

This construction specification utilizes Construction Specifiers Institute (CSI) format. The specification is specific to **Enverge NexSeal®** spray polyurethane foam insulation product specifications and is designed to be used by professionals as a guide specification. This specification should be adopted for each project.

USGBC Leadership in Energy and Environmental Design (LEED) Point Contributions:

New Construction	Homes	Schools
EA Credit 1: Optimize Energy Performance	EA Credit 1.1: Performance of ENERGY STAR Homes (or EA 2-10 Pathway)	EA Credit Prerequisite 2: Minimum Energy Performance
MR Credit 2: Construction Waste Management	EA Credit 2.1: Basic Insulation	EA Credit 1: Optimize Energy Performance
MR Credit 5: Regional Materials	EA Credit 3: Air Infiltration	MR Credit 5: Regional Materials
IEQ Credit 7.1: Thermal Comfort	EA Credits 5.1 & 5.2: Heating & Cooling distribution system	IEQ Credit 4: Low Emitting Materials
ID Credit 1: Innovation in Design	MR Credit 2.2: Environmentally Preferable Products	IEQ Credit 7.1: Thermal Comfort – Design
	MR Credit 3.2: Construction Waste Reduction	IEQ Credit 9: Enhanced Acoustical Performance
	EQ Credit 1: ENERGYSTAR with Indoor Air Package Pathway	IEQ Credit 10: Mold Prevention
	EQ Credit 10: Garage Pollutant Protection	ID Credit 1: Innovation in Design



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SECTION 07 21 29
SPRAYED INSULATION

PART 1 – GENERAL

1.0 SCOPE OF WORK

Furnish all labor, materials, tools and equipment necessary for the application of a spray polyurethane team building envelope insulation system, including accessory items, subject to the general provisions of the contract.

1.1 SUMMARY

This guide discusses the application of seamless sprayed in place polyurethane foam for use as a building envelope insulation system.

1.2 RELATED DOCUMENTS

- A. Rough Carpentry Section 06100
- B. Insulation Other Section 07200
- C. Thermal Barrier Section 07220
- D. Vapor Retarder Section 06100
- E. Mechanical Division 15
- F. Electrical Division 16

1.3 REFERENCES

- A. ASTM C 518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
- B. ASTM D 1622 - Standard Test Method for Apparent Density of Rigid Cellular Plastics.
- C. ASTM D 6226 - Standard Test Method for Open Cell Content of Rigid Cellular Plastics.
- D. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- E. ASTM E 96 - Standard Test Methods for Water Vapor Transmission of Materials.
- F. ASTM E 2178 - Standard Test Method for Air Permeance of Building Materials
- G. ASTM E 2357 - Standard Test Method for Determining Air Leakage of Air Barrier Assemblies
- H. ASTM C 1305 - Standard Test Method for Crack Bridging Ability of Liquid-Applied Waterproofing Membrane.
- I. ASTM D 4541 - Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
- J. ASTM C 1338 - Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings
- K. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components
- L. NFPA 259 - Standard Test Method for Potential Heat of Building Materials
- M. ANSI/UL 263 (ASTM E119) - Standard for Fire Tests of Building Construction and Materials
- N. California Department of Public Health Standard Method V1.1
- O. International Code Council Acceptance Criteria for Spray Foam Insulation, AC 377
- P. International Residential Code
- Q. International Building Code
- R. International Energy Conservation Code
- S. International Green Building Code

- T. American Society of Heating, Refrigerating and Air-Conditioning Engineers Handbook
- U. USGBC Leadership in Energy and Environmental Design (LEED)

1.4 SUBMITTALS

- A. Manufacturers to provide published data sheets or letter of certification that their products comply with this specification
- B. Shop drawings, if required
- C. Manufacturer's application or installation instructions
- D. Contractor/applicator certification from spray polyurethane foam supplier or Spray Polyurethane Foam Alliance
- E. International Association of Plumbing and Mechanical Officials (IAPMO) Evaluation Services Report
- F. VOC Certificate
- G. Safety Data Sheets (SDS)
- H. Field Quality Control Procedures to be utilized by the contractor/applicator to insure proper preparation

1.5 QUALITY ASSURANCE

Contractor Qualifications: The contractor should provide information concerning projects similar in nature to the one proposed, including location and person to be contacted. Some manufacturers of sprayed polyurethane foam systems have approval programs and/or licensing methods that could be required.

1.6 DELIVERY, STORAGE AND HANDLING

- A. For optimal shelf life store materials between 50 to 90°F and 50% relative humidity
- B. Store materials above 65°F for 48 hours before use.
- C. Do not store in direct sunlight and out of inclement weather.
- D. Keep containers tightly closed, under dry air or nitrogen blanket, when not in use.

1.6 PROJECT CONDITIONS

- A. Substrates must be clean, dry and free of debris, oil, grease or other contaminants that could interfere with adhesion.
- B. For best results apply spray polyurethane foam insulation when ambient conditions are above 40°F and relative humidity less than 80%. For conditions with low temperature or high humidity, special job preparation measures should be implemented. These measures include warming the environment, drying the substrates and/or removing humidity, for example by air movement.
- C. Substrate moisture content should be verified before application of spray polyurethane foam insulation.

1.7 SEQUENCING

- A. Install insulation after rough plumbing and electrical completed and inspected and other wall penetrations completed.
- B. Install insulation after sealant foams/caulks around penetrations in walls/ceilings are in place.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. **Enverge®**
- B. Substitutions – Not permitted

2.2 MATERIALS

- A. **Enverge NexSeal®** spray polyurethane foam insulation
- B. Nominal core density: 2 lbs/ft³, ASTM D 1622
- C. Closed cell content: >90%, ASTM D 6226
- D. Moisture vapor transmission: < 2 perm-inches, ASTM E 96
- E. Surface Burning Characteristics: Maximum flame spread/smoke developed rating of 25 / 450, respectively, ASTM E 84
- F. R-value: Average R-value of 7.2 per inch, ASTM C 518 at 75°F mean temperature.
- G. Air leakage: < 0.02 L/s-m², ASTM E 2178
- H. Air assembly leakage: <0.002 L/s-m², ASTM E 2357
- I. Crack Bridging: Pass, No cracking, splitting, pinholes or any other condition in the area of the joint, ASTM C 1305
- J. Pull-Off Strength: Concrete > 16 psi, Gypsum Board > 16 psi or facer failure, CMU > 16 psi, ASTM D 4541
- K. Fungi Resistance: Pass, ASTM C 1338
- L. One-hour fire resistance rated wall: UL Design U305, ASNI/UL 263
- M. Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components: Pass, NFPA 285
- N. Dimensional Stability (200°F dry): < 15% volume change, ASTM D 2126
- O. Dimensional Stability (-40°F): < 15% volume change, ASTM D 2126
- P. Dimensional Stability (158F & 100% RH): < 15% volume change, ASTM D 2126
- Q. Resistance to Ignition: Pass without intumescent coating, ICC ES AC 377, Appendix X
- R. Standard Heat Potential of Building Materials: 2006 Btu / ft² per inch of thickness, NFPA 259
- S. Standard of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components: Compliance, NFPA 285
- T. Volatile Organic Compounds: Pass Office, Classroom and Home Requirements, California Department of Public Health Standard Method V1.1

2.3 ACCESSORIES

- A. Sealant Foam: CF 124 Filler Foam by Hilti or equivalent.
- B. Joint Sealer: Single component polyurethane type; Sikaflex 1a by Sika Corp. or equivalent.

PART 3 – EXECUTION

3.1 PREPARATION

- A. Clean surfaces to receive insulation; remove dirt, dust, and debris by blowing with compressed air or vacuuming.
- B. Protect adjacent and underlying surfaces from accidental application using plastic sheeting and masking tape.
- C. Apply filler foam or joint sealer around door and window frames, openings, and perimeter to contain insulation.

- D. Cover gaps greater than 2 inches with seam tape or gypsum backer board, then spray insulation over opening.
- E. Protect heat emitting fixtures/penetrations with gypsum board or mineral fiber insulation, see spray foam manufacturers' recommendations.

3.2 APPLICATION

- A. The spray polyurethane foam components (A) and (B) shall be processed in accordance with the manufacturers' installation instructions.
- B. The polyurethane foam shall be sprayed within the manufacturer's guidelines for temperature, humidity, and other atmospheric conditions.
- C. The polyurethane foam shall be sprayed in minimum 1/2 inch thick passes (lifts) with the overall thickness to be a nominal [] inches in walls, [] inches in ceilings/roofs [] inches in subfloors/crawlspaces.

3.3 SUBSTRATE PREPARATION CONSIDERATIONS

- A. WOOD:
 - 1. Plywood shall contain no more than 18% water, as measured in accordance with ASTM D-4449 and 4444-84.
 - 2. Most untreated and unpainted wood surfaces need not be primed. The spray polyurethane foam can be applied directly to the dry wood. Priming may be required in certain instances. See the spray polyurethane foam manufacturer for specific details.
- B. STEEL:
 - 1. Primed: If the primed metal surface is free of loose scale, rust, weathered or chalking paint. It can be cleaned using vacuum equipment and hand or power tools to remove loose dirt. Grease, oil, or other contaminants shall be removed with proper cleaning solutions.
 - 2. Previously Painted: Clean the painted metal surface using hand or power tools to remove loose scale and dirt. Grease, oil, and other surface contaminants can be cleaned using a power wash technique.
 - 3. Galvanized: When required, clean galvanized steel as recommended by the primer manufacturer.
 - 4. Unpainted Steel: Clean as recommended by primer manufacturer in order to prepare the steel surface for the primer.
- C. CONCRETE AND MASONRY: Must be cured, and loose dirt and any other contaminants removed.
- D. SHEATHING BOARD: Most sheathing boards need not be primed prior to the application of sprayed-in-place polyurethane foam.

3.4 PRIMERS

When required, the primer shall be applied to the properly prepared substrate in accordance with the manufacturer's guidelines so as to achieve a minimum thickness of dry mils. Many primers require a curing time of 24 hours prior to application of spray polyurethane foam or other products, see manufacturers recommendations.

3.5 VAPOR RETARDERS

- A. When required, a vapor retarder shall be applied to the substrate to be insulated or to the finished spray polyurethane foam insulation. The predominant direction of the vapor drive determines the location of the vapor retarder relative to the spray polyurethane foam.

- B. The vapor retarder shall be applied in accordance with manufacturer's specifications so as to achieve the desired perm rating per ASTM E-96, Method E.

3.5 THERMAL BARRIERS

- A. The spray polyurethane foam must be separated from the interior (occupied) space by a 15-minute rated thermal barrier. The thermal barrier must be applied in accordance with manufacturer guidelines.
- B. Exception to the thermal barrier requirement is allowed when testing in compliance with interior finish (NFPA 286) is demonstrated.
- C. Exception to the thermal barrier requirement is allowed in attics/crawlspaces where entrance is allowed only for the services of utilities and the spray polyurethane foam insulation is covered by a prescribed barrier to ignition. Ignition barriers are prescribed in IRC and IBC R314 and Chapter 26, respectively.

3.6 IGNITION BARRIERS

- A. The prescribed ignition barrier in attics and crawlspaces may be omitted when the spray foam has conducted end use configuration testing and analysis per IBC Section 2603.96 and IRC Section R316.6, to qualify without a prescriptive ignition barrier or intumescent coating in unvented attics conforming with IBC Section 1202.37 or IRC Section R806.5. Restrictions in this application apply, consult local building codes.