SECTION 07540

NEOGARD™

Guide Specification

Polyurethane Foam Roofing

ALPHA ROOF SYSTEM

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Furnish all labor, materials, tools and equipment necessary for the application of sprayed polyurethane foam and elastomeric polyurethane coating roof system, including accessory items, subject to the general provisions of the contract.
2. The manufacturer's application instructions for each product used are considered part of this specification and should be followed at all times.

B. Related Sections:
1. Section 03300 - Cast-in-Place Concrete
2. Section 05500 - Metal Decking
3. Section 06100 - Rough Carpentry
4. Section 07200 - Insulation
5. Section 07500 - Membrane Roofing
6. Section 07600 - Flashing and Sheet Metal
7. Section 07700 - Roof Specialties and Accessories
8. Section 07800 - Skylights

1.2 SUBMITTALS

A. Submit reference list of 50 projects indendently verified by third party within 150 miles of jobsite. Include project name and location, and current contact information.

B. Submit *ALPHA* product data sheets for primers, polyurethane foam, elastomeric polyurethane coating, and MSDS for all products, other safety and handling instructions and installation instructions.

C. Submit 6" X 6" sample of specified ALPHA system.

D. Submit a currently dated Applicator's License Certificate issued by Neogard and Approved Applicator certificate issued by BASF. Submit proof of good standing in the *PBRSG ALPHA* program. Submit performance documentation and rating.

E. Submit a copy of the joint Neogard/Applicator *ALPHA* Maintenance Agreement and joint BASF/Applicator *ALPHA* Maintenance Agreement.

F. Approvals for UL, FM, and applicable local and national codes.

1.3 QUALITY ASSURANCE

A. Manufacturer(s) shall be a current participant of the *PBSRG ALPHA* program as administered by Arizona State University.

B. Applicators shall be current approved applicators as identified by the *ALPHA* program.

C. Requirements of Regulatory Agencies:
1. Materials used in the *ALPHA* system shall meet Federal, State and local VOC regulations.
2. The *ALPHA* system shall be approved for use on this project and rated "Class A" by Underwriters Laboratories. (ASTME-108/UL 790).

D. Field Quality Control: Upon completion of the *ALPHA* roofing system installation, an inspection by an *ALPHA* approved third party inspection company is required. The inspection will confirm that the installation meets or exceeds owner and manufacturers' minimum requirements as detailed within this specification.

E. Post Hail Testing: After third party confirmation that the specification requirements have been met, the Factory Mutual severe hail test shall be performed on the finished roof installation;. The test will be performed at a location mutually agreed upon by the owner and applicator. This test can be conducted at any time during the warranty period and if failure occurs, the affected roof area shall be inspected as to the cause of the failure, and repaired; in accordance with the *ALPHA* manufacturers' and applicator'(s) license agreements. Upon completion of the required repairs, the Factory Mutual severe hail test will be repeated in the same location as before. The building owner will not be responsible for any costs associated with repairs and re-testing.

1.4 DELIVERY, STORAGE & HANDLING

A. Materials shall be delivered in original sealed containers, clearly marked with supplier's name, product identification, safety information and batch or lot number.

B. Recommended material storage temperature is 75°°F (24°C). Handle products to avoid damage to the container. Do not store in direct sunlight. The *ALPHA* system should be installed within 6 months of manufacture date of any materials under this specification. All materials shall be stored in compliance with local fire and safety requirements.

1.5 PROJECT CONDITIONS

A. Environmental Conditions:
1. Do not proceed with application of polyurethane

foam materials when substrate temperature and/or ambient conditions are less than 40°F (4.4°C).
2. Do not proceed with application of polyurethane foam or coating materials when inclement weather is imminent or when temperature and /or humidity are outside the limits set by the supplier.
3. Do not apply material unless surface to receive polyurethane foam and/or elastomeric coating is clean, dry and free of all contaminants.
4. Wind barriers shall be used if wind conditions could affect the quality of the spray polyurethane foam or elastomeric polyurethane coating installation during spraying. The elastomeric polyurethane coating can be roller applied.

1.6 SEQUENCING AND SCHEDULING

A. In new construction projects or projects where other trades are also at work, the spray polyurethane foam is installed when the deck, parapet walls, rough openings, and curbs are completed. The type of skylight used will determine when the skylights should be installed. Plumbing vents, drains, and electrical penetrations should be in place. No other trades are permitted on the roof while the spray polyurethane foam and elastomeric polyurethane coating are being installed.

1.7 WARRANTY

A. The materials and workmanship involved in this application shall be jointly and severally guaranteed from each material supplier individually and the licensed applicator for 15 years.

B. Guarantee against leaks, polyurethane foam or elastomeric polyurethane coating membrane failures caused by faulty material or workmanship or by ordinary wear and tear, bird damage, wind forces up to 90 mph, and severe hail damage as defined by Factory Mutual Research Corporation (FMRC) simulated hail damage tests. (See *ALPHA* warranties for exclusions).

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Neogard Division of Jones-Blair Company, P.O. Box 35286, Dallas, TX 75235, (800) 321-6588, www.neogard.com.

B. BASF Corporation, 1609 Biddle Avenue, Wyandotte, MI 48192, (800) 547-4004, www.basf.com/spray.

2.2 MATERIALS

A. Polyurethane Foam
1. The polyurethane foam insulation shall be a two-component system made by combining an isocyanate (A) component with a polyol (B) component. The spray polyurethane foam system shall be *ALPHA* approved Elastospray 1620B-030 and/or 2001B-030 (B) component and Elastospray 8000A (A) component as made by BASF Corporation.
2. The cured sprayed in place polyurethane foam shall have the following minimum characteristics:

PERFORMANCE REQUIREMENTS FOR CURED FOAM

PHYSICAL PROPERTIES	TEST METHOD	RESULTS
Tensile Strength	ASTM D1623	75 psi
Density	ASTM D1622	3.0 pcf
Compressive Strength (parrallel to rise)	ASTM D1621	50 psi @ yield
Closed Cell Content	ASTM D1940	>90% min.
Dimensional Stability 158°F, 100% RH, 28 Day	ASTM D2126	+8% max.
K Factor (aged)	ASTM C518	0.15 BTU/hr ft² °F/in
Flame Spread (nominal 2" thickness)	ASTM E84	45 max.

B. Elastomeric Coating System
1. The elastomeric coating shall be a single component polyurethane coating. The polyurethane coating system shall be the Permathane II FR system as manufactured by NEOGARD®, Dallas, TX. The base coat shall be 70620 series. The topcoat shall be 70611 series (gray, tan or white) in color.
2. Performance requirements for cured elastomeric coating system 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	140 lb/in
Water Resistance	ASTM D471	<3 @ 7 days	<3 @ 7 days
MVT @ 30 mils	ASTM E96	1.6 Perms	2.2 Perms
Shore A	ASTM D2240	50 - 55	70 - 75
Adhesion	ASTM D903	20 lb/in	15 lb/in
Weathering Resistance	ASTM D822	N/Ap	Slight Chalk
Thermal Shock	Alternate Head/Cold	No Loss of Adhesion	No Loss of Adhesion
Fire Resistance	ASTM E108, UL790	System Rated Class "A"	

C. ACCESSORIES
1. Sheet Flashing: 6" or 12" wide, non-staining, 60 mil, UltraGard EPDM Flashing as manufactured by Johns Manville or equal.
2. Miscellaneous materials such as primers, elastomeric sealants, metal, vents, and drains shall be a composite part of the roof system and shall be compatible with the polyurethane foam roofing system.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

A. Concrete: Verify that the work done under other sections meets the following requirements:
1. Remove loose dirt, dust and debris by using compressed air, vacuum equipment or wet-vac. Oil, grease, release agents or other contaminants shall be removed with proper cleaning solutions.
2. That the concrete was cured for a minimum of 28 days. Water-cured treatment of concrete is preferred.

The use of concrete curing agents, if any, shall be of the sodium silicate base only; others require written approval by BASF Corporation.

3. All joint openings in concrete decks that exceed ¼ inch shall be grouted or caulked prior to application of the polyurethane foam.
4. Lightweight or insulating concrete are not recommended for direct *ALPHA* sprayed polyurethane foam application.
5. Concrete surfaces shall be primed with Neogard's 7760/7761 primer or other primer recommended by the *ALPHA* suppliers.

B. Wood: Verify that the plywood deck work done under other sections meets the following requirements:
1. Plywood shall be exterior grade quality and minimum B-C grade. Plywood shall be at least 5/8" thick. Tongue and groove plywood is preferred. Attachments must meet building code requirements for resistance to wind uplift.
2. Joist spacing beneath plywood deck has a maximum spacing of 16" O.C. Plywood shall not have a deflection of greater than 1/240 or the span when subjected to maximum design load.
3. Plywood imperfections are filled with a one-part moisture cured polyurethane sealant as recommended by *ALPHA* suppliers.
4. A maximum of 1/16" space between sheets of plywood is maintained while deck is being placed.
5. Deck shall be free of loose dirt, grease, oil or other contaminants prior to priming. No washing is permitted.
6. Priming of wood deck with 7760/7761 primer or other primer as recommended by *ALPHA* suppliers shall be required.
7. Plywood decking is to be covered as soon as possible after installation.

C. Metal: Verify that the work done under other sections meets the following requirements:
1. The metal roof deck shall be constructed of minimum 22-gauge steel and deflection shall be less than 1/240 of the span. Construction shall conform to local building codes.
2. Metal surfaces to be foamed shall be free of rust, loose scale, dust, dirt, grease, oil, chalking paint or other contaminants.
3. Grease, oil, chalking paint or other obvious contaminants must be removed with tri-sodium phosphate and water or other solutions as required by job conditions. Remove all cleaning solutions with plenty of fresh water.
4. Metal surfaces having loose scale or rust must be cleaned and primed prior to polyurethane foam application as job conditions dictate.
5. Clean and prime all non-ferrous metal surfaces such as galvanized metal, aluminum, and stainless steel with a primer and procedures recommended by the *ALPHA* suppliers.
6. Fluted metal decks require a suitable method of covering the flutes prior to the application of the polyurethane foam. Flutes may be covered with fastened or adhered insulation board, Dens-deck, gypsum board, special polyester tapes, or polyurethane foam.

D. Existing Built-Up/Aggregate Roofs:
1. All loose gravel or other aggregate, dust, and debris shall be removed using power vacuum equipment, hydro-vac, power sweeper, or other suitable means.
2. Examine roof for areas where cold application asphaltic materials may have been applied. Remove all resaturants, cutback asphalts and plastic cements down to the existing felts.
3. Remove and replace all blisters and delaminating materials and replace to grade.
4. Inspect and test the existing roof assembly for the presence of moisture. Wet (areas with greater than 15% moisture content) areas and areas of saturation must be removed and replaced with compatible materials.
5. Remove or refasten all loose base flashing, counterflashing, and gravel stops as required.

E. Aged Polyurethane foam roof systems:
1. Remove the surface of the polyurethane foam/coating system by means of a mechanical scarifier to a level surface. Any wet or loose areas shall be completely removed.
2. Vacuum or blow the resulting polyurethane foam surface free of all dust and debris.
3. Prime surface of the polyurethane foam with a dark primer as recommended by the manufacturers.

F. Other Considerations:
1. Lightning rods shall be masked prior to the application of the polyurethane foam. Lightning rod cables shall not be embedded in the SPF and should be removed prior to the SPF application. Electrical and mechanical conduits should be relocated or raised above the roof surface.

3.2 POLYURETHANE FOAM APPLICATION

A. INSPECTION

1. Prior to the application of the polyurethane foam, the surface shall be inspected to insure that conditions required by 3.01 have been met.
2. The polyurethane foam application shall not proceed during a periods of inclement weather, nor should any SPF be applied until exterior surfaces are thoroughly dry. The SPF shall not be applied below an ambient air or substrate temperature of 40°F (4.4°C) and /or above 85% relative humidity.

B. APPLICATION
1. Pre-start up verification of the polyurethane foam formulation will be made according to the approved *ALPHA* process. The applicator will provide a sample of the polyurethane foam sprayed through their equipment prepared at the job site, to BASF Corporation for analysis. Based on BASF Corporation findings, the formulation will be optimized for application. Documentation and appropriate testing will be conducted according to currently accepted *ALPHA* protocol.
2. The application of the polyurethane foam shall be in accordance with polyurethane foam manufacturer's instructions.
3. The spray polyurethane foam shall be applied in a

minimal pass thickness of ½ inch.

4. The spray equipment used shall be that recommended by polyurethane foam manufacturer.
5. The spray polyurethane foam thickness shall be a minimum of 1.5 inches. The polyurethane foam shall be applied uniformly over the entire surface with a tolerance of plus ¼ inch of thickness minus 0, except where variations are required to insure proper drainage or to complete a feathered edge. The SPF shall not be applied in thickness greater than 2 inches in one pass.
6. The final SPF surface texture shall be "smooth, orange peel, course orange peel, or verge of popcorn". SPF surfaces termed "Popcorn or treebark" surfaces are unacceptable. These areas shall be removed and resprayed to an acceptable surface. (See Addendum A)
7. The SPF shall be uniformly terminated a minimum of four (4) inches above the roofline at all penetrations (except drains, parapet walls, or building junctions). Sprayed in place cants shall be smooth and uniform to allow positive drainage. (See Addendum B – Detail Drawings)
8. If polyurethane foam is not coated within 24 hours, surface shall be examined for surface oxidation and moisture contamination. If oxidation or contamination exists, contact BASF for recommendations.
9. Any damage or defects to the polyurethane foam surface shall be repaired prior to the elastomeric coating application.

C. Flashing Material
   1. Flashings and Coverings: Flashings and waterproof coverings for expansion joints shall be uncured, non-staining, 60 mil (0.060") Neoprene elastomeric sheet material.

3.3 ELASTOMERIC COATING APPLICATION

A. *ALPHA* System: The fluid-applied elastomeric protective coating system, herein specified, shall be applied in accordance to the procedures outlined below. The composite protective coating system includes the following:
   1. Base Coat:
      a. The initial base coat shall be applied the same day as the polyurethane foam. If due to weather conditions, more than 24 hours elapse between SPF and the base coat application, the polyurethane foam shall be inspected for UV degradation. If such degradation is present contact BASF for recommended procedures.
      b. The SPF shall be free of dust, dirt, contaminants and moisture prior to the application of the base coat.
      c. Apply the seamless, elastomeric polyurethane 70620 Series base coat membrane at the rate of 3 gallons per 100 sq.ft. in a minimum of 2 coats to yield an average thickness of 37 dry mils in strict accordance with procedures outlined by Neogard.
   2. Topcoat:
      a. Subsequent coating shall be applied in a timely manner to insure proper adhesion between coats.
      b. The previous base coat shall be allowed to cure and be inspected for pinholes, thinly coated areas, uncured areas or other defects. Any defects shall be repaired prior to the topcoat application. The bas coat shall be free of dirt, dust, moisture, or other contaminants prior to the application of the topcoat.
      c. Apply the seamless, elastomeric polyurethane 70611 Series topcoat membrane at the rate of 3/4 gallon per 100 sq.ft. in 1 coat to yield an average thickness of 9 dry mils in strict accordance with application procedures outlined by Neogard.
      d. The cured dry film thickness of the finished multiple coat application shall be checked according to Neogard's specifications. Areas that are found to have less than the thickness specified shall require additional coating.
   3. Aggregate Finish:
      a. Apply the seamless, elastomeric polyurethane 70611 Series topcoat membrane at the rate of 3/4 gallon per 100 sq.ft. in 1 coat to yield an average thickness of 9 dry mils in strict accordance with application procedures outlined by Neogard. Immediately broadcast #11 roof granules into wet coating at the rate of 30 lbs. per 100 square feet. When dry, remove excess loose granules. Minimum coating thickness of the system at any point on the roof to be 20 dry mils beneath the aggregate. The above application rates are theoretical, calculated for glass-smooth surfaces with no allowances made for loss, job or surface conditions.

3.4 FIELD QUALITY CONTROL

A. Following project completion, a detailed inspection shall be conducted by an independent *ALPHA* approved inspection firm.

3.5 CLEANING

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

END OF SECTION

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