

**Guide Specification****PART 1 GENERAL****1.1 SUMMARY**

- A. Furnish all labor, materials, tools and equipment necessary for the application of a new sprayed-in-place, polyurethane foam and coating system (PERMATHANE™ II FR), including accessory items, as specified herein.
- B. All existing HVAC and other equipment shall be protected from any damage that could be caused by roofing demolition, foam over spray, coating, and mishandling.
- C. Raising, re-setting, and protection of air conditioning equipment, ventilators, and exhaust fans may be required.
- D. Related Sections:
 - 1. Section 03 03 00 - Cast-in-Place Concrete
 - 2. Section 05 30 00 - Metal Decking
 - 3. Section 06 10 00 - Rough Carpentry
 - 4. Section 07 20 00 - Thermal Protection
 - 5. Section 07 50 00 - Membrane Roofing
 - 6. Section 07 60 00 - Flashing and Sheet Metal
 - 7. Section 07 70 00 - Roof and Wall Specialties and Accessories
 - 8. Section 08 60 00 - Roof Windows and Skylights

1.2 SYSTEM DESCRIPTION

- A. PERMATHANE™ II FR shall be a complete system of compatible materials to create a seamless waterproof roofing membrane to comply with the warranty requirements of this specification.
- B. PERMATHANE™ II FR shall be designated for application on the specific type of deck as indicated on the drawings and specifications.

1.3 SUBMITTALS

- A. Product Data: Submit manufacturers' literature, technical data, material safety data sheets (MSDS) and installation instructions for primers (if required), polyurethane foam and protective coatings. Submit letter of certification that their products comply with the materials specified.
- B. Samples: Submit samples of PERMATHANE™ II FR roofing system. Samples shall be construed as examples of finished color and texture of the system only.

- C. Applicator Approval: Submit letter from manufacturer stating applicator is approved to install the PERMATHANE™ II FR roofing system.

- D. Warranty: Submit specimen copy of manufacturer's standard warranty.

1.4 QUALITY ASSURANCE

- A. Supplier Qualifications: PERMATHANE™ II FR, as supplied by NEOGARD®, is approved for use on this project.
- B. Applicator Qualifications: The applicator shall be approved to install specified roofing system. Manufacturer's written verification of applicator approval is required.
- C. Regulatory Requirements:
 - 1. The PERMATHANE™ II FR roofing system shall be compliant with appropriate UL, FM and specific regional agencies, which have jurisdiction approvals.
 - 2. Materials used in the PERMATHANE™ II FR roofing system shall meet Federal, State and local VOC regulations.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Containers and Packaging: Materials shall be delivered in original, tightly sealed containers, clearly labeled with the manufacturer's name, brand name, type of material and batch number(s).
- B. Storage and Handling: It is recommended to store materials at 75°F (23.8°C) with careful handling to prevent damage to products. All materials shall be stored in compliance with local fire and safety requirements. Do not store at high temperature or in direct sunlight.

1.6 PROJECT CONDITIONS

- A. The sprayed polyurethane foam applications shall not proceed during periods of inclement weather. Do not apply the sprayed polyurethane foam below the temperature and/or above humidity specified by the manufacturer for ambient air and substrate.
- B. Do not apply protective coatings when surface temperature is less than 40°F (4.4°C). Do not apply if there is ice, frost, surface moisture or visible dampness present on the surface to be coated. Prior to applying the protective coatings, check the polyurethane foam to insure that the surface is dry. Apply protective coatings in accordance with the coating manufacturer's application instructions.

- C. Wind barriers may be used if wind conditions could affect the quality of the polyurethane foam or protective coating installation.

1.7 WARRANTY

- A. Upon request, NEOGARD shall offer its standard warranty upon receipt of a properly executed warranty request form.

PART 2 PRODUCTS

2.1 POLYURETHANE FOAM

- A. The polyurethane foam manufacturer and the polyurethane foam system must be approved for use in a warranted roof system by NEOGARD.
- B. The foam to be applied shall be a two-component, sprayed-in-place, rigid-class polyurethane foam, having a nominal density of 3 lbs per cubic foot and a thermal conductance ("K" Factor) of .16 btu/hr/sqft/°F/in at 70°F.
- C. Typical performance requirements of cured foam used on this project are:

PERFORMANCE REQUIREMENTS FOR CURED FOAM		
PHYSICAL PROPERTIES	TEST METHOD	RESULTS
Tensile Strength	ASTM D1623	50 psi min.
Density	ASTM D1622	2.7 to 3.2 pcf
Compressive Strength	ASTM D1621	40 - 60 psi
Closed Cell Content	ASTM D1940	90% min.
Dimensional Stability 158°F, 100% RH, 28 Day	ASTM D2126	15% max.
K Factor (aged)	ASTM C518	0.14 - 0.16
Flame Spread	ASTM E84	75 max.

2.2 ELASTOMERIC COATING SYSTEM

- A. The PERMATHANE™ II FR coating system shall be manufactured by NEOGARD®, a division of JONES-BLAIR® Company, P.O. Box 35286, Dallas, TX 75235, Toll Free (800) 321-6588, Fax (214) 357-7532, www.neogard.com.
- B. Protective Coating Materials:
- Liquid Flashing: 70600 series polyurethane coating, gray, tan or white in color.
 - Base Coat: 70620 polyurethane coating, gray in color.
 - Topcoat: 70611 series polyurethane coating, gray, tan or white in color. Note: 70613 white meets ENERGY STAR® and LEED reflectance and emissivity performance requirements (for low-slope roofs) and is approved by the Cool Roof Rating Council (CRRC).
- C. Typical performance requirements for the cured protective coatings used on this project are:

PERFORMANCE REQUIREMENTS OF CURED FILM			
PHYSICAL PROPERTIES	TEST METHOD	BASE COAT	TOPCOAT
Tensile Strength	ASTM D412	1,000 psi	1,500 psi
Elongation	ASTM D412	375%	360%
Permanent Set	ASTM D412	<10%	<10%
Tear Resistance	ASTM D1004	100 lb/in	100 lb/in
Water Resistance	ASTM D471	<3% @ 7 days	<3% @ 7 days
MVT @ 30 mils	ASTM E96	1.6 English	2.2 English
Taber Abrasion	ASTM D4060	N/A	45 mg/1,000cs-17
Shore A	ASTM D2240	50 - 55	70 - 75
Adhesion	ASTM D903	15 pli	15 pli
Weathering Resistance	ASTM D822	N/A	Slight Chalk
Thermal Shock	Alternate Heat/Cold	No Loss of Adhesion	No Loss of Adhesion

2.3 ACCESSORIES

- A. Flashings and waterproof coverings for expansion joints shall be compatible with specified PERMATHANE™ II FR roofing system.
- B. Miscellaneous materials such as primers, adhesives, elastomeric caulking compounds, metal, vents and drains shall be a composite part of the roof system and shall be compatible with specified PERMATHANE™ II FR roofing system.
- C. Granules (Optional): When used, shall be of the size and type recommended by NEOGARD and broadcast into an additional topcoat.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect surfaces, which will receive the PERMATHANE™ II FR roofing system to make sure they are clean, smooth, sound, properly prepared, and free of moisture, dirt, debris, or other contaminants.
- B. Verify that all roof penetrations, mechanical equipment, cants, edge metal, and other on-roof items are in place and secure.
- C. Verify that all critical areas around the immediate vicinity of the spray area are suitably protected.
- D. Verify that all roof drains are clean and in working order.
- E. Verify that all air conditioning and air intake vents are suitably protected or closed.

3.2 PROTECTION

- A. The overspray and/or solvents from sprayed polyurethane foam and protective coating materials can carry considerable distances and care should be taken to do the following:
- Post warning signs noting potential overspray hazard within 100' of work area.

2. Mask off or cover all air intakes near the work area to prevent odors from entering occupied areas of the building or structure.
- B. All surfaces not to receive system specified shall be protected from overspray hazard i.e. windows, doors, exterior and vehicles. Protective coverings shall be secured against wind.

3.3 SURFACE PREPARATION

A. Built-Up Roof

1. All loose gravel, dust and residue shall be removed using power vacuum equipment, power sweeper, air blowing, or other suitable means.
2. The roof shall be thoroughly inspected or tested to determine if moisture is present within the roof assembly. Saturated insulation must be removed and replaced with compatible materials.
3. The existing roof shall be thoroughly inspected for adhesion between felts, insulation, and deck. Areas of poor adhesion should be fastened. Blisters, buckles, wrinkles and fishmouths shall be cut out and/or fastened.
4. All soft mastic or other materials that impede polyurethane foam adhesion shall be removed.
5. Remove or refasten all loose base flashing, counter flashing and gravel stops as required.
6. Existing expansion joints should be inspected and repaired as necessary.
7. Electrical and mechanical conduits should be relocated or raised above the finished roof surface.

B. Metal Deck

1. Metal surfaces to be foamed shall be free of rust, loose scale, dust, dirt, grease, oil or other contaminants.
2. Grease, oil or other obvious contaminants must be removed by tri-sodium phosphate and water or other solutions as required by job conditions. Remove all cleaning solutions with plenty of fresh water.
3. Metal surfaces having loose scale or rust must be cleaned and primed with metal primer prior to polyurethane foam application as job conditions dictate. Contact NEOGARD for primer recommendations.
4. Fluted metal decks require a suitable method of covering or filling the flutes prior to polyurethane foam application. Flutes may be covered with mechanically fastened board stock or filled with precut board stock or spray applied polyurethane foam.

C. Concrete

1. Remove loose dirt, dust and debris by using compressed air, vacuum equipment or brooming. Oil, grease, form release agents or other contaminants shall be removed with proper cleaning solutions.
2. Priming is required on concrete surfaces, and it is recommended that poured concrete decks be permitted to cure for twenty-eight (28) days prior to the application of primer or sprayed polyurethane foam. Consult polyurethane foam manufacturer for primer recommendations.

3. All joint openings in concrete decks that exceed 1/4 inch shall be grouted or caulked and allowed to thoroughly cure prior to application of primer or sprayed polyurethane foam.
4. The PERMATHANE™ II FR roofing system is not recommended for lightweight or insulating concretes unless tests have been made to determine that adequate adhesion can be obtained or unless an overlayment is installed.

D. Wood

1. Plywood shall be exterior grade not less than 1/2 inch thick, nailed firmly in place. Attachment must meet building code requirements for resistance to wind uplift.
2. Plywood shall contain no more than 18% water, as measured in accordance with ASTM D4444, or ASTM D4442.
3. Deck shall be free of loose dirt, grease, oil or other contaminants prior to priming or foam application. Remove loose dirt or debris by use of compressed air, vacuum or brooming. No washing shall be permitted.
4. All untreated and unpainted surfaces shall be primed with an exterior grade primer. Priming is required to minimize moisture absorption and eliminate potential polyurethane foam adhesion problems. Contact polyurethane foam manufacturer for primer recommendations.
5. Plywood joints in excess of 1/4 inch shall be taped or filled with a suitable sealant material. If sealant material is used, allow to thoroughly cure prior to application of primer or sprayed polyurethane foam.
6. Tongue & Groove, Sheathing, Planking: Due to the frequency of joints, possibility of variable openings and effects of aging and shrinking, these surfaces must be overlaid with a minimum of 1/4 inch thick exterior grade plywood or suitable covering.

E. Other Surfaces (i.e. Gypsum Board, Isocyanurate Board)

1. These materials are generally used over fluted metal decks and must be fastened to achieve necessary wind uplift requirements.
2. Boards shall be firmly butted together along all edges without gaps or openings. Joints exceeding 1/4 inch shall be caulked with a suitable sealant material. Allow sealant to thoroughly cure prior to application of primer or sprayed polyurethane foam.
3. Special care must be taken to prevent these materials from getting wet in storage on the job site and after installation prior to being protected by polyurethane foam. Moisture exposure will damage these materials and may be a cause for replacement.
4. Remove loose dirt and debris by using compressed air, vacuum or light brooming. No power brooming is permitted due to possibility of damage.
5. The installed materials shall be protected from spills of contaminants such as oil, grease, solvents, etc., as these materials cause soiling that cannot be readily removed from the board surfaces.

3.4 SPRAYED POLYURETHANE FOAM APPLICATION

- A. Application Techniques: Techniques used to apply polyurethane foam to roof assembly shall be those recommended by the manufacturer of the polyurethane foam system.
- B. Equipment: Equipment used shall be recommended by the manufacturer of the polyurethane foam system.
- C. Tolerance: A multiple pass application of polyurethane foam is to be made in accordance with the polyurethane foam manufacturer's specifications and application procedures to reach the specified thickness. A tolerance of +1/4" - 0" per 1" thickness is acceptable.
- D. Texture of Surface: Polyurethane foam surface texture may range from smooth orange peel to verge of popcorn and be acceptable. "Popcorn" surfaces are unacceptable and must be reworked. Note: Texture of polyurethane foam surfaces directly affects coating coverage rates.
- E. Details: Use of sprayed polyurethane foam at cants is recommended.
- F. Polyurethane foam application shall be limited to an area which can be completed to full foam thickness in one day and base coat applied the same day. Consult the foam manufacturer for minimum curing time before application of the base coat.
- G. If polyurethane foam is not coated within 72 hours, surface shall be examined for surface oxidation and moisture contamination. If oxidation or contamination exists, contact polyurethane foam manufacturer for recommendations.
- H. The polyurethane foam surface shall be free of moisture, frost, dust, debris, oils, tars, grease or other materials that will impair adhesion of the protective coating.

3.5 PROTECTIVE COATING APPLICATION

- A. Base Coat: The base coat shall be applied the same day as the polyurethane foam application when possible. Apply 70620 base coat in a uniform thickness at the rate of 2 gallons per 100 square feet to yield an average thickness of 26 dry mils in strict accordance with procedures outlined by NEOGARD and allow to cure.

- B. Topcoat: Apply 70611 series topcoat in a uniform thickness at the rate of 1 gallon per 100 square feet to yield an average thickness of 13 dry mils in strict accordance with application procedures outlined by NEOGARD and allow to cure. Note: The above application rates are theoretical, calculated for glass-smooth surfaces with no allowances made for loss, job or surface conditions. Therefore, published coverage rates should only be used as a guide for estimating material requirements for a given job.
- C. Granules: If a granule finish is desired, they shall be of the size and type recommended by NEOGARD and broadcast into an additional topcoat

3.6 FIELD QUALITY CONTROL

- A. The contractor shall maintain a system to verify compliance with this specification. Thickness of polyurethane foam and applied coating shall be measured and recorded for each coat and the total protective coating system.
- B. Any variations from specified limits found by contractor shall be corrected by the contractor.
- C. Total coating system thickness shall average 39 dry mils with a minimum coating thickness of the system, at any point on the roof, to be 20 dry mils.

3.7 CLEANING

- A. Remove debris, resulting from completion of coating operation, from the project site.

3.8 PROTECTION

- A. After completion of application, do not allow traffic on the PERMATHANE™ II FR roofing system for a period of at least 48 hours at 75°F (23.8°C) and 50% R.H., or until completely cured.

END OF SECTION

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Div. of JONES-BLAIR®

2728 Empire Central - P.O. Box 35286 - Dallas, Texas 75235 - Toll Free (214) 353-1689 - Fax (214) 357-7532 - www.neogard.com