

NOTE: Segment from the SUPER THERM Standard Specification regarding durability and adhesion testing. See: 2.4, 6.2, 6.4, 6.5, 6.6, 6.9, 6.10, 6.12, 6.16, 6.17, 6.18, and 6.19

Standard Specifications for Liquid Applied Insulation Coating

1. Scope

- 1.1 This scope covers a liquid-applied water-dispersed urethane/acrylic blend coating used for insulation of roofs, attic spaces, wall voids, exterior walls, flooring, and interior walls and ceilings.
- 1.2 This specification does not provide guidance for application.
- 1.3 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.
- 1.4 This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

2. Referenced Documents

2.1 ASTM Standards:

B 117 / D 1654 Test and Evaluation Method for 450 Hour Salt Spray (Fog)
C 236-89(93) Test Method for Steady-State Thermal Performance of Building Assemblies by Means of a Guarded Hot Box
C 411 Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation
D 412 Test Method for Tensile Properties of Fiber-Resin Composites
D 522 Test Method for Mandrel Bend Test of Attached Organic Coatings
D1653 Test Method for Water Vapor Permeability of Organic Coatings
D3273-82T Test Method for Determination of Fungal Resistance
D4060 Test Method for Resistance to Abrasion of Organic Coatings
E 84-89a Test Method for Surface Burning Characteristics of Building Materials
E 96 Test Method for Determination of Water Vapor Transmission (WVT)
E 108-00 Test Method for Approval Standard for Class 1 Roof Cover (2-12 Pitched)
E 903-96 Test Method for Solar Absorption, Reflectance and Transmittance of Materials Using Integrating Spheres
E 1269 Test Method for Heat Capacity by Differential Scanning Colorimeter
E 1461(92) Test Method for Thermal Diffusivity/Conductivity by Flash Method
G 53 Test Method for Visual Effects of UV Exposure

2.2 NASA (National Aeronautics and Space Administration) Testing:

NASA STD 6001 Test 1 (formerly NHB 8060.1B/C Test 1) Test Method for Flammability
NASA STD 6001 Test 7 (formerly NHB 8060.1C Test 7) Test Method for Toxic Off-Gassing

2.2 ABS (American Bureau of Shipping), IMO (International Maritime Organization), and US Coast Guard:

IMO A. 653 (16) Test Method for Flame Spread
MSC 41 Test Method for Smoke Toxicity

2.3 JIS (Japanese Institute of Standards):

JIS A 5759 Test Method for Sunshine Reflective Ratio and Long Wave Radiation Ratio

2.4 *China Center for Technical Testing:*

GB/T 1771-91 Test Method for Salt Fog (2000 Hours)

GB/T 1866-88 Test Method for Manuel Aging (2000 Hours)

GB/T 10834-88 Test Method for Resistance to Salt Water (1000 Hours)

GB/T 5210-85 Test Method for Adhesion (pulling apart method)

GB/T 1733-93 Test Method for Boiling Water Immersion (8 Hours)

3. Packaging and Materials

3.1 Shipping containers shall be marked with the name of the material and the batch number identifying the particular batch from which the product was made and the date.

4. Materials and Manufacture

4.1 *Composition-* The product, as manufactured, shall be in liquid form for application by brushing, rolling, or spraying. The product shall be composed of a water-dispersed urethane/acrylic blend, to which various pigments and other additives have been added to give the required physical properties.

5. Liquid and Physical Properties

5.1 Although the product is supplied as a liquid, its performance is based on the functional properties of the dried material in film form. The coating is formed into a film fully adhered to the substrate surface.

5.2 *Liquid Property Requirements-* The liquid coating shall comply with the property requirements in Table 1.

5.3 *Film Physical Property Requirements-* Specimen preparation (dry time) films are prepared by applying 2 coats at 8 mils wet each coat, with a minimum of a 4 hour drying period between coats to the testing substrate to give a total dry maximum thickness of 10 dry mils, plus or minus 1 mil. The film is allowed to dry at 70° F (21.1° C) for a period of 21 to allow for complete drying. (see Table 2)

TABLE 1 Liquid Property Requirements

Physical Property	Requirement
Viscosity	105-110 KU
Volume by Solids	65-70%
Volume by Weight	60-65%

6. Test Methods

6.1 *Viscosity-* Canon LV2000 Viscometer No.4 spindle, 12 RPM.

6.2 *Salt Spray (Fog) Testing-* (Test Method B 117):

6.2.1 Test methods: 95° ± 4.8° F (35° ± 1.8° C) Chamber Temperature.

6.2.2 5% ± 1% Salt Solution

6.2.3 6.9 pH

6.2.4 1.4 ml/hour

6.2.5 Total Exposure: 450 Hours

6.3 Steady State Thermal Performance of Building Assemblies by Means of a Guarded Hot Box

(Test Method C 236-89):

6.3.1 Test methods: 70.5° F (21.39° C) average *Room Side* air temperature

6.3.2 0.1° F (17.72° C) average *Weather Side* air temperature

6.3.3 73.1° F (22.83° C) average *Guard Box* air temperature

6.3.4 12% RH

6.3.5 14.3 mph (23.0 kilometers per hour)

- 6.3.6 0.00 "H₂O Static Pressure Difference Across Specimen
- 6.3.7 Cut specimen measuring 48 in. (1218.2) long by 24 in. (609.6mm) wide \pm 10%
- 6.4 *Hot Surface Performance of High-Temperature Thermal Insulation* (Test Method C 411)
 - 6.4.1 Test methods: 296.6° F (147° C) \pm 14.8° F (7.35° C)
 - 6.4.2 96 Hours
- 6.5 *Tensile Strength* (Test Method D 412):
 - 6.5.1 Test methods: 78° \pm 3.9° F (25.5° \pm 2.5° C) at 45% RH
 - 6.5.2 Cut specimen measuring 4.5 in. (114.3 mm) long by .24 in. (6.147 mm) wide \pm 10%.
 - 6.5.3 *Test Type or Functional Equivalent:*
 - Cross Head Speed 20 in./min (508mm/min)
 - Die D and 2 in. (50.8mm) initial jaw separation.
- 6.6 *Mandrel Bend Test of Attached Organic Coatings* (Test Method D 522):
 - 6.6.1 Test methods: 2 specimens on smooth surface
 - 6.6.2 6 mandrel sizes ranging from 1/4 in. (6.35mm) to 1 in. (25.4mm)
- 6.7 *Water Vapor Permeability of Organic Coatings* (Test Method D 1653)
 - 6.7.1 Test methods: 75° \pm 3.75° F (23.89° \pm 1.19° C) at 50% RH
 - 6.7.2 3 specimens
 - 6.7.3 24 hour cycle
 - 6.7.4 Method A, Condition B
- 6.8 *Mold and Fungal Resistance* (Test Method D 3273 82T)
 - 6.8.1 Test method: 90 \pm 2° F (32.22 \pm .64° C) at 95-98% RH
 - 6.8.2 Soil contained *Aspergillus niger*, *Aspergillus oryzae*, and an unknown species of *Penicillium*
 - 6.8.3 Exposed in chamber 5 ½ weeks
- 6.9 *Abrasion Resistance of Organic Coatings by the Tabor Abraser* (Test Method D 4060)
 - 6.9.1 Test method: 2 specimens painted on metal disks
 - 6.9.2 3,000 cycles
 - 6.9.3 CS 17 wheel size
 - 6.9.4 1,000 grams load on wheels
- 6.10 *Surface Burning Characteristics of Building Materials* (Test Method E 84-89a)
 - 6.10.1 Test method: Coating applied to glass reinforced cement board at 10 dry mils
 - 6.10.2 24 in. (609.6mm) wide by 24 ft. (7.32 meters) long specimen size
 - 6.10.3 73° F (22.8° C) at 50% RH specimen conditioning time
- 6.11 *Water Vapor Transmission* (Test Method E 96)
 - 6.11.1 Test method: Water Method – Three Specimens
 - 6.11.2 90° F (32.2° C) at 50% RH for 24 hours
 - 6.11.3 0.5 RH in chamber, 1 RG in cup
- 6.12 *Flame Spread on Metal Panels* (Test Method E 108-00)
 - 6.12.1 Test method: 2 in 12 slope
 - 6.12.2 2 - 3.33 ft (1.0 meter) wide by 8 ft (2.4 meters) long standard metal panels used
 - 6.12.3 Applied 16 mils wet, 10 mils dry, allowed to cure 28 days
 - 6.12.4 12 \pm 0.5 mph (5.3 \pm 0.2 m/s) wind velocity
 - 6.12.5 1400° \pm 50° F (760° \pm 28° C) for Class A test
- 6.13 *Solar Absorption, Reflectance and Transmittance of Materials Using Integrating Spheres* (Test Method E 903-96)
 - 6.13.1 Test method: Beckman 5240 Spectrophotometer
 - 6.13.2 Reflectance measurements obtained from 2500nm to 300nm at a 15 degree incident angle
 - 6.13.3 Integrated against Air Mass 1.5 global spectrum utilizing 109 weighted ordinates
 - 6.13.4 3 specimens used
- 6.14 *Heat Capacity by Differential Scanning Colorimeter* (Test Method E 1269)
 - 6.14.1 Test method: Perkin-Elmer Model DSC-2 Differential Scanning Colorimeter
 - 6.14.2 Sapphire as reference material
 - 6.14.3 1.28cm long by 1.28cm wide by .084cm standard metal test plates
 - 6.14.4 5 specimens used
- 6.15 *Thermal Diffusivity/Conduction by Flash Method* (Test Method E 1461-92)
 - 6.15.1 Test method: Laser Flash Diffusivity Technique
 - 6.15.2 Half time value corrected by using the Cowan Correction procedure.

- 6.15.3 TWOLA or THRLA computer program used
- 6.15.4 Korad K2 laser
- 6.15.5 5 specimens used
- 6.16 *Visual Effects of UV Exposure* (Test Method G 53)
 - 6.16.1 Test Method: 1000 Hours
 - 6.16.2 9in (22.86cm) by 3in (7.62cm) standard test plates
 - 6.16.3 3 specimens used
 - 6.16.4 Exposed to UV, elevated temperature and humidity
- 6.17 *Upward Flame Propagation* (Test Method NASA STD 6001 Test 1)
 - Formerly NASA NHB 8060.1B/C Test 1
 - 6.17.1 Test Method: Complete combustion in chamber
 - 6.17.2 2.5in (6.35cm) by 12in (30.48cm) standard test plates
 - 6.17.3 3 specimens used
 - 6.17.4 30%, 34%, and 40% oxygen at 10.2psia (pounds/square inch absolute)
 - 6.17.5 3000 J (Joules) for 25 seconds
 - 6.17.6 No more than 5% relative depletion of oxygen concentration
- 6.18 *Toxic Off-gassed Products* (Test Method NASA STD 6001 Test 7)
 - Formerly NHB 8060.1C Test 7
 - 6.18.1 Test method: Controlled temperature test chamber and analytical instrumentation
 - 6.18.2 Toxic Hazard Index (T) values must be less than 0.5
 - 6.18.3 $120^{\circ} \pm 5^{\circ} \text{ F}$ ($248^{\circ} \pm 3^{\circ} \text{ C}$) Test Temperature
 - 6.18.4 2276.87 lbs (1032.77kg) Maximum Limit Weight
- 6.19 *Flame Spread* (Test Method IMO A.653 (16))
 - 6.19.1 Test method: Non-Impinging Pilot Flame
 - 6.19.2 6.02in (153mm) by 31.46in. (799mm) standard test plates
 - 6.19.3 3 specimens used
 - 6.19.4 6.81 MJ/m² Heat of Ignition
 - 6.19.5 Heat of Sustained Burning at 150mm, 200mm, 250mm, 300mm, 350mm, 400mm
- 6.20 *Toxic Gas Generation at 25 KW/m² and 50 KW/m²* (Test Method MSC.41 (64))
 - 6.20.1 Test method: Smoke Chamber using Colorimetric Gas Detector Tubes
 - 6.20.2 61° F (16.1° C) Ambient Temperature, 44 RH
 - 6.20.3 30.20 Inches of Mercury for Barometric Pressure
- 6.21 *Sunshine Reflective Ratio* (Test Method JIS A 5759) (Japanese Industrial Standard)
 - 6.21.1 Test method: Film for Window 5.3.4 (c) for Light Reflectivity Ratio and Long Wave Radiation
 - 6.21.2 Tested July 1-August 31st and January 1-February 28th
 - 6.21.3 Monitored interior temperatures and intruding calories