

MIL-C-27725B (ASG)

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## MILITARY SPECIFICATION

COATINGS, CORROSION-PREVENTIVE, FOR AIRCRAFT INTEGRAL  
FUEL TANKS

This specification has been approved by the Department of the Air Force and by the Naval Air Systems Command.

## 1. SCOPE

1.1 Scope. This specification covers two types and two classes of coatings to be used for the protection of aircraft fuel tanks against corrosion from fuel contaminants.

1.2 Classification. The corrosion-preventive coatings covered by this specification shall be of the following types and classes, as specified (see 6.2).

Type I. A one-part-formulation polyurethane coating.

Type II. A two-part-formulation polyurethane coating.

Class A. General use. (Use in areas where air pollution regulations do not exist.)

Class B. Limited use.

## 2. APPLICABLE DOCUMENTS

2.1 The following documents, of the issue in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein:

SPECIFICATIONSFederal

QQ-A-250/12	Aluminum Alloy 7075, Plate and Sheet
QQ-B-613	Brass, Leaded and Non-Leaded: Flat Products (Plate, Bar, Sheet, and Strip)
TT-E-751	Ethyl Acetate, Technical
TT-I-735	Isopropyl Alcohol
TT-M-261	Methyl-Ethyl-Ketone (For Use in Organic Coatings)
TT-N-97	Naphtha, Aromatic

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TT-S-735	Standard Test Fluids; Hydrocarbon
TT-T-548	Toluene; Technical
CCC-C-419	Cloth, Cotton, Duck Unbleached, Plied-Yarn (Army and Numbered)
PPP-B-636	Box, Fiberboard
PPP-C-96	Cans, Metal, 28 Gage and Lighter

Military

MIL-C-5541	Chemical Films and Chemical Film Materials for Aluminum and Aluminum Alloyz
MIL-H-5606	Hydraulic Fluid, Petroleum Base, Aircraft, Missile, and Ordnance
MIL-L-7808	Lubricating Oil, Aircraft Turbine Engine, Synthetic Base
MIL-A-8625	Anodic Coatings, for Aluminum and Aluminum Alloys
MIL-S-8802	Sealing Compound, Temperature- Resistant, Integral Fuel Tanks and Fuel Cell Cavities, High Adhesion

STANDARDSFederal

Test Method Std. No. 141	Paint, Varnish, Lacquer, and Related Materials. Methods of Inspection, Sampling, and Testing
Test Method Std. No. 791	Lubricants, Liquid Fuels, and Related Products. Methods of Testing

Military

MIL-STD-129	Marking for Shipment and Storage
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PUBLICATIONSU.S. Air Force

Specification Bulletin No. 535	Free Dithiocyanate Test Method
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(Copies of specifications, standards, drawings, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Other publications.— The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

American Society for Testing and Materials

ASTM D 257	Electrical Resistance of Insulating Materials
ASTM D 823	Producing Films of Uniform Thickness of Paint, Varnish, Lacquer, and Related Products on Test Panels
ASTM D 2267	Method of Test for Aromatics in Light Naphthas, Reformates, and Gasolines by Gas Chromatography

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race St., Philadelphia, Pennsylvania 19103.)

### 3. REQUIREMENTS

3.1 Qualification.— Coatings furnished under this specification shall be products which are qualified for listing on the applicable qualified products list at the time set for opening of bids (see 4.3 and 6.3).

#### 3.2 Materials.—

3.2.1 Type I.— The coating shall be a one-component polyurethane prepolymer material which cures or polymerizes by reaction with atmospheric moisture. The materials, classes A and B, shall be suitable for application by brush, spray, sash flowcoating, or fill-and-drain techniques.

3.2.2 Type II.— The coating shall be a two-component chemically curing polyurethane prepolymer material. The materials, classes A and B, shall be suitable for application by brushing and spraying.

3.2.3 Types I and II - Class B.— Class B material shall contain only nonphotochemically reactive solvents or thinners. Nonair polluting class B material may be used in areas not having air pollution regulations.

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3.2.3.1 Nonphotochemically reactive solvent.— The nonphotochemically reactive solvent ingredient of class B material shall not exceed any one of the following percentage composition limitations with reference to the total volume of the solvent:

- (a) A combination of hydrocarbons, alcohols, aldehydes, esters, ethers or ketones having an olefinic or cycloolefinic type unsaturation: 5 percent.
- (b) A combination of aromatic compounds with eight or more carbon atoms to the molecules except ethylbenzene: 8 percent.
- (c) A combination of ethylbenzene, ketones having branched hydrocarbon structures, trichloroethylene or toluene: 20 percent.

3.2.4 Thinner.— The thinner used with the class B coatings shall be nonphotochemically reactive as defined in 6.4, and shall be compatible with the coatings.

3.2.5 Toxic products and formulations.— The material shall have no adverse effect on the health of personnel when used for its intended purpose. Questions pertinent to this effect shall be referred by the procuring activity to the appropriate department medical service who will act as an advisor to the procuring agency.

3.3 Physical properties.— The physical properties for both type I and type II materials shall be as specified in table I.

3.4 Coating characteristics.—

3.4.1 Resistance to water.— The cured coatings shall show no blistering, softening, leaching, or corrosion extending more than 1/8 inch beyond the scribe mark or in from the edge of the panel, loss of adhesion, or other visible deleterious effect when tested as specified in 4.7.10.

3.4.2 Resistance to salt water and fuel.— The cured coatings shall show no blistering, softening, leaching, shrinkage, or corrosion extending more than 1/8 inch beyond the scribe mark or in from the edge of the panel, loss of adhesion, or other visible deleterious effect when tested as specified in 4.7.11.

3.4.3 Resistance to engine oil.— The cured coatings shall show no blistering, softening, leaching, shrinkage, loss of adhesion, or other visible deleterious effect when tested as specified in 4.7.12.

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Table I. Physical properties

Property and test conditions	Requirement		Test method references
	Type I	Type II	
Application to a film thickness of 0.5 mils minimum	Brush, spray, or sash	Spray	4.7.2
Surface appearance	Smooth, uniform, and free of film irregularities		4.7.2
Color: Freshly applied	Clear to translucent	Chrome yellow or chromium oxide green	4.7.3
Solvent free	Clear to translucent	Translucent chrome yellow or chromium oxide green	
Weight per gallon, variation from acceptable preproduction sample, percent.	± 5		4.7.4
Nonvolatile content, percent, minimum	40	35	4.7.5
Viscosity, seconds	20 to 35	10 to 20	4.7.6
Application life, hours, minimum	240	8	4.7.7
Drying time, hours, max at standard conditions	2		4.7.8
Cure time, days at standard conditions	14		4.7.9
or days at standard conditions	1		
followed by days at 140°F (60°C) and 50% RH	1		

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3.4.4 Resistance to hydraulic fluid.- The cured coatings shall show no blistering, softening, leaching, shrinkage, loss of adhesion, or other visible deleterious effect when tested as specified in 4.7.13.

3.4.5 Resistance to iron chloride.- The cured coatings shall show no blistering or softening, and the panels shall show no corrosion, when tested as specified in 4.7.14.1. After immersion, the cured coatings shall have a resistance of at least 5.0 megohms per mil of thickness when tested as specified in 4.7.14.2.

3.4.6 Fuel contamination.- The nonvolatile extractable materials contributed by the cured coatings in contact with the jet reference fluid shall be not more than 20 milligrams per 100 milliliters when tested as specified in 4.7.15. Not more than a slight discoloration or tarnish shall be present on a freshly polished copper strip.

3.4.7 Low-temperature flexibility.- The cured coatings shall withstand the low-temperature test specified in 4.7.16 without cracking, checking, crazing, or loss of adhesion.

3.4.8 Sealing compound compatibility.-

3.4.8.1 Sealing compound to coating materials.- Sealing compound conforming to MIL-S-8802, class B-2, applied to the cured coating materials shall have a peel strength of not less than 20 pounds when tested as specified in 4.7.17.1. There shall be no adhesive failure between the coating and the sealing compound except for bubbles and knife cuts.

3.4.8.2 Coating materials to sealing compound.- The coating materials applied to sealing compound conforming to MIL-S-8802, class B-2, shall not cause cracks in the sealing compound when tested as specified in 4.7.17.2. Cracks in the cured coatings shall be permissible, but the cured coatings shall not flake from the sealant.

3.4.9 Reparability.- The cured coatings shall show no blistering or loss of adhesion when tested as specified in 4.7.18.

3.4.10 Resistance to simulated microbial by-products.- The cured coatings shall show no blistering, softening, or shrinkage when tested as specified in 4.7.19. There shall be not more than 5 percent loss of coating when subjected to the tape test. Removal of coating immediately adjacent to the scribe and obviously caused by coating cracking during scribing shall not be cause for rejection.

3.5 Accelerated storage stability.- After storing as specified in 4.7.20, coating material shall be capable of meeting the initial viscosity requirements and the requirements for application life specified in table I.

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3.6 Free diisocyanate.- The free diisocyanate content of the polyurethane shall not be greater than 1.0 percent when tested as specified in 4.7.21.

3.7 Workmanship.- The materials shall be translucent, uniform compounds free of skins, lumps, and gelled or coarse particles.

#### 4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection.- Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the supplier may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.2 Classification of inspections.- The inspection requirements specified herein are classified as follows:

- (a) Qualification inspection (see 4.3).
- (b) Quality conformance tests (see 4.4).

4.3 Qualification inspection.- Qualification inspection shall consist of all examinations and tests specified herein.

4.3.1 Qualification samples.- The test samples shall consist of approximately 2 gallons of material. The material shall be furnished in containers of the type to be used in filling contract orders. Samples shall be identified as follows and forwarded to the activity responsible for testing, as designated in the letter of authorization from the activity responsible for qualification (see 6.3).

Samples for qualification tests  
 COATING, CORROSION-PREVENTIVE, FOR AIRCRAFT INTEGRAL FUEL TANKS  
 Specification MIL-C-27725B(ASG)  
 Manufacturer's code No.  
 Name of manufacturer  
 Submitted by (name)(date) for qualification tests in accordance  
 with the requirements of Specification MIL-C-27735B(ASG) under  
 authorization (reference authorizing letter)  
 Mixing instructions.

4.3.1.1 Test report.- In addition to the qualification test samples, the manufacturer shall furnish a test report showing that the material satisfactorily conforms to this specification.

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4.4 Quality conformance tests. - Quality conformance tests for acceptance of coatings shall consist of the following examinations and tests:

- (a) Application properties.
- (b) Color.
- (c) Weight per gallon.
- (d) Nonvolatile content.
- (e) Viscosity.
- (f) Application life.
- (g) Drying time.
- (h) Cure time.
- (i) Resistance to simulated microbial by-products (using accelerated cure).
- (j) Free diisocyanate.

4.4.1 Sampling. - Unless otherwise specified (see 6.2), not less than 1 quart of coating material shall be selected at random from each lot and subjected to the tests specified in 4.4.

4.4.1.1 Lot. - A lot shall consist of all coating material of a single type and class manufactured during one continuous period of operation, forming part of one contract or order for delivery.

4.5 Toxicological data and formulations. - The supplier shall furnish the toxicological data and formulations required to evaluate the safety of the materials for the proposed use.

4.6 Test conditions.

4.6.1 Standard conditions. - Standard conditions shall be considered as being a temperature of  $77^{\circ} \pm 2^{\circ}$  Fahrenheit (F) ( $25^{\circ} \pm 1^{\circ}$  Centigrade (C)) and a relative humidity of  $50 \pm 5$  percent. All tests shall be conducted at standard conditions unless otherwise specified herein.

4.6.2 Preparation of metal panels. -

4.6.2.1 Description of panels. - Panels required for testing of the coating materials shall be identified as follows:

- (a) Class A: Bare aluminum alloy (7075) conforming to QQ-A-250/12, temper T6, with chemical treatment in accordance with MIL-C-3541

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- (b) Class B: Bare aluminum alloy (7075) conforming to QQ-A-250/12, temper T6, with chemical treatment in accordance with MIL-A-8625, type II.

Test panels shall be cut to the required dimensions prior to chemical treatment and as specified in table II.

4.6.2.2 Cleaning. - Unless otherwise specified herein, all test panels shall be cleaned by scrubbing and rinsing in solvent formulated in accordance with table III. After rinsing, and while still wet, the panels shall be wiped dry with a clean lint-free cloth and allowed to air-dry 30 minutes at standard conditions in an uncontaminated atmosphere.

Table II. Size and quantity of test panels

Test paragraph	Panel Class	Approximate dimensions (inches)	Quantity required
4.7.3	A	0.040 by 2-7/8 by 6	1
4.7.7	A	0.040 by 2-7/8 by 6	4
	B	0.040 by 2-7/8 by 6	2
4.7.8	A	0.040 by 2-7/8 by 6	2
4.7.10	A	0.040 by 2-7/8 by 6	1
	B	0.040 by 2-7/8 by 6	1
4.7.11	A	0.040 by 2-7/8 by 6	2
	B	0.040 by 2-7/8 by 6	2
4.7.12	A	0.040 by 2-7/8 by 6	1
	B	0.040 by 2-7/8 by 6	1
4.7.13	A	0.040 by 2-7/8 by 6	1
	B	0.040 by 2-7/8 by 6	1
4.7.14.1	A	0.040 by 2-7/8 by 6	1
4.7.15	A	0.025 by 1 by 5	1
4.7.16	A	0.025 by 1 by 6	1
	B	0.025 by 1 by 6	1
4.7.17.2	A	0.025 by 1 by 6	4
	B	0.025 by 1 by 6	4
4.7.19	A	0.040 by 2-7/8 by 6	2

Table III. Formulation of cleaner

Ingredient	Specification	Percent by volume
Aromatic petroleum naphtha	TT-N-97, type I, grade B	50
Ethyl acetate	TT-E-751	20
Methyl ethyl ketone	TT-M-261	20
Isopropyl alcohol	TT-I-735	10

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#### 4.6.3 Preparation of test specimens.-

4.6.3.1 Preparation of coating materials.- The coating materials shall be prepared as recommended by the manufacturer.

4.6.3.2 Application of coating materials.- Unless otherwise specified herein, the test panels shall be brush- spray- or dip-coated with type I material to produce a film thickness of 0.5 to 1.2 mils and spray-coated with type II material to produce a film thickness of 0.8 to 1.2 mils when cured. Brush and spray coats may be on one side of the panel only. Dip-coating shall be accomplished in accordance with ASTM D 823, method B, using a withdrawal rate of 2 inches per minute. (Dip-coated test panels shall be used to simulate sloss-coating technique.) Unless otherwise specified in the procurement documents, the coated panel shall be cured for 14 days at standard conditions by suspending or placing in a vertical position.

4.6.3.3 Preparation of sealing compound.- Not less than 175 grams of sealing compound conforming to MIL-S-8802, class E-2, shall be mixed thoroughly within a period of 5 minutes.

4.6.3.4 Application of sealing compound.- Unless otherwise specified herein, sealing compound shall be applied to test panels and cured for 7 days at standard conditions. Cured thickness of the sealing compound shall be  $1/8 \pm 1/64$  inch.

4.6.4 Testing fluids.- Fuel used for immersion tests shall be hydrocarbon test fluid conforming to TT-S-735, type VII.

#### 4.7 Test methods.-

4.7.1 Nonphotochemically reactive solvent - The nonphotochemically reactive solvent content with reference to the total volume of the solvent as specified in 3.2.3.1 shall be tested in accordance with ASTM D 2267.

4.7.2 Application and surface appearance.- Test panels prepared in accordance with 4.6.3.2 shall be examined for smoothness and uniformity and shall be free of bubbles, pinholes, cracks, and other film irregularities.

4.7.3 Color.- A line approximately 1/8 inch wide shall be etched lengthwise on a type I panel, measuring 0.040 by 2-7/8 by 6 inches, with a 10 percent by weight sodium hydroxide (technical

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grade) solution applied with a glass rod approximately 1/8 inch in diameter. The etchant shall remain on the panels until a noticeable line definition is obtained between the base metal and the chemical treatment coating. Rinse panel with clean water and dry. Apply coating material to the etched panels to produce a film having a thickness of not less than 0.8 nor more than 1.2 mils when dried as specified in 4.7.8. The panels shall be inspected before and after drying for conformance to the color requirements specified in table I.

4.7.4 Weight per gallon.— This test shall be conducted in accordance with Federal Test Method Standard No. 141, method 4184.

4.7.5 Nonvolatile content.— The test shall be conducted in accordance with Federal Test Method Standard No. 141, method 4041, except the coatings shall be aged in an open vessel for 8 hours at  $75^{\circ} \pm 20^{\circ}\text{F}$  ( $24^{\circ} \pm 1^{\circ}\text{C}$ ) before starting the test.

4.7.6 Viscosity.— The viscosity test shall be conducted in accordance with Federal Test Method Standard No. 141, method 4282.

4.7.7 Application life.— A round, wide mouth, 1-pint, metal container with a press lid shall be filled to within 1 inch of the top with coating material. The container of type I coating shall be allowed to remain uncovered for 8 hours, resealed, and allowed to stand undisturbed for not less than 240 hours at standard conditions. The container of mixed type II coating shall be allowed to remain uncovered and undisturbed for not less than 8 hours at standard conditions. The aged coating material shall be examined for appearance, noting skinning and gelling, and for conformance to application life (table I). The coatings shall then be tested for viscosity (4.7.6), drying time (4.7.8), cure time (4.7.9), resistance to water (4.7.10), resistance to salt water and fuel (4.7.11), and resistance to simulated microbial by-products (4.7.19). For quality conformance testing of application life, the viscosity test (4.7.6) is the only test required.

4.7.8 Drying time.— Two class A panels, measuring 0.040 by 2-7/8 by 6 inches, shall be coated to the thickness specified in 4.6.3.2. The coated panels shall then be suspended from a suitable fixture at standard conditions for 2 hours. The coating shall be considered tack-free when the finger with slight pressure will not leave a mark. The surface shall not be tacky. These panels upon further conditioning, shall be used for testing cure time as specified in 4.7.9.

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4.7.9 Cure time.- Coated panels shall be selected from the drying time test (4.7.8). One panel shall be allowed to cure for 14 days at standard conditions. The other panel shall be cured 1 day at standard conditions followed by 1 day at  $140^{\circ} \pm 2^{\circ}\text{F}$  ( $60^{\circ} \pm 1^{\circ}\text{C}$ ) and not less than 50 percent relative humidity. The coating shall be considered cured when the substrate is not exposed after 50 double strokes of moderate pressure with a gauze pad wet with toluene.

4.7.10 Resistance to water.- One panel each of class A and class B, measuring 0.040 by 2-7/8 by 6 inches, shall be coated and cured as specified in 4.6.3.2. The coated panels shall be scored through to the metal diagonally from one corner to the opposite corner. The coated panels shall be immersed vertically for 30 days in a covered glass vessel containing distilled water with 3 inches of the panels exposed to the water and the remainder exposed to the air-vapor-mixture. The temperature during the test shall be  $140^{\circ} \pm 2^{\circ}\text{F}$  ( $60^{\circ} \pm 1^{\circ}\text{C}$ ). Immediately upon removal from the water, the panels shall be examined for conformance to the requirements specified in 3.4.1.

4.7.11 Resistance to salt water and fuel.- Two panels each of class A and class B, measuring 0.040 by 2-7/8 by 6 inches, shall be coated and cured as specified in 4.6.3.2. One coated panel each of class A and class B shall be scored through to the metal diagonally from one corner to the opposite corner. The remaining coated panels shall be left unscored. The coated panels shall be immersed vertically in a covered glass vessel containing a two-layer liquid consisting of 3.0 percent aqueous sodium chloride solution and jet reference fluid as specified in 4.6.4, and 1-5/8 inches of the panel shall be exposed to the salt solution, 1-5/8 inches to the jet reference fluid, and the remainder to the air-vapor mixture. The temperature during the test shall be  $140^{\circ} \pm 2^{\circ}\text{F}$  ( $60^{\circ} \pm 1^{\circ}\text{C}$ ). After 7 days immersion, the unscored panels shall be removed from the test fluid for use as specified in 4.7.17.1. At the end of 30 days, the scored panels shall be removed from the test fluid and immediately examined for conformance to the requirements specified in 3.4.2.

4.7.12 Resistance to engine oil.- One panel each of class A and class B, measuring 0.040 by 2-7/8 by 6 inches, shall be coated and cured as specified in 4.6.3.2. Coated test panels shall be scored through to the metal diagonally from one corner to the opposite corner. The coated panels shall be immersed completely and vertically for 14 days in a covered glass vessel containing engine oil conforming to MIL-L-7808. The temperature during the test shall be  $250^{\circ} \pm 5^{\circ}\text{F}$  ( $121^{\circ} \pm 2^{\circ}\text{C}$ ). Immediately upon removal from the oil, the panels shall be examined for conformance to the requirements specified in 3.4.3.

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4.7.13 Resistance to hydraulic fluid.— One panel each of class A and class B, measuring 0.040 by 2-7/8 by 6 inches, shall be coated and cured as specified in 4.6.3.2. Coated test panels shall be scored through to the metal diagonally from one corner to the opposite corner. The coated panels shall be immersed completely and vertically for 14 days in a covered glass vessel containing hydraulic fluid conforming to MIL-H-5606. The temperature during the test shall be  $180^{\circ} \pm 5^{\circ}\text{F}$  ( $82^{\circ} \pm 2^{\circ}\text{C}$ ). Immediately upon removal from the fluid, the panels shall be examined for conformance to the requirements specified in 3.4.4.

4.7.14 Resistance to iron chloride.—

4.7.14.1 One class A panel, measuring 0.040 by 2-7/8 by 6 inches, shall be coated on both sides, with a double coating on the edges, and cured as specified in 4.6.3.2. The coated panels shall be immersed completely and vertically for 10 days in a covered glass vessel containing a liquid consisting of 0.5 percent by weight of ferric chloride (technical grade) in distilled water. The temperature during the test shall be  $140^{\circ} \pm 2^{\circ}\text{F}$  ( $60^{\circ} \pm 1^{\circ}\text{C}$ ). Immediately upon removal from the fluid, the panel shall be rinsed in clean water and examined for conformance to the visual requirements specified in 3.4.5.

4.7.14.2 After visual examination, the test specimens used in 4.7.14.1 shall be used for measuring resistance. The test shall be conducted in accordance with ASTM D 257, using a megohmmeter with a potential of 500 volts. (A continuity check should be made prior to applying the test current to determine if sufficient resistance is provided by the specimen to prevent a direct short.) The test current shall be introduced by means of a brass disk, 1-inch in diameter and weighing not less than 50 grams, positioned over a coated area not nearer than 1/4 inch from any edge of the specimen and with an electrode clamped to bare metal of the specimen. Readings shall be made 1 minute after application of current and shall continue until three values are obtained within 25 percent of each other. The average of these three values shall be used to determine conformance with the requirements specified in 3.4.5.

4.7.15 Fuel contamination.— A class A panel, measuring 0.075 by 1 by 5 inches, shall be coated on both sides, cured as specified in 4.6.3.2, and immersed in a flask containing 250 milliliters of jet reference fluid specified in 4.6.4 for 48 hours at standard conditions. The contaminated fuel shall be decanted off and the nonvolatile material determined by air jet evaporation, method 3302 of Federal Test Method Standard No. 791, at a temperature of  $320^{\circ}$  to  $329^{\circ}\text{F}$  ( $160^{\circ}$  to  $165^{\circ}\text{C}$ ), except that the total evaporation time shall be 45 minutes. A corrosion test for free sulfur shall be run in accordance with method 5313 of Federal Test Method Standard No. 791, except that a nonleaded copper strip conforming to QQ-B-613 shall be suspended in the contaminated fluid during the 48-hour extraction period previously outlined.

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4.7.16 Low-temperature flexibility.- One panel each of class A and class B, measuring 0.025 by 1 by 6 inches, shall be coated and cured as specified in 4.6.3.2 except that the coating thickness shall be not less than 0.8 nor more than 1.2 mils. The coated panels and the flexibility jig (see figure 1) shall be subjected to a temperature of  $-65^{\circ} \pm 2^{\circ} \text{ F}$  ( $-54^{\circ} \pm 1^{\circ} \text{ C}$ ) for 2 hours. While at this temperature, one end of the test panel shall be held in the slotted position and the other end bent rapidly around the curved portion of the jig with the side coated with material on the exterior of the radius. The panels then shall be removed and examined for conformance to the requirements specified in 3.4.7.

4.7.17 Sealing compound compatibility.-

4.7.17.1 Sealing compound to coating materials.- One panel each of class A and class B panels removed from the two-layer salt water-fuel test fluid in 4.7.11, shall be cleaned with a cleaning material as specified in table III or a cleaner recommended by the manufacturer of the coating being tested. Test panels shall be allowed to dry 30 minutes at standard conditions (or use the manufacturer's recommendation, if applicable) and shall be coated with an approximately 1/8-inch thickness of sealing compound conforming to MIL-S-8802, class B-2. After the sealing compound has immobilized, one end of a 3-by-12-inch strip of wire screen (20 to 40 mesh aluminum or Monel wire fabric) or cotton duck conforming to CCC-C-412, type III, shall be placed on each panel, leaving a loose end 6 inches in length. An additional 1/32-inch coating of sealing compound shall be applied over the screen or fabric strips and panels allowed to cure as specified in 4.6.3.4. After the sealing compound cure period, the panels shall be replaced in the same two-layer salt water-fuel test fluid and allowed to remain for 7 days at a temperature of  $140^{\circ} \pm 2^{\circ} \text{ F}$  ( $60^{\circ} \pm 1^{\circ} \text{ C}$ ). The test panels shall be removed and a 1-inch section shall be cut through the strip and sealing compound on each panel to provide the center inch for the peel test. The specimens shall be stripped back at an angle of  $190^{\circ}$  to the metal panel in a suitable tension testing machine having a jaw separation rate of 2 inches per minute. Four cuts at least 1/2 inch apart shall be made perpendicular to the direction of pull through the sealing compound and coating in an attempt to promote adhesive failure. The results shall be the numerical average of the peak loads. If the sealing compound separates in cohesion and does not separate from the coating material, the adhesion shall be reported as greater than the measured value. The adhesion shall be measured within 1 hour after removal from the test fluid.

4.7.17.2 Coating materials to sealing compound.- Four panels each of class A and class B, measuring 0.025 by 1 by 6 inches, shall be coated with sealing compound conforming to MIL-S-8802, class B-2, 1/8-inch thick, and cured as specified in 4.6.3.4. To two panels each of Class A and Class B, a coat of the coating material shall be 1.2 mils maximum, applied over the sealing compound and cured as specified in 4.6.3.2 except that the coating thickness shall be not less than 0.8 mil. The remaining two panels shall be left uncoated to provide control panels. All the panels shall be tested for flexibility (4.7.16) at  $-20^{\circ} \pm 2^{\circ} \text{ F}$  ( $-29^{\circ} \pm 1^{\circ} \text{ C}$ ) and at  $-65^{\circ} \pm 2^{\circ} \text{ F}$

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( $-54^{\circ} \pm 1^{\circ}\text{C}$ ) and examined for conformance to requirements specified in 3.4.8.2. Any cracks developed in the sealing compound on the control panels shall be taken into consideration when examining the panels covered with the coating material.

4.7.18 Reparability. One panel each of class A and class B, measuring 0.040 by 2-7/8 by 6 inches, shall be coated and cured as specified in 4.6.3.2. The coated panels shall be immersed vertically for 7 days in a covered glass vessel containing jet reference fluid with 3 inches of the panels exposed to the jet reference fluid and the remainder exposed to the air-vapor mixture. The temperature during the test shall be  $140^{\circ} \pm 2^{\circ}\text{F}$  ( $60^{\circ} \pm 1^{\circ}\text{C}$ ). After immersion for 7 days, the panels shall be removed from the test fluid and air-dried for 24 hours at  $140^{\circ} \pm 2^{\circ}\text{F}$  ( $60^{\circ} \pm 1^{\circ}\text{C}$ ) in a forced draft oven. The panels then shall be cleaned with the cleaner specified in 4.6.2.2. A second coat of the coating material shall be applied and cured as specified in 4.6.3.2. The test panels shall be replaced in the same test fluid and allowed to remain for 7 days at a temperature of  $140^{\circ} \pm 2^{\circ}\text{F}$  ( $60^{\circ} \pm 1^{\circ}\text{C}$ ). The test panels shall be removed and examined for conformance to the requirements specified in 3.4.9.

4.7.19 Resistance to simulated microbial byproducts. - Two panels of class A, measuring 0.040 by 2-7/8 by 6 inches, shall be coated and cured as specified in 4.7.14.1. Five parts of analytical-grade glacial acetic acid shall be dissolved in 100 parts by weight of 3 percent sodium chloride in distilled water. The coated panel shall be immersed vertically for 5 days at  $140^{\circ} \pm 2^{\circ}\text{F}$  ( $60^{\circ} \pm 1^{\circ}\text{C}$ ) for preproduction tests and at  $77^{\circ} \pm 2^{\circ}\text{F}$  ( $25^{\circ} \pm 1^{\circ}\text{C}$ ) for quality conformance tests, exposing one-third of the panel to the acetic acid-salt solution, one-third to jet reference fluid, and one-third to the air-vapor mixture. The panels shall be removed, rinsed gently in running tap water at  $120^{\circ}\text{F}$  ( $45^{\circ}\text{C}$ ) and carefully blotted dry with absorbent paper toweling. The panels shall be immediately scribed with two parallel scratches in each of the three areas: the acid-salt solution, jet reference fluid, and air-vapor mixture areas. The scribes shall be across the full width of the panel 1 inch apart through the coating down to the metal with a sharp-edge scribe. Across the scratches at  $90^{\circ}$  to the parallel scribes, a strip of 1-inch-wide masking tape, code No. 250, Minnesota Mining and Manufacturing Company, or equal, which is not more than 6 months from date of manufacture, shall be applied. The tape shall be pressed down using two passes of a 4.5-pound rubber-covered roller approximately 3.5 inches in diameter by 1.75 inches in width. The durometer hardness of the roller surface shall be 70 to 80. The tape shall be removed in one abrupt motion perpendicular to the panel. The panel and tape shall then be examined for conformance to 3.4.10.

4.7.20 Accelerated storage stability. - Approximately 1 gallon of the coating material in the containers, of the kind to be used in filling contract orders, shall be stored unopened for 14 days at  $120^{\circ} \pm 2^{\circ}\text{F}$  ( $49^{\circ} \pm 1^{\circ}\text{C}$ ) and then cooled at standard conditions for 24 hours. The aged material shall be used to determine conformance to the requirements specified in 3.5.



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4.7.21 Free diisocyanate.- The test for the amount of free diisocyanate in the coatings shall be conducted in accordance with U.S. Air Force Specification Bulletin No. 535. The amount shall be as specified in 3.6.

## 5. PREPARATION FOR DELIVERY

5.1 Preservation and packaging.- Preservation and packaging shall be level A or C, as specified (see 6.2).

### 5.1.1 Level A.-

5.1.1.1 Unit package.- The type I coating material shall be packaged in its own container. The two parts of the type II coating material shall be packaged in their own containers. The number of containers of one part of the type II coating material shall be a simple multiple of the number of containers of the second part of the material. The ratio of the quantity of one part of the coating material to the quantity of the other part shall be the same as the recommended mixing ratio of the two parts of the coating material.

5.1.1.2 Containers.- The coating material shall be furnished in 1-gallon, 1-quart, 1-pint, and 1/2-pint cans, as specified in the contract or order (see 6.2). Cans shall conform to PPP-C-96, type V, class 2, except that tin-plated cans with paper labels may be used unless specifically prohibited. All containers shall be packaged full.

5.1.2 Level C.- When level C is required, packaging shall conform to manufacturer's commercial practice.

5.2 Packing.- Unless otherwise specified, (see 6.2) all material shall be packed for level B.

5.2.1 Level A and level B.- Exterior shipping containers shall conform to PPP-B-636 with a maximum of six 1-gallon cans, nine 1-quart cans, twelve 1-pint cans, and twelve 1/2-pint cans per shipping container. The ratio of cans containing one part of the type II coating material to the cans containing the other part of the material in the shipping container shall be the same as the recommended mixing ratio of the two parts of the coating material. Overseas shipping containers shall be used for level A and domestic shipping containers for level B.

5.2.2 Level C.- Packing shall conform to manufacturer's commercial practice.

5.3 Marking of shipments.- In addition to any special markings required by the contract or order, individual cans and containers shall be marked in accordance with MIL-STD-129.

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## 6. NOTES

6.1 Intended use.- The coating materials covered by this specification are intended for the protection of aircraft integral fuel tanks against corrosion from fuel contaminants. It is suitable for use in a service temperature range from  $-65^{\circ}$  to  $+250^{\circ}\text{F}$  ( $-54^{\circ}$  to  $+121^{\circ}\text{C}$ ). Class A material is for general use in areas where air pollution controls are nonexistent. Class B material is for use in areas having air pollution regulations controlling the emission of solvents into the atmosphere.

6.2 Ordering data.- Procurement documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Type and class required (see 1.2).
- (c) Sampling plan, if other than specified (see 4.4.1).
- (d) Applicable levels of preservation, packaging, and packing (see 5.1 and 5.2).
- (e) Container size (see 5.1.1.2).

6.2.1 In the ordering of type II coating materials covered by this specification, the quantity of material should be specified by the number of the particular container volume desired. The type II coating material will be supplied on the basis of total combined contents of the two parts. Contracts, orders, and requisitions will be filled to the nearest quantity multiple in keeping with the material mixing ratio.

6.3 With respect to products requiring qualification, awards will be made only for such products as have, prior to the time set for opening bids, been tested and approved for inclusion in the applicable Qualified Products List, whether or not such products have actually been so listed by that date. The attention of suppliers is called to this requirement, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification, in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. The activity responsible for the Qualified Products List is the Air Force Materials Laboratory, Attn: MAAA, Wright-Patterson Air Force Base, Ohio 45433, and information pertaining to qualification of products may be obtained from that activity.

6.4 Nonphotochemically reactive solvent.- A nonphotochemically reactive solvent is any solvent with an aggregate of less than 20 percent of its total volume of chemical compounds not exceeding the individual percentage composition limitations specified in 3.2.3.1.

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6.5 Marginal indicia.- Asterisks are not used in this revision to identify changes with respect to the previous issue, due to the extensiveness of the changes.

Custodians:

Navy - AS

Air Force - 11

Reviewer activities:

Air Force - 84, 95

Preparing activity:

Air Force - 11.

Project No. 8030-F001

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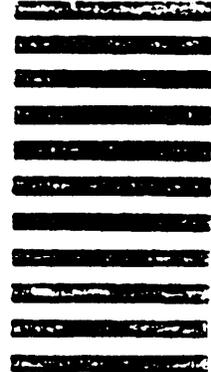
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