficient of 6.0 pcf (96 kg/cu m) Density Product: 0.50, when tested on 2 inch (50 mm) samples in accordance with ASTM C 423.
    d. Vapor Retarder Perm Rating: Maximum 0.02 perms (1.1 ng/(Pa s sq m)) when tested in accordance with ASTM C 1136.
    e. Puncture Resistance: 50, when tested in accordance with TAPPI T 803.

B. Foil-Faced Batt Insulation: EcoBatt Glasswool thermal insulation complying with ASTM C 665; insulation exclusive of facing non-combustible when tested in accordance with ASTM E 136; extra wide stapling flanges.
1. R-value as indicated when tested in accordance with ASTM C 518.
2. 3-1/2 Inch (89 mm) Thickness: R-value of 11.
3. 3-1/2 Inch (89 mm) Thickness: R-value of 13.
4. 6-1/4 Inch (159 mm) Thickness: R-value of 19.
5. 10 Inch (254 mm) Thickness: R-value of 30.
6. 12 Inch (305 mm) Thickness: R-value of 38.
7. Size: Maximum sizes available, to avoid jointing to greatest extent possible.
8. Width for Metal Framing Application: Same as framing center to center dimension.
9. Width for Wood Framing Application: Maximum of 1 inch (25 mm) less than framing center to center dimension.
10. Facing: Foil-scrim-kraft (FSK-25) vapor retarder faced; ASTM C 665, Type III, Class A; non-combustible when tested in accordance with ASTM E 136.
    a. Surface Burning Characteristics: Maximum flame spread of 25, maximum smoke developed of 50, when tested in accordance with ASTM E 84.
    b. Vapor Retarder Perm Rating: Maximum 0.04 perms (2.3 ng/(Pa s sq m)) when tested in accordance with ASTM C 1136.
11. Facing: Foil vapor retarder faced; ASTM C 665, Type III, Class B.
    a. Vapor Retarder Perm Rating: Maximum 0.05 perms (2.9 ng/(Pa s sq m)) when tested in accordance with ASTM C 1136.
12. VOC Emission: Low VOC emission certified by GreenGuard Environmental Institute for Children and Schools.

C. Kraft Faced Batt Insulation: EcoBatt Glasswool thermal insulation complying with ASTM C 665, Type II, Class C; insulation exclusive of facing non-combustible when tested in accordance with ASTM E 136; extra wide stapling flanges.
   1. R-value as indicated when tested in accordance with ASTM C 518.
   2. 3-1/2 Inch (89 mm) Thickness: R-value of 11.
   3. 3-1/2 Inch (89 mm) Thickness: R-value of 13 (high density).
   4. 3-1/2 Inch (89 mm) Thickness: R-value of 15 (high density).
   5. 5-1/2 Inch (140 mm) Thickness: R-value of 21 (high density).
   6. 6-1/4 Inch (159 mm) Thickness: R-value of 19.
   7. 6-1/2 Inch (165 mm) Thickness: R-value of 22.
   8. 8-1/4 Inch (210 mm) Thickness: R-value of 30 (high density).
   9. 9 Inch (229 mm) Thickness: R-value of 26.
   10. 10 Inch (254 mm) Thickness: R-value of 30.
   11. 10-1/4 Inch (261 mm) Thickness: R-value of 38 (high density).
   12. 12 Inch (305 mm) Thickness: R-value of 38.
   13. Size: Maximum sizes available, to avoid jointing to greatest extent possible.
   14. Width for Metal Framing Application: Same as framing center to center dimension.
   15. Width for Wood Framing Application: Maximum of 1 inch (25 mm) less than framing center to center dimension.
   16. Vapor Retarder Perm Rating: Maximum 1.0 perms (57 ng/(Pa s sq m)) when tested in accordance with ASTM E 96.
   17. VOC Emission: Low VOC emission certified by GreenGuard Environmental Institute for Children and Schools.

D. Unfaced Batt Insulation: EcoBatt Glasswool thermal insulation complying with ASTM C 665, Type I, Class A; non-combustible when tested in accordance with ASTM E 136.
   1. R-value as indicated when tested in accordance with ASTM C 518.
   2. 3/4 Inch (19 mm) Thickness: R-value of 3.
   3. 1-1/2 Inch (38 mm) Thickness: R-value of 5.
   4. 3-1/2 Inch (89 mm) Thickness: R-value of 11.
   5. 3-1/2 Inch (89 mm) Thickness: R-value of 13 (high density).
   6. 3-1/2 Inch (89 mm) Thickness: R-value of 15 (high density).
   7. 5-1/2 Inch (140 mm) Thickness: R-value of 21 (high density).
   8. 6-1/4 Inch (159 mm) Thickness: R-value of 19.
   9. 6-1/2 Inch (165 mm) Thickness: R-value of 22.
   10. 8-1/4 Inch (210 mm) Thickness: R-value of 30 (high density).
   11. 8-1/2 Inch (216 mm) Thickness: R-value of 25.
   12. 9 Inch (229 mm) Thickness: R-value of 26.
   13. 10 Inch (254 mm) Thickness: R-value of 30.
   14. 10-1/4 Inch (261 mm) Thickness: R-value of 38 (high density).
   15. 12 Inch (305 mm) Thickness: R-value of 38.
   16. Size: Maximum sizes available, to avoid jointing to greatest extent possible.
   17. Width for Metal Framing Application: Same as framing center to center dimension.
   18. Width for Wood Framing Application: Maximum of 1 inch (25 mm) less than framing center to center dimension.
   19. Surface Burning Characteristics: Maximum flame spread of 25, maximum smoke developed of 50, when tested in accordance with ASTM E 84.
   20. VOC Emission: Low VOC emission certified by GreenGuard Environmental Institute for Children and Schools.

E. Acoustical Batt Insulation: EcoBatt Glasswool insulation complying with ASTM C 665; non-combustible when tested in accordance with ASTM E 136; Knauf Quiet Therm.
   1. Size: Maximum sizes available, to avoid jointing to greatest extent possible.
   2. Stud Walls and Rafter Spaces: Thickness to nominally fill cavity.

3. Over Ceilings: Minimum thickness of _____.
4. Facing: None, unfaced; ASTM C 665, Type I, Class A.
    a. Surface Burning Characteristics: Maximum flame spread of 25, maximum smoke developed of 50, when tested in accordance with ASTM E 84.
    b. Noise Reduction Coefficient: 1.00, when tested on 2 inch (50 mm) samples in accordance with ASTM C 423.
5. Facing: Kraft paper faced; ASTM C 665, Type II, Class C; extra wide stapling flanges.
6. VOC Emission: Low VOC emission certified by GreenGuard Environmental Institute for Children and Schools.

F. Black Acoustical Insulation: Glass fiber insulation with smooth black facing; insulation exclusive of facing non-combustible when tested in accordance with ASTM E 136.
1. Batt Insulation: ASTM C 665, Type I, Class A; Knauf Wall and Ceiling Liner M.
    a. Noise Reduction Coefficient of 1.5 pcf (24 kg/cu m) Density Product: 0.90, when tested on 2 inch (50 mm) samples in accordance with ASTM C 423.
    b. Thickness: 1/2 inch (13 mm), 1.5 lb/cu ft (24 kg/cu m) density.
    c. Thickness: 1 inch (25 mm), 1.0 lb/cu ft (16 kg/cu m) density.
    d. Thickness: 1 inch (25 mm), 1.5 lb/cu ft (24 kg/cu m) density.
    e. Thickness: 1 inch (25 mm), 2.0 lb/cu ft (32 kg/cu m) density.
    f. Thickness: 1-1/2 inches (38 mm), 1.0 lb/cu ft (16 kg/cu m) density.
    g. Thickness: 1-1/2 inches (38 mm), 1.5 lb/cu ft (24 kg/cu m) density.
    h. Thickness: 2 inches (51 mm), 1.0 lb/cu ft (16 kg/cu m) density.
    i. Thickness: 2 inches (51 mm), 1.5 lb/cu ft (24 kg/cu m) density.
2. Board Insulation: ASTM C 612, Type 1A or 1B; Knauf Black Acoustical Board.
    a. Maximum Air Velocity In Plenums: 4000 ft/min (1219 m/min).
    b. Thickness: 1 inch (25 mm), 3.0 lb/cu ft (48 kg/cu m) density.
    c. Thickness: 1-1/2 inches (38 mm), 3.0 lb/cu ft (48 kg/cu m) density.
    d. Thickness: 2 inches (51 mm), 2.25 lb/cu ft (36 kg/cu m) density.
    e. Thickness: 2 inches (51 mm), 3.0 lb/cu ft (48 kg/cu m) density.
3. Surface Burning Characteristics: Maximum flame spread of 25, maximum smoke developed of 50, when tested in accordance with ASTM E 84.
4. Water Vapor Sorption: Less than 3 percent by weight when tested in accordance with ASTM C 1104.

G. Blown Insulation: Unbonded, virgin fibrous glass, for pneumatic placement, complying with ASTM C 764, Type I; non-combustible when tested in accordance with ASTM E 136; Knauf Jet Stream 73.3, Perimeter Plus (BIBS) Fiber Glass Blowing Insulation.
1. Installed Thickness in Open Applications: As required to achieve R-value of ____, based on testing in accordance with ASTM C 518.
2. Closed Cavity Applications (Retro-Fit): Fill entire cavity full.
3. BIBS with Netting: Perimeter Plus installed as required to achieve R-value of ____, based on testing in accordance with ASTM C 518.
4. Surface Burning Characteristics: Maximum flame spread of 5, maximum smoke developed of 5, when tested in accordance with ASTM E 84.
5. Critical Radiant Flux: Greater than 0.12 W/sq cm, when tested in accordance with ASTM E 970.
6. Color: White.
7. VOC Emission: Low VOC emission certified by GreenGuard Environmental Institute for Children and Schools.

H. Accessory Materials and Fasteners: Provide all materials required for complete and

proper installation of insulation, whether specified or not.

I. Separate Vapor Retarders: As specified in Section 07260.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine the areas and conditions under which work of this section will be installed.

B. Verify that adjacent materials are dry and ready to receive insulation.

C. Verify mechanical and electrical services within walls have been tested and inspected.

D. Notify Architect in writing of conditions detrimental to performance of work in this section.

E. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION—BATTS, BLANKETS, AND BOARDS

A. Install in accordance with NAIMA “Recommendations for Installation in Residential and Other Light-Frame Construction—Fiber Glass Building Insulation” and manufacturer's instructions.

B. Surface Application: Apply insulation directly to surface with appropriate spindle or prong-type anchors.
1. Fasten anchors to steel surfaces by welding the pin to metal or by using pre-attached heads and welded through the insulation.
2. Fasten anchors to other substrates with adhesive. Follow manufacturer's recommendations for surface preparation and adhesive pattern.
3. Impale insulation on anchor and secure with washer.
4. Select pin lengths to ensure tight fit. Protect pin tips where subject to human contact.
5. See manufacturer's diagram for impaling pin pattern.

C. Surface Application: Apply insulation with adhesive. Follow adhesive manufacturer's recommendations for surface preparation and adhesive pattern.

D. Between Furring Strips, Hat-Channels, and Z-Shaped Furring: Install insulation between furring members; use fastening system recommended by furring strip manufacturer.

E. Between Metal Studs, Rafters, and Joists: Friction fit insulation between framing members after cover material has been installed on one side of the cavity.
1. Unfaced Insulation: In applications without a cover material and where framing depth is larger than insulation thickness, use wire or metal straps to hold insulation in place.
2. Faced Insulation: Tape attachment flanges to face of metal framing prior to applying interior finish.
3. Wall Heights Over 8 Feet (2440 mm) and Ceilings: Provide supplementary support to hold insulation in place until finish surface is applied.

F. Between Wood Studs, Rafters, and Joists:
1. Unfaced Insulation: Friction fit insulation between framing members after cover material has been installed on one side of cavity. In applications without a cover material, use wire or metal straps to hold insulation in place.
2. Faced Insulation: Staple attachment flanges to face or side of framing member every 8 to 12 inches (200 to 305 mm) on verticals, every 6 to 8

inches (150 to 200 mm) on horizontals and slopes.

3. Faced Insulation: Friction fit insulation between framing members after cover material has been installed on one side of cavity. In applications without a cover material, use wire or metal straps to hold insulation in place.

G. Between Open Web Bar Joists: Secure with 16 or 18 gage wire running diagonally or perpendicular to insulation, spaced at 18 to 24 inches (460 to 610 mm).

H. Over Suspended Ceilings: Install insulation with face contacting back of ceiling panels; butt insulation tightly together at edges to prevent thermal leaks.

I. Maintain vapor retarder integrity by tightly abutting adjacent insulation.

J. Repair punctures or tears in vapor retarder facing by taping. Follow tape manufacturer's application recommendations.

K. Do not leave kraft or standard foil facings exposed.

3.3 INSTALLATION—BLOWN INSULATION

A. Install in accordance with NAIMA “Recommendations for Installation in Residential and Other Light-Frame Construction—Fiber Glass Loose Fill Insulation” and manufacturer's instructions; follow manufacturer's coverage chart.

B. In open applications, install to depth necessary to achieve specified R-value.

C. In closed cavities, install to fill entire cavity.

3.4 PROTECTION

A. Protect insulation from damage and from becoming wet before, during and after installation.

END OF SECTION

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