

Coating Materials, Fluorocarbon (FKM) Elastomeric

RATIONALE

Revision C was issued in 1999 and a review was needed. There was a desire to incorporate the slash sheets into the basic document.

1. SCOPE

1.1 Form

This specification covers fluorocarbon (FKM) elastomeric coating materials for fiber-reinforced-resin composite structures in the form of two-component brushable or sprayable liquids.

1.2 Application

These products have typically been used for protection of aircraft and missile radomes and other components from rain erosion, aerodynamic heating, precipitation static build-up, thermal flash exposure, and weathering, but usage is not limited to such applications.

1.3 Classification

Coating materials covered by this specification are classified as follows (see 8.5):

Type I Base coating
Type II Antistatic topcoating

Class 1 Black
Class 2 White (with thermal-flash resistance)
Class 3 Color-matched

1.4 Safety - Hazardous Materials

While the materials, methods, applications, and processes described or referenced in this specification may involve the use of hazardous materials, this specification does not address the hazards which may be involved in such use. It is the sole responsibility of the user to ensure familiarity with the safe and proper use of any hazardous materials and to take necessary precautionary measures to ensure the health and safety of all personnel involved.

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2. APPLICABLE DOCUMENTS

The issue of the following documents in effect on the date of the purchase order forms a part of this specification to the extent specified herein. The supplier may work to a subsequent revision of a document unless a specific document issue is specified. When the referenced document has been cancelled and no superseding document has been specified, the last published issue of that document shall apply.

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

AMS 2825	Material Safety Data Sheets
AMS 3609	Plastic Sheet, Methyl Methacrylate, Heat-Resistant
AMS 3831	Cloth, Type "E" Glass, "B" Stage Epoxy-Resin-Impregnated, 7781 Style Fabric, Flame Resistant, Improved Strength
AMS 3844	Cloth, Type E-Glass, Style 7781 Fabric, Hot-Melt, Addition-Type, Polyimide Resin Impregnated
AMS 3849	Cloth, Quartz, Style 581 Fabric, Hot-Melt, Addition-Type, Polyimide Resin Impregnated

2.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM D 471	Rubber Property - Effects of Liquids
ASTM D 1193	Reagent Water
ASTM D 1296	Odor of Volatile Solvents and Diluents
ASTM D 1475	Density of Paint, Varnish, Lacquer, and Related Products
ASTM D 1644	Nonvolatile Content of Varnishes
ASTM D 1824	Apparent Viscosity of Plastisols and Organosols at Low Shear Rates by Brookfield Viscometer
ASTM D 3960	Volatile Organic Compound (VOC) Content of Paint and Related Coatings

2.3 U. S. Government Publications

Available from DODSSP, Subscription Services Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094, or www.assistdocs.com.

FED-STD-595	Color
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3. TECHNICAL REQUIREMENTS

3.1 Material

Coating material shall be pigmented, chemically room-temperature-curing fluoroelastomeric compositions with appropriate curing agents, in kit form, formulated to meet the requirements of 3.2.

3.1.1 Toxicity and Air Quality Compliance

Coating material shall have no adverse effect on the health of personnel when used for its intended purposes and applied in approved facilities with the use of approved safety equipment. Coating material shall also meet the requirements of the cognizant Air Quality Authority for the locality in which the coating material is applied.

3.1.2 Accelerated Storage Stability

Coating material components, stored uncatalyzed for 4 days $\pm$ 0.1 at 50 °C $\pm$ 1 (122 °F $\pm$ 2) in an unopened original container, shall be free from lumps, skins, and gels, and shall disperse readily to smooth, homogeneous mixtures.

3.1.3 Long-Term Storage Stability

Coating material components shall meet the requirements of this specification after being stored for one year at 20 to 38 °C (68 to 100 °F) in an unopened original container.

3.1.4 Color

Shall be per the applicable Class, and of sufficient intensity to hide completely the surface of the substrate when applied at the specified coating thickness. Class 3 coatings shall be color-matched to the purchaser-specified FED-STD-595 color standard or purchaser supplied color standard, as applicable.

3.1.5 Primer

A primer (for promoting adhesion) shall be used prior to application of the Type I coatings when recommended by the manufacturer. Coating material and primer shall meet requirements of this specification when used according to manufacturer's instructions.

3.2 Properties

The product shall conform to the following requirements:

3.2.1 Mixed, Uncured Coating Materials

Shall meet the following requirements after mixing as in 4.5.1:

3.2.1.1 Nonvolatile Content

Shall be greater than or equal to 10% by weight, determined in accordance with ASTM D 1644, Method A.

3.2.1.2 Weight Per Unit Volume

Shall be greater than or equal to 7.6 pounds per gallon (0.91 kg/L), determined in accordance with ASTM D 1475.

3.2.1.3 Viscosity

Shall be 20 to 1000 centipoise (0.02 to 1.00 Pa·s) at 23 °C $\pm$ 0.5 (73 °F $\pm$ 1) but shall not vary from the preproduction value by more than $\pm$ 150 centipoise ($\pm$ 0.15 Pa·s), determined in accordance with ASTM D 1824 using a Model LVF Viscometer and No. 2 spindle. Preproduction value shall be recorded for future test verification.

3.2.1.4 Odor

The odor of the wet coatings shall not be obnoxious when tested in accordance with ASTM D 1296.

3.2.1.5 Pot Life

When mixed in accordance with manufacturer's instructions, coating materials stored at 20 to 30 °C (68 to 86 °F) shall have a minimum pot life of 4 hours. At the end of 4 hours, the coating materials shall show no evidence of lumping, seeding, or separation, shall meet the viscosity requirements of this specification, and shall dilute readily to a viscosity suitable for application by spraying.

3.2.1.6 Volatile Organic Compound (VOC) Content

Shall be no greater than 850 g/l when mixed and thinned to spraying consistency. Testing shall be in accordance with ASTM D 3960.

3.2.2 Application Properties

Coating materials, mixed as in 4.5.1 and applied in accordance with manufacturer's instructions, shall meet the following requirements:

3.2.2.1 Recoat Time

Rate of cure or drying of the coating shall be such that recoat time, after which a subsequent coat may be applied without solvent softening or damage to undercoats, shall be 30 minutes or less.

3.2.2.2 Tack-Free Time

Shall be 4 hours or less, as shown by no evidence of removal of the film, determined in accordance with 4.5.3.

3.2.2.3 Final Cure Time

Shall be no greater than 240 hours at $24\text{ }^{\circ}\text{C} \pm 2$ ($75\text{ }^{\circ}\text{F} \pm 4$).

3.2.3 Cured Coating Properties

Coating materials, mixed as in 4.5.1, applied in accordance with manufacturer's instructions, and cured for 7 to 10 days at $24\text{ }^{\circ}\text{C} \pm 2$ ($75\text{ }^{\circ}\text{F} \pm 4$), shall meet the following requirements. Application of antistatic topcoating material over not-fully-cured base material shall not retard or inhibit curing of either the base coating or the antistatic topcoating.

3.2.3.1 Peel Strength

Shall be greater than or equal to 5 pounds force per inch width (876 N/m), determined in accordance with 4.5.4.

3.2.3.2 Fluid Resistance

Coatings shall show no leaching of pigment, loss of adhesion, blistering, or discoloration and shall meet the peel strength requirements of 3.2.3.1 after being immersed as in 3.2.3.2.1 and 3.2.3.2.2, determined in accordance with 4.5.5. Peel testing shall be performed in accordance with 4.5.4 within 1 hour after removal from fluid.

3.2.3.2.1 Immerse in ASTM D 1193, Type IV, water at $38\text{ }^{\circ}\text{C} \pm 1$ ($100\text{ }^{\circ}\text{F} \pm 2$) for 4 days ± 0.1 .

3.2.3.2.2 Immerse in ASTM Reference Fuel B (ASTM D 471) at $24\text{ }^{\circ}\text{C} \pm 2$ ($75\text{ }^{\circ}\text{F} \pm 4$) for 24 hours ± 1 .

3.2.3.3 Heat Resistance

Coatings shall show no evidence of melting, erosion, cracking, crazing, or other film deterioration, determined in accordance with 4.5.9.

3.2.3.4 Weather and Rain-Erosion Resistance

Coatings produced on specimens and exposed six months in accordance with 4.5.11 shall exhibit no peeling or blistering, or loss of rain erosion resistance when tested in accordance with 4.5.6. The average time to erode through the full thickness of this material shall be greater than 80 minutes for each specified condition.

3.2.3.5 Electrical Transmission

Shall be determined in accordance with 4.5.7. The electrical transmission shall be greater than 90% of the uncoated panel for each specified condition.

3.2.3.6 Surface Resistivity

Shall be determined in accordance with 4.5.8 for Type II coatings only. The surface resistivity of panels coated with this material shall be not less than 0.5 nor more than 15 megohms per square.

3.2.3.7 Thermal Flash Resistance

Shall be determined in accordance with 4.5.10 for Class 2 coatings only. The coating shall not burn or char. Discoloration of the coating is acceptable.

3.3 Quality

3.3.1 The coating components shall be uniform in quality and condition, homogeneous, and free from foreign material that would alter their use or function.

3.3.2 The applied coatings shall be smooth, continuous, uniform in thickness, and free from pinholes, cracks, bubbles, and other film imperfections.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The manufacturer of the coating material shall supply all samples and shall be responsible for the performance of all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the coating material conforms to specified requirements.

4.2 Classification of Tests

4.2.1 Preproduction Tests

Tests for all technical requirements are preproduction tests and shall be performed prior to or on the initial shipment of a product to a purchaser, when a change in ingredients and/or processing requires reapproval as in 4.4.2, and when purchaser deems confirmatory testing to be required. See Table 1 for the list of requirements.

4.2.2 Acceptance Tests

Acceptance tests shall be performed on each lot of material. See Table 1 for the list of requirements.

TABLE 1

Requirement	Paragraph Reference	Preproduction	Acceptance
Accelerated Storage Stability	3.1.2	X	X
Nonvolatile Content	3.2.1.1	X	X
Weight per Unit Volume	3.2.1.2	X	X
Viscosity	3.2.1.3	X	X
Odor	3.2.1.4	X	X
Pot Life	3.2.1.5	X	X
Recoat Time	3.2.2.1	X	
Tack Free Time	3.2.2.2	X	X
Peel Strength	3.2.3.1	X	X
Fluid Resistance	3.2.3.2	X	
Heat Resistance	3.2.3.3	X	
Rain Erosion Resistance	3.2.3.4	X	
Electrical Transmission	3.2.3.5	X	
Surface Resistivity (Type II)	3.2.3.6	X	X
Thermal Flash Resistance (Class 2)	3.2.3.7	X	