PART 1 GENERAL

SUMMARY

SECTION INCLUDES: Spray polyurethane foam insulation and acceptable alternatives as described herein.

DESCRIPTION

A. Insulation materials shall be ICC approved ½ lb or 2 lb spray polyurethane wall foam insulation.

B. Insulation materials, both ½ lb and 2lb shall be Greenguard approved and certified for Children and Schools.

C. Insulation materials shall meet revised AC377, approval criteria.

D. Open cell or ½ lb foam may be installed in attics to the underside of roof sheathing or roof rafters and in crawl spaces with insulation on the underside of top spaces to a maximum thickness of 11.5 inches and to a maximum thickness of 7.5 inches for vertical surfaces.

E. Open cell or ½ lb foam must be covered with Quik-Shield 1500 Intumescent coating applied to a minimum wet film thickness of 18 mils (0.46 mm) in attics and crawl spaces where required by code.

F. Closed cell or 2 lb foam may be installed in attics to the underside of roof sheathing or roof rafters and in crawl spaces with insulation on the underside of top spaces to a maximum thickness of 9.5 inches and to a maximum thickness of 5.5 inches for vertical surfaces.

G. Closed cell foam shall not require intumescent coatings in attics or crawl spaces.

H. Insulation materials shall meet AC377 thermal barrier standards with the application of DC315 in prescribed depths.

I. Insulation materials shall meet type III and IV construction standards.

RELATED SECTIONS

A. Section 04 40 00 - Stone Assemblies.

B. Section 06 10 00 - Rough Carpentry.

C. Section 07 21 26 - Blown Insulation.

D. Section 07 26 00 - Vapor Retarders.

E. Section 07 27 26 - Fluid-Applied Membrane Air Barriers.

F. Section 07 62 00 - Sheet Metal Flashing and Trim.

G. Section 07 90 00 - Joint Protection.

H. Section 07 81 33 - Mineral-Fiber Fireproofing.

I. Section 09 20 00 - Plaster and Gypsum Board.

REFERENCES

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

B. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

C. ASTM E 96 - Standard Test Methods for Water Vapor Transmission of Materials.

D. ASTM E 283 - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

E. ASTM D 1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics.

F. ASTM D 1622 - Standard Test Method for Apparent Density of Rigid Cellular Plastics.

G. NFPA 286 - Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Wall and Ceiling Interior Finish.

H. ESR-2003 - ICC Evaluation Service, ICC-ES Evaluation Report, SWD Urethane Quik-Shield 106,112 and 112XC Spray Applied Polyurethane Insulations.

SUBMITTALS

A. Material Safety Data Sheets (MSDS) for all applicable insulation products specified herein.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

C. LEED Submittals (if applicable): Provide documentation of how the requirements of credit will be met:
   1. List of proposed materials with recycled content. Indicate post-consumer recycled content and pre-consumer recycled content for each product having recycled

content.

2. Product data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content.

D. Manufacturer's Certificates: Including but not limited to ICC-ES reports, and other certifications.

QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing urethane foam products and systems of this section with minimum ten years documented experience.

B. Installer Qualifications: Installer must be certified by SWD Urethane to install SWD urethane insulation systems.

C. Pre Installation Conference: Convene a pre-installation conference to review roofing specifications, installation procedures and workflow with the architect, contractor, roofer and other trades relative to the work, prior to ordering materials.

DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging, clearly marked with the manufacturer's name, brand name, product identification, type of material, safety information, manufacture date, and lot numbers until ready for installation.

B. Store spray foam materials between 50 degrees F (10 degrees C) and 85degrees F(27 degrees C) with careful handling to prevent damage to products.

C. Protect all materials from freezing and other damage during transit, handling, storage, and installation.

D. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

PROJECT & SITE CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

B. Do not apply the polyurethane foam when substrate or ambient air temperatures are above or below the acceptable temperatures identified by the manufacturer on the product data sheets.

C. Ensure that the project site is sealed off and ventilated properly per the safety standards set forth by the American Chemistry Council, and by SWD Urethane.

PART 2 PRODUCTS

MANUFACTURERS

A. Acceptable Manufacturer: SWD Urethane, which is located at: 222s Date St Mesa AZ; Tel: 800-461-1394; Email: sales@swdurethane.com Web:www.swdurethane.com

B. Substitutions: Not permitted.

C. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

POLYURETHANE FOAM

A. Closed Cell Spray Foam Insulation: Quik-Shield 112 two-component, closed cell polyurethane foams with a nominal density of 2.0 pcf, as manufactured by SWD Urethane. Quik-Shield 112 foam shall have the following minimum physical properties when cured:
   1. Core Density: 2.0 lbs/ft3 when tested in accordance with ÅSTM D 1622.
   2. Compressive Strength: 25 psi when tested in accordance with ÅSTM D 1621.
   3. R-Value (aged): When tested in accordance with ÅSTM C 518:
      a. 6.0 at 1 inch.
      b. 23 at 3.5 inches.
      c. 36.2 at 5.5 inches.
   4. Closed Cell Content: Greater than 90 percent when tested in accordance with ÅSTM D 2856.
   5. Surface Burning Characteristics: Less than 25 when tested in accordance with ÅSTM E 84 and SDI less than 450 when tested in ÅSTM E 84.
   6. Tensile Strength: 60 psi when tested in accordance with ÅSTM D 1623.
   7. Moisture Vapor Transmission (permeance) when tested in accordance with ASTM E 96. 1.0 Perms at 1.47 inch.
   8. Dimensional Stability: (7 days at 158 degrees F, 95 percent RH) less than 10 percent change in volume when tested in accordance with ASTM D 2126.
   9. Air Leakage Rate: Less than 0.02 (L/s)/m2 when tested in accordance with ASTM E 283.

B. Open Cell Spray Foam Insulation: Quik-Shield 106 two-component, polyurethane cellular foam with a nominal density of 0.5 pcf, as manufactured by SWD Urethane. Quik-Shield 106 foam shall have the following minimum physical properties when cured:
   1. Apparent Density: 0.5 pcf when tested in accordance with ASTM D 1622.
   2. R-Value (aged) when tested in accordance with ÅSTM C 518:
      a. 4.0 at 1 inch.
      b. 12.9 at 3.5 inches.
      c. 19.8 at 5.5 inches.
   3. Compressive Strength: 0.5 psi when tested in accordance with ÅSTM D 1621.
   4. Air Leakage: 0.00 plus or minus .01 (L/s)/m2 when tested in accordance with ÅSTM E

283.

5. Sound Transmission Coefficient: 39 (STC) when tested in accordance with ÅSTM E 90.
6. Noise Reduction Coefficient: 0.7 (NRC) when tested in accordance with ASTM C 423.
7. Open Cell Content: Greater than 92 percent when tested in accordance with ASTM D 2846.
8. Tensile Strength: 3.2 psi when tested in accordance with ASTM D 1623.
9. Shear Strength: 1.4 psi when tested in accordance with ASTM C 273.
10. Permeability: 51 perm-inch when tested in accordance with ÅSTM E 96.
11. Surface Burning Characteristics:
    a. Flame Spread/Smoke Developed: At maximum 4 inch (102 mm) thickness, flame spread index of less than 25 and a smoke developed index of less than 450 when tested in accordance with ÅSTM E 84.
    b. Corner Test: Thickness up to 11.25 inches for wall cavities and 11.25 inches for ceiling cavities meets NFPA 286 when covered with 1/2 inch gypsum board or equivalent thermal barrier.

COATINGS

C. Quik-Shield 1500 intumescent coating for spray foam insulation in attic and crawlspace applications, manufactured by SWD Urethane foe use as an ignition barrier.

D. DC-315 intumescent coating for spray foam insulation in attic and crawlspace applications for 15 minute thermal barrier alternative for use with Quik-Shield 106,112 and 112XC manufactured by SWD Urethane

END OF SECTION

PART 2 EXECUTION

EXAMINATION

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

B. Verify that all surfaces to receive polyurethane foam insulation are clean, dry and free of dust, dirt, debris, oil, solvents and all materials that may adversely affect the adhesion of the polyurethane foam.

C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Mask and protect adjacent surfaces from over spray.

C. Prepare surfaces using the methods recommended by the spray foam manufacturer for achieving the best result for the substrate under the project conditions.

D. Wood:
1. Plywood shall contain no more than 18 percent water, as measured in accordance with ASTM D 4449 and ASTM D 4444.
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 under certain conditions as recommended by the manufacturer.

E. Steel:
1. Primed: Clean primed metal surfaces free of loose scale, rust, weathered or chalking paint. Remove grease, oil, or other contaminants with proper cleaning solutions.
2. Previously Painted: Clean painted metal surface using hand or power tools to remove loose scale and dirt. Remove grease, oil, and other surface contaminants using a power wash technique or proper cleaning solutions.

F. Sheathing Board: Most sheathing boards need not be primed prior to the application of sprayed-in-place polyurethane foam.

INSTALLATION

A. Install in spray foam in accordance with manufacturer's instructions.

B. Spray polyurethane foam components (A) and (B) shall be processed in accordance with instructions found on the manufacturers product datasheet.

C. Schedule application to anticipate climatic conditions prior to application to ensure highest quality foam and to maximize yield. All substrates to be sprayed must be dry at the time of application. Moisture in the form of rain, fog, frost, dew, or high humidity greater than 85 percent R.H is not permitted unless Contractor reviews means and methods of spraying with manufacturer's representative prior to installation. Use screens, masking and other precautions to prevent damage to adjacent areas from overspray.

D. Where spray foam system is installed within attics or crawl spaces where entry is made only for service of utilities, an ignition barrier must be installed in accordance with IBC Section 2603.4.1.6 and IRC Section R314.5.4, as applicable. Quik-Shield spray foam insulation, as described in these sections, may be installed in unvented attics in accordance in compliance with IRC Section R806.4.

E. Application in attics and crawlspaces with Intumescent Coating:
1. Quik-Shield 106 foam insulation may be installed in unvented conditioned attics in accordance with IRC Section R806.4.
2. In attics, spray foam insulation may be spray-applied to the underside of roof sheathing and roof rafters.
3. In crawlspaces, spray foam insulation may be spray-applied to the underside of floors as described in this section.
4. Thickness of Quik-Shield 106 open-cell foam applied to the underside of the top space must not exceed 11.5 inches
5. Thickness of Quik-Shield 106 open-cell foam applied to vertical surfaces must not exceed 7.5 inches and the thickness of Quik-Shield 112 and 112XC closed-cell foam must not exceed 5.5 inches.
6. Quik-Shield 106 must be coated uniformly coated with Quik-Shield 1500 at a coverage thickness of 18 wet mils in accordance with manufacturer's instructions.
7. Surfaces to be coated must be dry, clean, and free of dirt, loose debris, and any other substances that could interfere with the adhesion of the coating.
8. Coating must be applied when ambient and substrate temperatures are above 50 degree F and require a 24-hour curing time after application.

F. Application in attics and crawlspaces with Minimum 1/2 inch Gypsum Board.
1. In attics, spray foam insulation may be spray-applied to the underside of roof sheathing and roof rafters.
2. In crawlspaces, spray foam insulation may be spray-applied to the underside of floors as described in this section.
3. Thickness of Quik-Shield 106 open-cell foam applied to horizontal surfaces must not exceed 7.5 inches and the thickness of Quik-Shield,112 and 112XC must not exceed 5.5 inches
4. When applied to vertical surfaces, the thickness of Quik-Shield 106 open-cell foam must not exceed 7.5 inches and the thickness of Quik-Shield 112 and 112XC closed-cell foam must not exceed 5.5 inches.

G. Application on Attic Floors:
   1. Quik-Shield 106,112 and 112XC must be separated from the area beneath the attic by an approved 15 minute rated coating.
   2. Quik-Shield 106 maximum depth is 7.5inches. Quik-Shield 112 and 112XC maximum height 5.5 inches
   3. Quik-Shield 106 must be coated with 18 wet film thickness of Quik-Shield 1500 intumescent coating.
   4. Quik-Shield 112 and 112XC do not require coating
   5. Quik-Shield 106,112 and 112XC insulation must be separated from the area beneath the attic by an approved thermal barrier. The ignition barrier in accordance with IBC Section 2603.4.1.6 and IRC Section R314.5.3 may be omitted when installed in accordance with this Section.

H. Exothermic Caution:
   1. Polyurethane foam shall be sprayed in minimum 1/2 inch (12.7 mm) thick passes or lifts. Overall thickness applied in one pass shall be limited to a maximum of 6 inches for Quik-Shield 106 open cell foam and 3 inches for Quik-Shield 112 and 112XC closed cell foam to avoid fire hazards resulting from excessive heat generation.
   2. If a second pass is needed, wait 10 to 15 minutes between passes to allow reaction heat to dissipate. If more passes are needed, wait 30 minutes between passes to allow reaction heat to dissipate.
   3. The exothermic reaction can cause temporary substrate thermal rises in excess of 150 degrees F, which may result in substrate thermal expansion. If the substrate then contracts when the reaction heat dissipates, substrate deformation can occur.
   4. The full thickness of spray polyurethane foam to be applied within any given area should be completed in one day.

FIELD QUALITY CONTROL

A. Protect installed products until completion of project.

B. Field inspection and testing will be performed under provisions of Section 01 40 00 - Quality Requirements.

C. Inspection will include verification of insulation and overcoat thickness and density.

PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products.

END OF SECTION