Specification Guide

Section 07541 Duraplus™/Polyurethane Foam Roof System

PART 1 - GENERAL

1.01 Work Included
- A. Preparation of substrate
- B. Sprayed-in-place Polyurethane Foam Insulation
- C. Duraplus™ Acrylic Coating Application
- D. Roofing Granules (Optional)
- E. Walkways (Optional)

1.02 Related Work
- A. Section 01410: Testing Laboratory Services
- B. Section 07600: Flashing and Sheet Metal
- C. Section 07700: Roof Specialties and Accessories

1.03 Quality Assurance
- A. Applicator Qualifications: Must be a Duraplus™ Approved Applicator in order to qualify for Rohm and Haas roof warranties.
- B. The Approved Applicator shall perform the work of this section. Subcontracting the roofing work is not allowed.
- C. Inspections: Completed roofing application will be inspected by an independent inspection firm designated by Rohm and Haas to verify compliance with warranty requirements.

1.04 Submittals
- A. Product Data: Provide two copies of product data sheets of Duraplus™ Acrylic Coating and the polyurethane foam to be used.
- B. Samples: Provide 2' x 2' sample of completed roof system showing surface texture and finished thickness of polyurethane foam, color and thickness of Duraplus™ Acrylic Roof Coating, and graduation of roofing granules, if used.
- C. Submit verification that the applicator is a current Rhom and Haas Duraplus™ approved applicator.
- D. Provide specimen copy of Rhom and Haas warranty to be issued for this roof installation.
- E. Submit Underwriters Laboratories, Factory Mutual, and/or local building code approvals as required.

1.05 Delivery, Storage and Handling

A. Deliver materials to the site in their original, tightly sealed containers, all clearly labeled with manufacturer's name, product identification and lot number.

B. Store materials in their original containers out of the weather and where the temperatures are within the limits specified by the manufacturer.

C. All materials shall be stored in compliance with applicable fire and safety requirements.

D. Protect materials from damage during transit, handling, storage and installation.

1.06 Environmental Conditions

A. Neither the Duraplus™ Acrylic Roof Coating nor the polyurethane foam shall be applied during periods of inclement weather (rain, snow, fog, mist and high humidity).

B. Do not apply the polyurethane foam when substrate or ambient air temperatures are below 50^{o}F unless specifically approved in writing by the polyurethane foam manufacturer.

C. Do not apply the polyurethane foam when the substrate surface is less than 5^{o}F above the dew point.

D. Do not apply Duraplus™ Acrylic Roof Coating when weather conditions will not permit complete cure before rain, dew, fog or freezing temperatures occur. Do not apply in late afternoon if heavy moisture condensation may appear during the night.

E. When wind speeds exceed 10 miles per hour at the job site, windscreens shall be used during the application of the polyurethane foam and Duraplus™ Acrylic Roof Coating to prevent overspray onto surfaces not intended to receive foam and coating. Under no circumstances shall the polyurethane foam or Duraplus™ Acrylic Roof Coating be applied when wind speeds exceed 25 miles per hour.

1.07 Warranty

A. Upon satisfactory completion of the work, provide:

1. Rhom and Haas ten year Full System Limited Warranty.

PART 2 – PRODUCTS

2.01 Polyurethane Foam Insulation

A. The polyurethane foam manufacturer and polyurethane foam system must be currently on Rhom and Haas Certified Polyurethane Foam list and be approved for use in a Rhom and Haas warranted roof system. For a copy of the Certified Polyurethane foam list, contact DAS Products @ (800) 437-5157.

B. Physical Property Requirements:

Property	Value	Test Method
Density, sprayed-in-place, pcf, min.	3.0	ASTM D-1622
Compressive Strength, psi, min.	50	ASTM D-1621
Closed-cell Content, percent, min.	95	ASTM D-2856
K-Factor, initial, max.	.16	ASTM C-518
Dimensional Stability, 28 days, 158°F, 100% R.R., percent volume change, max.	8	ASTM D-2126
Flame Spread, max.	75	ASTM E-84

2.02 Duraplus™ Acrylic Roof Coating

A. Colors: dark gray, light gray, beige, white

B. Typical physical properties per ASTM D-6083:

Property	Method	Result
Initial Tensile Strength (psi)	ASTM D-2370	>400
Initial Elongation (%)	ASTM D-2370	>525
Dry Adhesion (pli)*	ASTM C-749, D-903	>4.0
Wet Adhesion (pli)*	ASTM C-749, D-903	>2.0
Tear Resistance (lbf/in)	ASTM D-624	>125
1000-hr Accelerated Weathering	ASTM D-4798	No Cracking or Checking
Elongation After Accelerated Weathering (%)	ASTM D-2370	>450
Low Temperature Flexibility After Accelerated Weathering	ASTM D-522	Pass
Permeance (perms)	ASTM D-1653	<10
Water Swelling (%)	ASTM D-471	<30
Fungi Resistance (zero=No Growth)	ASTM G-21	Zero Rating
Volume Solids (%)	ASTM D-2697	54±1
Weight Solids (%)	ASTM D-1644	64±1
Viscosity (KU)	ASTM D-562	115±1
***Measured Over Sprayed Polyurethane Foam**		

C. Approved Duraplus™ Licensee:

1. United Coatings – Diathon DP

2.03 Sealant

A. Sealant shall be United Coatings Roofmate Buttergrade in a color to best match the topcoat color.

2.04 Substrate Primer

A. When a substrate primer is required, it must be recommended by the polyurethane foam manufacturer and approved by Rhom and Haas.

B. Cut-back asphalt primers are not to be used.

2.05 Granules

A. Granules shall be number 11 screen size, ceramic-coated roofing granules as manufactured by the Industrial Products Division of 3M Company, or other when approved by Rhom and Haas.

PART 3 – EXECUTION

3.01 Inspection

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

B. Verify that all roof penetrations are properly installed and secured.

C. Do not begin applying polyurethane foam insulation until substrate and environmental conditions are satisfactory.

3.02 Surface Preparation

A. Built-Up Roof Membrane

1. Remove all loose and poorly embedded aggregate surfacing material, if present, by use of a power broom, hand broom, power vacuum, wet vacuum and/or other suitable means. Do not accumulate large amounts of aggregate surfacing material in one location that may overload the roof deck structure.
2. Remove all wet insulation under existing built-up roof membrane. Clean and dry the area and install new similar compatible insulation, or apply polyurethane foam insulation to the level of the adjacent existing membrane.
3. Repair all built-up roof membrane defects, such as blisters, ridges, splits, punctures and delaminations, by cutting, removing, nailing or properly adhering to form a solid substrate. Make sure the roof materials around these defects are dry.
4. Remove all dust, dirt, debris and other contaminants from the built-up roof membrane that may impair the adhesion of the polyurethane foam.
5. Make sure all surfaces are clean and dry prior to polyurethane foam application.

B. Metal Decks

1. The metal roof deck should be a minimum of 22-gauge and be securely installed to conform to local building code requirements. Deflections shall not exceed $^{1}/_{240}$ of the span.

2. Remove any loose scale, rust and weathered or chalking paint using a wire brush, scraper or other suitable means.
3. Remove all dust, dirt and debris using air pressure, a hand or power broom and/or a power washer. Other contaminants such as oil and grease must be removed with appropriate cleaning solution.
4. Fluted metal roof decks should be covered with a polyester tape securely adhered to the metal deck over the flutes, or by mechanically fastened gypsum, urethane or fiberglass board per Factory Mutual recommendations for local wind uplift resistance. The boards shall be firmly butted together along all edges. Any joints greater than ¼ inch shall be taped prior to foam application.
5. Make sure all surfaces are clean and dry prior to foam application.

C. Concrete Decks
1. The concrete shall be cured a minimum of 28 days at temperatures above 50^{o}F and must be free of any laitance.
2. Remove all loose dirt, dust and debris using air pressure, a hand or power broom and/or a vacuum. Oil, grease, release agents and other contaminants must be removed using the appropriate cleaning solution.
3. All joints or cracks greater than ¼ inch shall be caulked or grouted prior to polyurethane foam application.
4. Make sure all surfaces are clean and dry prior to polyurethane foam application.
5. Lightweight insulating concrete fill material is not suitable for direct polyurethane foam application. Contact Rhom and Haas Technical Service for recommendations.

D. Wood Surfaces
1. Plywood shall be exterior grade not less than ½ inch thick, nailed firmly in place. Attachment must meet building code requirements for resistance to wind uplift. Deflections shall not exceed $^{1}/_{240}$ of the span.
2. The plywood shall contain no more than 18 percent moisture by weight, as measured in accordance with ASTM D-2016.
3. All untreated and unpainted surfaces shall be primed with an approved primer to minimize moisture absorption and aid in the polyurethane foam adhesion.
4. Tongue-and-groove, sheathing and planking decks shall be overlaid with a minimum of ¼ inch exterior grade plywood securely attached to meet building code requirements.
5. Any joints greater than ¼ inch shall be caulked or taped prior to the polyurethane foam application.
6. Remove all loose dirt, dust and debris using air pressure, a hand or power broom and/or a vacuum. Washing is not permitted. Oil, grease and other contaminants must be removed using appropriate cleaning solution.

7. Make sure all surfaces are clean and dry prior to polyurethane foam application.

E. Other Surfaces
1. Contact Rhom and Haas Technical Service for recommendations on surface preparations on other surfaces to receive Duraplus™ Acrylic/Polyurethane Foam Roof System.

3.03 Polyurethane Foam Application

A. Inspection
1. Prior to polyurethane foam application, inspect the substrate surface to ensure preparations required in Section 3.02 have been met.
2. Polyurethane foam shall not be applied unless the environmental requirements of Section 1.06 are met.

B. Application
1. Apply the polyurethane foam in accordance with the polyurethane foam manufacturer's specifications and application instructions, using spray equipment recommended by the foam manufacturer.
2. Polyurethane foam shall be applied in a minimum of ½ inch thick passes. The total thickness of the polyurethane foam shall be ___ inches, except where tapering is required to facilitate drainage. A minimum of one inch of the polyurethane foam is required for a Rhom and Haas Warranty.
3. Apply the full thickness of polyurethane foam in any area on the same day.
4. Polyurethane foam shall be applied to ensure proper drainage, resulting in no ponding water. Ponding water is defined as "an area of 100 square feet or more which holds in excess of ½ inch of water as measured 24 hours after rainfall."
5. The polyurethane foam shall be terminated neatly a minimum of four inches above the finished roof surface at roof penetrations. Foamed-in-place cants shall be applied to allow a smooth transition from the horizontal to vertical surface.
6. The finished polyurethane foam surface texture shall be smooth to orange-peel, free of voids, pinholes and depressions. Verge of popcorn texture is acceptable if it can be thoroughly and completely coated. Popcorn and tree bark textures are not acceptable. Unacceptable foam textures shall be removed and refoamed prior to coating application.

3.04 Duraplus™ Acrylic Roof Coating Application

A. Inspection
1. Prior to the application of Duraplus™ Acrylic Roof Coating, inspect the polyurethane foam surface to ensure the conditions of Section 3.03 have been met.

2. The polyurethane foam surface shall be free of dust, dirt, debris and other contaminants that would impair the adhesion of the acrylic coating.
3. The polyurethane foam surface must be dry prior to the acrylic coating application.
4. If more than 24 hours elapse between the polyurethane foam application and the start of the acrylic coating application, thoroughly inspect the polyurethane foam surface for UV degradation and oxidation. If this condition is detected, the polyurethane foam surface shall be mechanically scarified, cleaned, primed and refoamed prior to the acrylic basecoat application.
5. Make sure all environmental conditions of Section 1.06 are met prior to acrylic coating application.

B. Application

1. The Rhom and Haas Acrylic Roof Coating basecoat shall be applied on the same day as the polyurethane foam application, after the polyurethane foam has been allowed to cure a minimum of one hour.
2. Apply Duraplus™ Acrylic Roof Coating basecoat in a uniform application to achieve a finished dry mil thickness of approximately ⅓ the total millage required for the roof or 1½ gallons per 100 square feet for a dry mil thickness of 12 mils.
3. The basecoat shall not be subjected to foot traffic or be disturbed until it is cured.
4. After basecoat has cured, inspect the coating for pinholes, cracks, thin areas or other deviations. All deviations observed shall be caulked with United Coatings Roofmate Buttergrade and/or roller coated with additional Duraplus™ Acrylic Roof Coating prior to applying subsequent coats of Duraplus™.
5. The basecoat must be cured, clean and free of all moisture prior to application of subsequent coats.
6. Apply the Duraplus™ Acrylic Roof Coating intermediate coat in a contrasting color to the basecoat within 72 hours of the basecoat application. The intermediate application shall be made at right angles to the basecoat application. The intermediate coat shall be installed at 1½ gallons per 100 square feet for a 12 dry mil thickness.
7. Apply the topcoat in a uniform manner to the intermediate coat within 72 hours of the intermediate coat application. Install the topcoat at 1½ gallons per 100 square feet for a total protective coating system dry film thickness of 36 mils.
8. The Duraplus™ Acrylic Roof Coating shall be applied a minimum of two inches beyond all the terminated edges of the polyurethane foam. These terminations should be masked to provide a neat finished appearance.

9. Allow the topcoat to cure and inspect the finished coating surface for pinholes, cracks, thin areas or other deviations. Repair any deviations observed with United Coatings Roofmate Buttergrade Sealant and/or additional Duraplus™ Acrylic Roof Coating topcoat.
10. It is the contractor's responsibility to ensure the minimum total dry film thickness specified is achieved throughout the entire roof area.

3.05 Granule Application (Optional)

A. Application

1. If mineral roofing granules are used to surface the system, the topcoat must be applied to a dry film thickness of at least 12 mils.
2. Apply the roofing granules in a wet finished coat of acrylic coating. A minimum of 12 dry mils of acrylic coating is required to hold the granules.
3. Spray apply the roofing granule, using suitable equipment, uniformly at a rate of approximately 40 pounds per 100 square feet of roof area.
4. Apply the roofing granules immediately after the additional coating application to obtain maximum wet-out and embedment.
5. After the coating has fully cured, all loose granules shall be removed using a soft-bristled broom to prevent blocking drains and scuppers.
6. Bare spots in the granulated surface shall be filled in by applying additional coating and granules in these areas.

3.06 Walkways (Optional)

A. In heavy traffic areas, apply a walkway surface in one of the following methods:

1. Apply a double layer of granules in the walkway area by applying acrylic coating over the finished roof surface at a rate to achieve a minimum dry film thickness of 12 mils. Uniformly broadcast roofing granules into the wet coating and allow the coating to cure. Broom off all loose granules and apply a second application of acrylic coating and granules over the embedded granules of the first application. After the second application is cured, remove loose granules and fill in any bare spots with more coating and granules.
2. Apply an additional coat of acrylic coating over the finished roof surface and lay a fiberglass or polyester fabric into the wet coating. Make sure the fabric is relaxed, smooth, free of wrinkles and fish mouths, and thoroughly wet out. Overcoat the fabric with additional acrylic coating to ensure total coverage, penetration and complete filling of the weave. Extend the overcoat a minimum of 6 inches beyond the fabric edge. The fabric ends shall be lapped a minimum of 12 inches. Immediately following the application of

the overcoat, uniformly apply roofing granules to the wet coating. After the coating has cured, remove all loose granules and fill in any bare spots.

B. The only factory-formed walkway pad approved for use is Yellow Spaghetti™. Yellow Spaghetti™ can also be used as a working surface around rooftop equipment. Yellow Spaghetti™ pads should be adhered to the finished roof surface using United Coatings Roofmate Buttergrade Sealant. Factory supplied adhesives from Yellow Spaghetti™ will not properly adhere to Duraplus™ Acrylic Roof Coating.

3.07 Field Quality Control – Rhom and Haas Warranted Roofs

A. Core samples of the Duraplus™ Acrylic Roof Coating System will be secured by an independent inspection firm at a rate of one core per 10,000 square feet, with a minimum of 2 cores per roof, to test for foam thickness, compressive strength, density and adhesion. Additionally, slit samples will be taken at a rate of 3 per 10,000 square feet, with a minimum of 3 per roof, to test the coating thickness and coating adhesion. Sampled areas will be repaired using United Coatings Roofmate Buttergrade Sealant and replacement foam cores.

3.08 Safety Requirements

A. Proper safety precautions shall be followed throughout the entire roofing operation. OSHA and local regulations shall be strictly followed. Refer to the roofing product's Material Safety Data Sheets for specific safety information on handling and working with all materials. Dispose of all trash, debris and empty containers in accordance with local, state and federal regulations.

END OF SECTION