

SECTION 07 21 00
THERMAL INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Rigid board insulation at cavity wall construction, perimeter foundation wall, and underside of floor slabs.
- B. Mineral fiber batt insulation in garage ceiling construction.
- C. Mineral fiber insulation used as thermal insulation where indicated in the Drawings.
- D. Acoustic insulation in interior partitions and under raised floor areas.
- E. Firesafing insulation.
- F. Sheet vapor retarders under concrete slab-on-grade.
- G. Foam insulation sealant.
- H. Adhesives, stick clips, tape, spring clips, etc.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Preparation to receive subsurface sheet vapor retarder.
- B. Section 04 20 00 - Unit Masonry.
- C. Section 04 72 00 - Cast Stone Veneer.
- D. Section 05 40 00 - Cold-Formed Metal Framing: Board insulation as wall sheathing.
- E. Section 07 25 00 - Weather Barriers: Separate air barrier and vapor retarder materials.
- F. Section 07 53 23 – Ethylene-Propylene-Diene-Monomer Roofing (EPDM): Insulation specified as part of roofing system.
- G. Section 07 54 00 - Thermoplastic Membrane Roofing: Insulation specified as part of roofing system.
- H. Section 07 84 00 - Firestopping: Safing insulation.
- I. Section 09 21 16 - Gypsum Board Assemblies: Partitions for acoustic insulation.

1.03 REFERENCE STANDARDS

- A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2010.
- B. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2014.
- C. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2014.
- E. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials; 2010.
- F. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components; 2012.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on product characteristics, performance criteria, and product limitations. For foam plastic insulation board, submit manufacturer's NFPA 285 tested assembly data indicating compliance and coordination with other materials used in the wall assembly.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

- D. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.
- E. Samples: Upon request, submit samples of each type of materials to be used.

1.05 MOCK-UPS

- A. Mock-Up(s): Provide insulation board for exterior wall mock-up(s) specified in Section 04 20 00 - Unit Masonry
- B. Mock-up panels shall demonstrate actual wall construction, detailing and workmanship.
- C. No work shall progress until the Architect has reviewed mock-up panel(s). Panel(s) shall be revised as necessary to secure the Architect's acceptance and shall then become the standard of comparison for all related exterior wall work.
- D. Mock-up panel(s) shall not be destroyed or moved until the Work is complete and accepted by the Architect. Upon completion of construction, mock-ups shall be removed.

1.06 FIELD CONDITIONS

- A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

1.07 PROTECTION, HANDLING AND STORAGE

- A. Protect plastic insulation from exposure to sunlight, except as necessary for period of installation and concealment. Protect plastic insulation against ignition at all times. Do not deliver plastic insulation materials before installation time. Complete installation and concealment of plastic materials as quickly as possible.

PART 2 PRODUCTS

2.01 APPLICATIONS

- A. Rigid Perimeter Insulation Board (at Foundations): Type 1 - Extruded polystyrene board.
- B. Insulation Over Metal Stud Framed Walls, Continuous: Type 2 - Polyisocyanurate insulation board.
- C. Batt Insulation (in steel framed ceiling structure): Batt insulation with no vapor retarder.
- D. Acoustic Insulation (in metal framed walls): Batt insulation.
- E. Safing Insulation: Fiber firestopping insulation.

2.02 FOAM BOARD INSULATION MATERIALS

- A. Type 1 - Extruded Polystyrene Board Insulation: ASTM C 578, Type IV; Extruded polystyrene board with either natural skin or cut cell surfaces; with the following characteristics:
 - 1. Flame Spread Index: 5 or less, when tested in accordance with ASTM E 84.
 - 2. Smoke Developed Index: 145 or less, when tested in accordance with ASTM E 84.
 - 3. Board Size: 24 x 96 inch.
 - 4. Board Thickness: 2 inches and as indicated on the Drawings.
 - 5. Board Edges: Square.
 - 6. Thermal Resistance at 75 degrees F: 5.0 per inch.
 - 7. Compressive Resistance: 25 psi.
 - 8. Water Absorption, maximum: 0.1 percent, volume.
 - 9. Products for Rigid Perimeter Insulation:
 - a. Styrofoam or Styrofoam Scoreboard by Dow Chemical Co.
 - b. Foamular 250 by Owens Corning Corp.
- B. Type 2 - Polyisocyanurate Insulation Board: Rigid cellular foam, complying with ASTM C 1289; Type II, Class 2, polymer bonded glass fiber mat both faces.
 - 1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
 - 2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.

3. Complies with fire-resistance requirements shown on the drawings as part of an exterior non-load-bearing exterior wall assembly when tested in accordance with NFPA 285.
 - a. See the attached Basis of Design Manufacturer Wall Assembly Guide Summary attached to the end of this section for reference.
4. Compressive Strength: 20 psi.
5. Board Size: 48 x 96 inch.
6. Board Thickness:
 - a. Wall Cavity: 3 inches.
 - b. Miscellaneous Details: As indicated on the Drawings.
7. Long-Term Thermal Resistance: Minimum R-5.6 per inch.
8. Board Edges: Square.
9. Product: (Basis of Design for an approved NFPA 285 system)
 - a. Xci CG by Hunter Panels LLC.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 BATT INSULATION MATERIALS

- A. Acoustic Batt Insulation: ASTM C665; flexible preformed batt or blanket, friction fit; minimum 25% recycled content.
 1. Flame Spread Index, ASTM E84: 25 or less.
 2. Smoke Developed Index, ASTM E84: 450 or less.
 3. Formaldehyde Content: Zero.
 4. Thickness for acoustic insulation: Depth of metal stud cavity unless otherwise indicated on the Drawings.
 5. Facing for acoustic: Unfaced.
 6. Product for acoustic insulation:
 - a. Sound Shield Free by Johns Manville.
 - b. EcoBatt by Knauf.
 7. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Thermal Batt Insulation: Flexible preformed batt or blanket, complying with ASTM C665; friction fit.
 1. Fire Resistance, ASTM E84 Unfaced: Flame spread index 0; Smoke developed index 0.
 2. Thermal Resistance: R of 4 per inch.
 3. Thickness for thermal insulation: Depth of metal stud cavity unless otherwise indicated on the Drawings.
 - a. Application: Where indicated per the Drawings.
 4. Thermal Resistance: One layer R14 and one layer R24 for a total R value of 38.
 - a. Application(s): Garage Level Ceiling Areas and other locations as indicated per the Drawings.
 - b. Stagger joints both horizontally and vertically for multiple insulation layers.
 5. Manufacturers:
 - a. Thermafiber, Inc.
 - b. ROXUL, Inc; ComfortBatt
 - c. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Fiber Firestopping Insulation (Safing Insulation): ASTM C 665 Type 1, unfaced, high-melt mineral fiber batt and have the following properties:
 1. Thickness: 2 inch minimum thickness, and as required by tested assemblies.
 2. Density, ASTM D1622: 4 pcf.
 3. Flame Spread, ASTM E 84: 15
 4. Smoke Developed ASTM E 84: 0
 5. Max. Water Absorption, ASTM C 272: 0.1% by volume
 6. Accessories: Manufacturer's "Z" impaling clips as required.
 7. Products:
 - a. Thermafiber by USG.
 - b. Safing Insulation / MW by Owens Corning Insulation

- c. Substitutions: See Section 01 60 00 - Product Requirements.

2.04 FOAM INSULATION

- A. Foam Insulation Sealant: Expanding, low VOC, HCFC-free, urethane foam sealant
 - 1. Products:
 - a. Pur Fil IG 750 Foam by Todol Products, Inc.
 - b. Great-stuff Pro by Dow Chemical Co.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.

2.05 ACCESSORIES

- A. Sheet Vapor Retarder:
 - 1. Application(s): Below all slab on grade areas and as indicated per the Drawings.
 - 2. Where concealed and in substantial contact with finishes: 3-ply laminate, combining 2 layers of high-density polyethylene and 1 high-strength non-woven cord grid. Class C, ASTM E 1745.
 - 3. Puncture Propagation Tear: 28 lb, ASTM D 2582.
 - 4. Puncture Strength: 24 lb, ASTM D 4833.
 - 5. Permeance (Perm): 0.038 grains/hr-ft²-in, ASTM E 96.
 - 6. Products:
 - a. Griffolyn Type 65-FR by Reef Industries Inc.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Tape: Ensure accessories are from the same manufacturer as reinforced vapor retarders.
 - 1. Mastic Tape: Black, double sided, asphaltic, pressure-sensitive, mastic tape.
 - 2. 3 inch Seam Shear: 35 lbs.
 - 3. Thickness: 35 mils.
 - 4. Product: Griffolyn Fab Tape by Reef Industries Inc
- C. Fasteners and Adhesive: As recommended by the insulation manufactures and as approved by Factory Mutual, material manufacturers, and related codes where applicable. In general, adhesives and fasteners shall be "Construction Grade", corrosion resistant stainless steel or galvanized, as suitable for damp locations.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation and adhesive.
- B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

3.02 BOARD INSTALLATION AT FOUNDATION PERIMETER

- A. Apply adhesive to back of boards:
 - 1. Three continuous beads per board length.
- B. Install boards horizontally on foundation perimeter.
 - 1. Place boards to maximize adhesive contact.
 - 2. Install in running bond pattern.
 - 3. Butt edges and ends tightly to adjacent boards and to protrusions.
- C. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.03 BOARD INSTALLATION AT EXTERIOR FURRED WALLS

- A. Apply adhesive to back of boards:
 - 1. Three continuous beads per board length.
- B. Install boards horizontally on the interior surface of concrete and masonry walls, as detailed.
 - 1. Place boards to maximize adhesive contact.
 - 2. Install in running bond pattern.

3. Butt edges and ends tightly to adjacent boards and to protrusions.
 4. Fit between steel zee clips, or as otherwise detailed.
- C. Extend boards over expansion joints, unbonded to wall on one side of joint.
- D. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.04 BOARD INSTALLATION AT CAVITY WALLS

- A. Install boards to fit snugly between wall ties and secure with thermal clip.
- B. Install boards horizontally on walls.
1. Install in running bond pattern.
 2. Butt edges and ends tightly to adjacent boards and to protrusions.
 3. Where required, use supplemental impaling fasteners with locking discs to secure insulation boards.
- C. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.
- D. All joints and gaps between insulation board shall be sealed with foam sealant compatible with the insulation board.

3.05 BOARD INSTALLATION UNDER CONCRETE SLABS

- A. Exterior wall perimeters shall have horizontal rigid insulation installed for a width of four (4) feet.
- B. Place insulation after base for slab has been compacted.
- C. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane. Stagger end joints.
- D. Prevent insulation from being displaced or damaged while placing vapor retarder and placing slab.
- E. Note that vapor retarder specified here-in shall be furnished and installed as part of the Work of Section 03 00 00 - Cast-in-Place Concrete.

3.06 THERMAL AND ACOUSTIC BATT INSTALLATION

- A. Install insulation in accordance with manufacturer's instructions.
- B. Install thermal insulation in exterior wall, roof, and ceiling spaces without gaps or voids. Do not compress insulation.
- C. Install acoustic insulation between studs and other materials. Friction fit to prevent sliding and sagging. Provide additional clips and fasteners as required.
- D. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
- E. Fit insulation tightly in cavities and tightly behind mechanical and electrical services within the plane of the insulation.
- F. All batt insulation shall be isolated from occupiable building spaces by a sealed fire retardant vapor barrier, gypsum board or other approved finish. Exposed insulation shall not be permitted in habitable areas.

3.07 SAFING INSULATION

- A. Install insulation as part of firestopping and smoke sealing in all floor/ceiling assembly penetrations, as required by fire sealant manufacturer's tested assemblies, as indicated on the Drawings, or as otherwise required for uninterrupted fire and smoke protection. Coordinate installation with Firestops and Smokestops specified in Section 07 84 00 - Firestopping. NOTE: Unless specifically noted otherwise, firesafing insulation shall serve as back-up firestopping at penetrations. The primary firestopping shall be firestops as specified in Section 07 84 00 - Firestopping.
- B. Insulation shall be cut to fit snugly and neatly with the smooth face toward the visible side. Where small pieces are used to close holes or gaps, they shall be neatly packed into the opening to be filled, out of view. Provide concealed mechanical fasteners as required.

3.08 INSULATION AT SPANDREL GLASS INSTALLATION

- A. In general, for fire containment at perimeter curtainwall systems, firesafing insulation shall be mechanically attached to curtainwall mullions and transoms using impaling pins, screws or other positive mechanical attachment as required. Install in strict accordance with the manufacturer's recommendations. Firesafing insulation shall be compression fit into the floor line void between floor structure and curtainwall firesafing, supported with "Z" clips.
- B. Install a light gage steel angle or channel continuously behind the insulation and attached to the vertical mullions at the floor firesafing line to prevent bowing of the curtainwall insulation due to compression of the firesafing insulation at the floor line. Exposed curtainwall mullions shall be protected with firesafing mullion covers.
- C. Install insulation between aluminum framing members and other surfaces with insulation fitting snugly to prevent settling. All voids and gaps shall be completely filled.
- D. Firestopping shall be installed on the floor line firesafing insulation. Installations shall be in accordance with UL tested assemblies.

3.09 VAPOR RETARDER INSTALLATION

- A. Vapor retarders shall be installed to provide continuous coverage on the warm-side insulation surface, with as few penetrations as necessary.
- B. All joints shall be lapped six (6) inches minimum and shall be sealed and/or taped as recommended by the manufacturer. Seal tightly around all terminations, obstructions, and penetrations.

3.10 FOAM INSULATION INSTALLATION

- A. Install foam insulation continuously to completely fill all gaps and voids at insulation boards, at voids in deck flutes, at voids around window and door frames, and at locations as indicated on the Drawings.
- B. Install foam insulation following manufacturer's instructions and recommendations. Exercise caution not to overfill voids. Insulation shall be permitted to expand without causing the deflection of adjacent materials. Use non-expanding foam at perimeters of doors and windows.

END OF SECTION



HUNTER
CONTINUOUS INSULATION

Hunter Xci CG – Wall Assembly Guide SUMMARY

Per Chapter 26 of the International Building Code, the wall assembly shall be tested in accordance with and comply with the acceptance criteria of NFPA 285. The listed assemblies in this document have met that criteria.

I BASE WALL SYSTEM	Steel Stud — 1 layer 5/8" thick Type X or 1/2" thick Type C Gypsum wallboard on interior, installed over steel studs: minimum 3 5/8" depth, minimum 22 gauge at a maximum of 24 inch o.c. with lateral bracing every 4 ft vertically.	
II APPROVED EXTERIOR FINISH	Masonry	Brick veneer anchors, standard types, installed maximum 24 inches o.c. vertically on each stud. Maximum 2 inch air gap between exterior insulation and brick. Standard nominal 4 inch thick or greater, clay brick.
	Stucco	Minimum 3/4" thick, Exterior Cement Plaster and Lath
	Limestone or Natural Stone	Minimum 2" thick, Limestone or Natural Stone Veneer or minimum 1 1/2" thick Cast Artificial Stone Veneer. Any standard installation technique can be used.
	Terra Cotta Cladding	Use any Terra Cotta Cladding System in which Terra Cotta is minimum 1 1/4". Any standard installation technique can be used.
	MCM System	Use any Metal Composite Material system that has been successfully tested by the panel manufacturer via the NFPA 285 test method. Any standard installation technique can be used.
	Metal Exterior	Metal Exterior wall coverings such as Steel, Aluminum, Copper, etc. Any standard installation technique can be used.
	Fiber Cement	Fiber Cement Board siding. Any standard installation technique can be used.
	Stone Aluminum	Stone Aluminum Honeycomb Composite Panels that have been successfully tested by the panel manufacturer via the NFPA 285 test method. Any standard installation technique can be used.
Hunter Panels is currently conducting additional NFPA Assembly tests. Please go to www.hunterxci.com for the latest updated literature.		
III MATERIAL OPTIONS	3.5" max thickness of Hunter Xci CG , 4x8 panels or cut to size	
IV FLOORLINE FIRESTOPPING	4 lb/cu ft mineral wool (e.g. Thermafiber) in each stud cavity and at each floor line, attached with Z Clips or equivalent	
V STUD CAVITY	Non Combustible Insulation or None	
VI EXTERIOR SHEATHING	1/2" or 5/8" thick exterior type gypsum sheathing	
VII WEATHER RESISTIVE MEMBRANE APPLIED TO GYPSUM	Carlisle: Barritech VP, Barritech NP, CCW 705 FR-A, CCW 705 VP Henry: Air Bloc 32MR Prosoco R-Guard: MVP, CAT-5, VB, Spray Wrap VaproShield: WrapShield SA DuPont™ Tyvek® Fluid Applied WB StoCorp: StoGuard™ VaporSeal™, EmeraldCoat, Gold Coat W.R. Grace: Perm-A-Barrier VPS Or None	
VIII WEATHER RESISTIVE MEMBRANE APPLIED TO EXTERIOR INSULATION	VaproShield: WrapShield SA DuPont™ Tyvek® Fluid Applied WB Carlisle: Barritech VP, Barritech NP, CCW 705 FR-A, CCW 705 VP Or None	

The location and number of WRB's in the wall assembly are determined by the architect.

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