

DURASHIELD II™ WITH DURAZONE™ HIGH PERFORMANCE ROOFING FOAM INSULATION MASTER SPECIFICATION

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Installation Guide Specification 10-Year No-Leak Warranty

0705- Polyurethane Foam and Coating System

PART 1 - SCOPE

1.01 This specification covers the preparation and application to roof surfaces of a monolithic, spray applied rigid polyurethane foam insulation system and elastomeric roof coating, which shall have UL 790 Class A listings and Class B combustible deck listings.

1.02 This system shall provide insulative value and a waterproof elastomeric weather barrier possessing good adhesion and physical bond strength to substrate. This system shall maintain hydraulic stability without age hardening or slump.

1.03 The applicator shall furnish all labor, materials and equipment and perform all operations required as specified. All contractors and applicators are to be UCSC/Spray Polyurethane Foam Alliance (SPFA) accredited.

1.04 Manufacturer, suppliers and contractors shall be unencumbered with serious litigation and/or bankruptcy. Payments are to coincide with material and labor lien releases.

PART 2 - QUALITY ASSURANCE

2.01 Manufacturer: For the purpose of defining the quality of the materials in this Section, the fluid applied materials shall be supplied by a single-source supplier.

A. Roof moisture/vapor vents: Shall be JBV roof vents manufactured by IPS Corporation (formerly Jimco Products, Inc.). No plastic vents shall be approved.

B. Primer: The primer shall be UCSC Solargain™, a water based low solids, resin rich primer to achieve superior adhesion and penetration as supplied by UCSC Ltd. Phoenix Arizona or approved equal.

C. Sprayed Polyurethane Foam: The polyurethane foam material shall be UCSC Durazone™ SFC II 2.7 pcf, utilizing the non-ozone depleting, third-generation blowing agent HFC 245-fa. Durazone 2.7 is a two-component liquid applied, spray polyurethane foam supplied by UCSC Ltd. or approved equal.

D. Coating: The elastomeric roof weather coating shall be Durashield II, a high solids, fire retardant, thixotropic, single-component acrylic elastomeric coating uniquely formulated for the protection of sprayed-in-place polyurethane foam, as supplied by UCSC or approved equal.

PART 3 - QUALIFICATIONS

3.01 All roofing contractors and subcontractors bidding work shall be licensed by the State Contractors License Board, and shall have a license currently in effect, which covers work called for in the specifications (where applicable).

3.02 Qualified applicators: Only contractors who are currently "Qualified" by the fluid applied material manufacturer for warranty projects shall bid projects and apply projects. The contractor shall furnish to the owner a letter confirming that the contractor is an approved applicator for the materials manufacturer. Contractor/applicator shall have successfully completed UCSC Advanced Applicator Certification for both equipment and materials handling or be SPFA Accredited.

3.03 The contractor shall have a minimum of three (3) years experience in applying polyurethane foam and coating roof systems and should be able to document, if requested, at least 500,000 sq. ft. of successful applications using similar roofing materials as that specified.

3.04 The building owner/architect shall reserve the right to accept the bid of their choice, which may not necessarily

be the low bidder. The building owner/architect shall also reserve the right to reject any and all bids.

PART 4 - SUBMITTALS

4.01 Manufacturer's Data: Submit technical datasheets, independent testing reports, application instructions and precautions, and manufacturer warranty.

4.02 Prior approval: Materials other than that specified shall be submitted to the architect/owner for approval no later than ten (10) days prior to bid date. In requesting prior approval, it shall be necessary to submit:

A. A letter of certification, signed by an officer of the manufacturer, stating that the substitute material is equal to or better in features or performance, which the job requires, than the specified product will provide.

B. Independent Laboratory test data giving physical property values.

C. A coated block sample 12" X 12" two (2) inches in thickness.

PART 5 - WARRANTY

5.01 The fluid-applied material manufacturer shall issue to the building owner a ten (10) year warranty, stating in simple terms that the roof(s) will not leak water due to faulty coating materials or faulty manufacture of such material or as a result of ordinary weather conditions.

PART 6 - PRODUCT HANDLING

6.01 Deliver products in manufacturer's original sealed containers, with seals and labels intact.

6.02 Store materials in an enclosed space protected from weather and out of the direct rays of the sun.

6.03 Do not ship or store materials unless protection against freezing (32°F) is available.

6.04 All personnel spraying the polyurethane foam and coating materials in exterior applications must wear acceptable organic respirators or other protective equipment to insure good safety precautions at all times. Contractor shall perform all work in accordance with OSHA regulations and safety regulations governing the location of the jobsite.

PART 7 - INSPECTION

7.01 Notify the fluid applied material manufacturer's representative and the owner as follows:

A. Before bidding work, the roofing contractor shall attend a mandatory pre-bid inspection tour to be scheduled through the owner.

B. Before starting work, notify the manufacturer's representative and the owner.

C. At the completion of the roofing project, furnish the fluid applied material manufacturer with a completed project "Inspection Report".

D. The Roofing Contractor shall be required to inspect the roof every twelve (12) months with a representative of the owner following completion of the roof installation.

E. The Roofing Contractor shall assume responsibility for the acceptance of materials under his roofing by his application of the roof

PART 8 - MATERIALS

8.01 Roof moisture/vapor vents: Shall be JBV roof vents, as manufactured by IPS Corporation (formerly Jimco Products, Inc.), or approved equal.

8.02 Primer: Shall be UCSC's Solargain, a water based low solids, resin rich primer to achieve superior adhesion and penetration as supplied by UCSC Ltd. or approved equal.

8.03 Sprayed polyurethane foam: UCSC Durazone SFC II 2.7 pcf is a two-component liquid applied, spray polyurethane foam supplied by UCSC Ltd. or approved equal. Foam thickness shall be a minimum of two (2) inches thick. Application shall result in a high quality rigid polyurethane foam and shall conform to the following minimum physical properties:

8.04

<u>PHYSICAL PROPERTY</u>	<u>TEST UNIT</u>	<u>VALUE</u>	<u>TEST METHOD @ 76°F</u>
In Place Density:	lb/ft ³	2.7	ASTM D-1622
"K" Factor (initial):	Btu/hr/ft ² /°F/in	0.16	ASTM C-177
Closed Cell Content:	%	>92	ASTM D-2856
Water Absorption:	lbs/ft ³	.04	ASTM D-2842
Compressive Strength			
Perpendicular to Rise:	psi	30-35	ASTM C-1621
Parallel to Rise:	psi	50-55	ASTM D-1621
Tensile Strength:			
Parallel to Rise:	psi	65-75	ASTM D-1623
Shear Strength	psi	50 ± 10	ASTM C-273

8.04 Elastomeric roof coating:

A. Shall be Durashield II, a high solids, single-component acrylic polymer exhibiting excellent resistance to abrasion, oils, cleaning compounds, water and chemicals, as supplied by UCSC Ltd. or approved equal.

B. Elastomeric roof coatings shall contain no migratory plasticizers, vegetable oils, marine oils or cementitious materials. Use of non-elastomeric resins is not permitted.

C. The coating materials shall meet the following minimum physical properties:

DURASHIELD II

Color:	White	
Theoretical Coverage DFT:	9-10 dry mils/100 sq. ft.	
Solids by Weight:	68% ± 1	ASTM D-1644
Solids by Volume:	60% ± 2	ASTM D-2697
Weight per gal. (approx.):	12.0 lbs	
Viscosity (cps):	110-117 KU ± 2	ASTM D-562
Permeability:	39 US perms ± 3	ASTM D-1653 A
Hardness:	Shore A: 45	ASTM D-2240
Flash Point:	No flash to boiling	ASTM D-93
Tensile Strength:	250-psi ± 5	ASTM D-2370
Elongation:	150% ± 5	ASTM D-2370
Impact Resistance:	160 in./lb	ASTM D-2794
Adhesion:	4.15 pli ± .2 (Peel strength on Foam)	ASTM D-794-D-
903 Tear Resistance:	88 lbf/in ± 3	ASTM D-624
Service Temperature:	-40° to 200°f	
Solar Reflectivity (White):	80.65% (Initial)	ASTM E903

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Solar Emittance (White):	0.90 (Initial)
Dirt pick-up Resistance:	99%
Dry to Touch:	4 hours
Tack Free:	12 hours
Recoat:	12-24 hours
Shelf Life Stability:	12 mo. @ 45°-80°F
Clean Up:	Water
Fire Rating:	UL790 Class A, Combustable Deck Class B, UL File #R13137

NOTE: UNDERWRITERS LABORATORIES ON FIRE TEST ONLY. NO SUBSTITUTES OR EQUAL TO BE CONSIDERED.

PART 9 - CONDITION OF SURFACE

9.01 Surface preparation - General

- A. Any roof deck that is to receive sprayed urethane foam shall be securely fastened to the building structure.
- B. Remove any contaminants that will interfere with total adhesion of the sprayed urethane foam to the substrate. Surface shall be free of loose particles, rust, scale, grease, dirt, latience, or other contaminants.
- C. Priming of substrate is necessary. All surfaces to receive foam must be primed with UCSC Solargain.

9.02 Surface preparation - Concrete

- A. Concrete surfaces must be free of form oil or form release agents.
- B. Excessive grease or oil other than form oil must be removed by use of a proper chemical solvent. Other loose dirt or contaminants may be removed by use of air jet, vacuum equipment, hand or power broom. Washing with tri-sodium phosphate solution may be employed if deck is dry prior to application of sprayed polyurethane foam.
- C. Taping may be required prior to application of sprayed urethane foam, if joint opening between matching panels of concrete beams exceeds 1/4". Taping is optional, depending on thickness of foam sprayed-in-place.
- D. If matching edges of pre-cast or pre-stressed panels are offset more than 1/2" special treatment of such a joint may be required.
- E. Lightweight concrete fill shall be generally smooth and sufficiently dense when cured to provide a firm hard surface. Loose granular finishes are not acceptable.
- F. Prime with Solargain the rate of one (1) gal. per 200 sq. ft.

9.03 Surface preparation - Metal

- A. If free of rust or loose scale, surface may be cleaned by use of air jet, vacuum equipment, hand or power broom to remove loose dirt.
- B. Grease, oil or other obvious contaminants must be removed by a proper chemical solvent.
- C. Metal surfaces having loose scale or rust must be cleaned in accordance with Steel Structure Painting Council Bulletin SP63 Commercial Blast Cleaning.
- D. Priming of substrate is necessary. All surfaces to receive foam must be primed with Solargain at the rate of one (1) gal. per 200 sq. ft.
- E. A thermal barrier may be required under the foam insulation to satisfy insurance or code requirements. Refer to specific local codes. If deemed necessary, add the following:*

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1. Steel decks shall have one layer of 1/2" thick type X gypsum board thermal barrier attached prior to the application of the foam insulation. All gypsum boards shall be mechanically fastened to the metal roof deck.
2. Fasteners shall be Dekfast #14's, 1 1/4" and coated with corrosion inhibitors. All fasteners are to be installed with a 2-3 inch steel, 26 gauge, galvanized plate. Minimum fastening pattern shall be one fastener and plate every four sq. ft. For a list of approved mechanical fasteners, see the latest edition of the Factory Mutual Approval Guide. Apply in pattern and spacing appropriate to materials and fasteners used as recommended by the manufacturer.
3. If gypsum board is used, one gal. per 200 sq. ft. of Solargain should be applied as moisture protection and primer.

NOTE: *The use of a high tensile mastic tape over the metal flutes may be acceptable if insurance or code requirements do not prevail.

9.04 Surface preparation – Wood surfaces

- A. Plywood joints in excess of 1/4" shall be taped or filled prior to application of sprayed urethane foam.
- B. T & G materials must be overlaid with a minimum of 1/4" thick plywood sheathing or other acceptable flat sheet material.
- C. The deck shall be dry and free of loose dirt, grease, oil and other contaminants.
- D. Loose dirt can be removed by use of air jet, vacuum, hand or power broom. No washing permitted.
- E. Grease, oil or other contaminants must be removed by use of proper chemical solvents.
- F. Priming of substrate is necessary. All surfaces to receive foam must be primed with Solargain at the rate of one (1) gal. per 200 s.f

9.05 Surface preparation – Existing asphalt or coal tar built-up roof systems

- A. Remove all existing non-embedded gravel or slag surfacing material by means of stiff bristle street brooms or powered mechanical sweepers: gravel or slag materials shall be hauled from the job site. Suitable trash chutes shall be used to convey existing roofing materials from roof level to ground.
- B. Roof shall be examined for areas where cold application materials may have been applied. Where these materials are present in excessive amounts, such as puddles or mounds, these materials shall be removed down to the existing roofing felts.
- C. Remove dirt and dust from existing roof surface by means of air jet or power vacuum. No washing will be permitted without prior approval. A broom swept clean surface is acceptable.
- D. Cut and repair all blisters and water saturated areas prior to application on sprayed polyurethane foam.
- E. The existing roof shall be examined for spongy insulation and/or water saturation. Depending upon conditions revealed by inspection, such areas shall be thoroughly dried or removed and replaced prior to application of sprayed polyurethane foam.
- F. Examine mounting or support members by removal, if necessary, of roof mounted mechanical equipment, such as air conditioners, evaporative coolers, fans, ducts, pipes, etc. If wood skids are utilized as support members for existing mechanical equipment, check for dry rot and replace with redwood. All such roof-mounted equipment shall be given specific consideration for proper application of sprayed polyurethane foam and elastomeric roof coating. Wood skids and support members shall not be encapsulated in the roofing system.
- G. Roof moisture/vapor vents shall be installed at the rate of one per 500-1,000 sq. ft. depending upon
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moisture content in the existing substrate and BUR. Cut a 3" to 4" vent hole extending through all insulation and roofing membrane to deck then attach vent to roof surface prior to application of the sprayed urethane foam: If there is a vapor barrier, leave it intact.

H. Existing asphaltic material on top of parapet walls and around scuppers is to be removed a minimum of 3 inches from the perimeter.

I. Priming of substrate is necessary. All surfaces to receive foam must be primed with Solargain at the rate of one (1) gal. per 200 sq. ft..

PART 10 - APPLICATIONS

10.01 PRIMING OF SURFACES:

A. Prime all surfaces with Solargain at the rate of one (2) gal. per 200 sq. ft.

10.02 Sprayed polyurethane foam:

A. Sprayed polyurethane foam shall be metered to material supplier specifications through proportioning equipment, which provides thermostatically controlled material temperatures. Hoses between the proportioner and spray gun shall be temperature controlled. Nominal polyurethane foam thickness shall be a minimum of two (2) inches. Foam shall be applied in no less than 1/2" passes. Additional foam may be required to provide positive drainage and a smooth consistent transition to the roof edge.

B. Complete foam thickness shall be achieved on any section of the roof during the same day. All foam shall receive a base coat application during the same day.

C. Foam normally shall not be applied when the measured roof deck temperature is below 40°F or above 120°F (refer to foam manufacturer's technical datasheets on specific cold and warm weather foam requirements). Foam shall not be applied when the relative humidity is above 85%. Foam shall not be applied when wind velocities exceed 12 miles per hour, as measured by a wind velometer, unless suitable wind barriers are employed. Foam shall not be applied to any surface where visible moisture is present or, that when tested with a moisture meter, registers a reading greater than ten (10) percent. No foam shall be applied to a roof deck if the deck temperature is within five (5°F) degrees of the dew point. Roofing contractor shall provide all equipment to check weather conditions and shall maintain a daily weather log during the project to be submitted with warranty request.

D. Surface texture of the installed foam shall range from a smooth to medium coarse "orange peel" finish. Surface textures which may be defined as "popcorn" or "tree bark" are not acceptable and must be re-sprayed.

E. Filleting of the foam to parapet walls, vents, skylights, roof mounted equipment, etc., shall provide a relatively smooth transition to the roof deck, shall be of uniform cross-section thickness and shall meet all other foam surface texture requirements.

F. All areas, which fail to meet specification requirements with respect to thickness, foam quality, etc. shall be repaired and re-sprayed at the expense of the contractor.

G. Application of spray foam shall not commence during inclement weather or when precipitation is imminent. Area shall be kept clear of traffic from other trades during and for twenty-four hours after completion of application.

H. Mask off metal, brick, fascias and other surfaces not to receive foam. Provide all procedures or means as required to prevent damage from fugitive over spray of the polyurethane foam insulation. Caution shall be taken to protect those areas not to receive spray foam, including vehicles located nearby.

10.03 Elastomeric roof coating:

- A. The Durashield II acrylic coating shall be applied in three (3) separate coats by spray or roller at the rate sufficient to achieve the minimum mill thickness requirements for the 10 year No Leak warranty (actual coverage will depend upon surface texture of the polyurethane foam insulation). The topcoat shall be allowed to cure a minimum of 72 hours without foot traffic.
- B. Each coat shall be allowed to cure a minimum of 12 hours (depending upon drying conditions) before proceeding with successive coats. Second and successive coats must be applied within 48 hours to insure good adhesion.
- C. The new nominal coating thickness of the final dry film protective elastomeric acrylic coating system shall be a minimum of 28 mils with 30 mils average for the ten (10) year no-leak warranty.
- D. Edges of the roof shall be pre-coated in a "picture framing" fashion so as to have at least one more additional coat than the field of the roof.
- E. Mask off metal and other surfaces not to receive coating.
- F. Refer to manufacturer's Application Instructions and Limitations/Precautions section of the technical datasheet for specific details on:
1. Mixing.
 2. Recommended spray equipment.
 3. Spray techniques.
 4. Cold and hot temperature precautions during application.
- G. All foam is to be coated. Coating shall be extended up and over all foam or vent pipes and terminate a minimum of two (2) inches above the foam creating a self-terminating flashing.
- H. If foam is exposed in excess of three (3) days and additional foam thickness is necessary, or surface oxidation has occurred prime with Solargain primer at a rate of one (1) gal. per 200 sq. ft.

10.04 Roofing granules:

- A. Roofing granules or a reinforced polyester mesh shall be installed around all mechanical equipment at least six (6) feet out as follows:
1. Apply an additional coat of acrylic coating at the rate of 1-1/2 gal. per 100 sq. ft.
 2. Broadcast grade 11 roofing granules at a rate of 50 lbs per 100 sq. ft. or lay down the reinforced polyester mesh while the coating is in a fluid condition.
 3. Seal granules or polyester mesh in by applying additional coating at the rate of 3/4 gal. per 100 sq. ft.

10.05 Coating for maintenance:

- A. The Roofing Contractor shall leave with the building owner for purposes of maintenance one (1) gal. of the single-component acrylic polymer top coat with manufacturer's Application Instructions and Precautions label attached thereto.

PART 11 – CLEAN UP

- 11.01 Clean all excess materials from roof area and job site. – End of Section