MILITARY SPECIFICATION

PRIMER COATING, ELASTOMERIC, POLYSULFIDE, CORROSION INHIBITING

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification establishes the requirements for four types of two component elastomeric corrosion resistant primer coatings. The primer materials shall be air pollution compatible, suitable for application by various spray application techniques and be compatible with an aliphatic polyurethane topcoat finish.

1.2 Classification

1.2.1 Components. The elastomeric polysulfide primer coatings shall be of the following components, as specified: (See 3.5)

Component I - Shall consist of the polysulfide polymer and may contain some or all of the corrosion inhibitors.

Component II - Shall consist of the catalyst or curing agent and may contain corrosion inhibitors.

1.2.2 Types. The primer material shall be furnished as specified:

Type I - Primer material, nonphotochemically reactive, suitable for application at package consistency by conventional pressurized air spray techniques as received.

Type II - Primer material suitable for application by conventional pressurized air spray techniques after dilution to spray consistency with nonphotochemically reactive solvents.

Type III - Primer material. nonphotochemically reactive, suitable for application by airless spray techniques.

Type IV - Primer material, nonphotochemically reactive, suitable for application by electrostatic airless spray techniques.

2. APPLICABLE DOCUMENTS

2.1 Issues of documents. 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.

SPECIFICATIONS

FEDERAL

L-P-378	Plastic Film (Polyethlene Thin Gage)
QQ-A-250/5	Aluminum Alloy (Clad 2024)
TT-S-735	Standard Test Fluids, Hydro-carbon
PPP-P-1792	Paint, Varnish, Lacquer and Related Materials; Packaging, Packing and Markings.

MILITARY

MIL-C-5541	Chemical Conversion Coatings on Aluminum and Aluminum Alloys.
MIL-H-5606	Hydraulic Fluid Petroleum Base, Aircraft, Missile and Ordnance.
MIL-C-25769	Cleaning Compound, Aircraft Surface, Alkaline Waterbase.
MIL-C-81706	Chemical Conversion Materials for Coating Aluminum and Aluminum Alloys.
MIL-T-81772	Thinner, Aliphatic Polyurethane Coating.
MIL-C-81773	Coating, Polyurethane, Aliphatic, Weather Resistant.
MIL-C-83286	Coating, Urethane, Aliphatic Isocyanate, for Aerospace Applications

STANDARDS

FEDERAL

Federal Test Method Standard No. 141	Paint, Varnish, Lacquer and Related Materials, Methods of Inspection, Sampling and Testing

MILITARY

MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes.
MIL-STD 129	Marking for Shipment and Storage
	Test Reports, Preparation of

(Copies of specifications, standards, drawings and publications required by contractors 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)

ASTM D1084-63	Viscosity of Adhesives, Tests for
ASTM D2240-75	Indentation Hardness of Rubber and Plastics by Means of a Durometer, Tests for
ASTM D2267	Method of Test for Aromatics in Light Napthas, Reformates, and Gasoline by Gas Chromatography
ASTM D2803-70	Filiform Corrosion Resistance of Organic Coatings on Metal, Tests for

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

U.S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE

Federal Hazardous Substances Labeling Act.

(Application for copies should be addressed to the U.S. Department of Health, Education and Welfare, Food and Drug Administration, Washington, D.C. 20203.)

Code of Federal Regulations

49CFR 171-178	Department of Transportation (DOT) Regulations for the Transportation of Explosives and Other Dangerous Articles by Land and Water.

(Applications for copies should be addressed to the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. Orders should cite the latest edition and supplements thereto.)

3. REQUIREMENTS

3.1 Qualification. The polysulfide primer coatings furnished under this specification shall be products which have passed the qualification tests specified herein and have been listed or approved for listing on the qualified products list at the time set for opening of bids.

3.2 Materials. The polysulfide primers shall consist of two components. Component I shall be the polysulfide polymer base compound. Component II shall consist of the catalyst or curing agent. Necessary additives may be contained in either or both components but the material shall not contain any highly alkaline corrosion inducing materials, such as, calcium peroxide, lead dioxide, manganese dioxide, potassium hydroxide or sodium hydroxide. The components shall be individually packaged and furnished as a kit.

3.3 Diluting solvents. Solvent contained in the polysulfide primers and solvents to be utilized in diluting the primers to spray consistency, shall be nonphotochemically reactive.

3.4 Toxic products and formulations. The polysulfide primers shall have no adverse effect on the health of personnel when used for their intended purpose. The instructions for use of the primers shall include any necessary safety precautions for handling materials containing components hazardous to health. The chemical composition/toxicological data of the primers shall be supplied to the Director of Base Medical Service to evaluate the occupational and environmental protection necessary to utilize the primer in military activities. The AFLC Surgeon's Office (AFLC/SGP), WPAFB, Ohio, 45433, is available to provide consultant assistance in this evaluation. (See 4.5)

3.5 Component requirements.

3.5.1 Components. The polysulfide primers shall consist of two components. Component I shall be the polysulfide polymer which may contain all or a portion of the corrosion inhibitors. Component II shall be the catalyst or curing agent which may contain a portion of the corrosion inhibitors. These shall be individually packaged and furnished as a kit. The mixing ratio by volume of the primer material shall be as recommended by the manufacturer.

3.5.2 Solvents. The solvents contained in the packaged primers shall be nonphotochemically reactive to meet existing air pollution regulations when tested in accordance with 4.8.1 and Table IV and shall have the required characteristics such as vapor pressure, polarity and boiling range to be functional with the spray application technique specified in 1.2.2.

3.5.3 Thinners. The Type I and Type II polysulfide primers shall be compatible with the nonphotochemically reactive solvent of Table I. The Type III and Type IV primers shall be thinned with a nonphotochemically reactive diluent with suitable vapor pressure and polarity for the type spray application utilized and shall be specified by the primer manufacturer. (See 4.8).

TABLE I. Nonphotochemical reactive materials.

Solvent	Percent by volume
Methyl Ethyl Ketone	30 ± 1
N-Butyl Acetate	10 ± 1
Cellosolve Acetate	40 ± 1
Toluene	12 max
Xylene	8 max

3.5.4 Nonphotochemically reactive solvent. A nonphotochemically reactive solvent is any solvent with an aggregate of less than 20 percent of its total volume composed of the chemical compounds classified below or which does not exceed any of the following individual percentage composition limitations, referred to the total volume of solvent. (See 4.8)

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 molecule except ethylbenzene: 8 percent;

c. A combination of ethylbenzene, ketones having branched hydrocarbon structures, trichloroethylene or toluene: 20 percent.

3.5.5 Condition in container. Freshly opened full containers of component I of the primer materials shall be free from lumps, skins, grit, and coarse particles and shall show no more settling than can be dispersed by five minutes of agitation on a Red Devil, or equivalent type paint shaker to a smooth homogenous condition when tested as specified in 4.8.3 and Table IV, component II shall be free of any insoluable precipitates.

3.5.6 Storage stability. The previously unopened packaged components shall meet all the requirements specified herein after a storage period of six months, provided that the daily mean temperature of the ambient air at the storage locations falls within the range of -17.8°C (0°F) to 46°C (115°F) when tested in accordance with 4.8.4.

3.6 Mixed primer requirements.

3.6.1 Working properties and surface appearance. Spray coats of the mixed primer, comprising the two components mixed in the ratio by volume recommended by the manufacturer and solvent thinned, if required, shall be smooth, uniform and free of bubbles, pinholes, holidays and other film irregularities. The applied films, dried under the conditions specified in 4.7.3 shall provide a surface free from grit, seeds, streaks, blisters, or other surface defects when observed as indicated in 4.8.3 and Table IV.

3.6.2 Viscosity. The viscosity of the freshly mixed primers shall be 22 to 28 seconds in a number 2 Zahn cup when measured in accordance with 4.8.5 and Table IV. After standing for two hours the viscosity shall not increase greater than 25% from the original viscosity.

3.6.3 Settling. When tested as specified in 4.8.3 and Table IV after standing undisturbed for two hours, the mixed and thinned primers shall be free of curdling, precipitates and separation which cannot be easily redispersed by shaking for five minutes on a mechanical paint mixer.

3.6.4 Pot life. The primer materials after mixing and reducing for spray application shall have a minimum pot life of two hours. After standing for 2 hours as specified in 4.8.5 the material shall conform to the requirements of 3.6.2, 3.6.3, and 3.6.5.

3.6.5 Drying time. The drying time of the primers applied in accordance with 4.7.3 shall dry to a recoat condition in a minimum of 8 hours when tested in accordance with 4.8.3 and Table IV.

3.6.6 Odor. The odor of the primer materials shall be characteristic of polysulfide polymers but shall not be excessivity obnoxious when tested in accordance with 4.8.3 and Table IV.

3.7 Applied primer film property requirements.

3.7.1 Chemical properties.

3.7.1.1 Soluble chromate content. When tested in accordance with 4.8.6, the primer film shall have a minimum of 2.7 percent soluble chromates.

3.7.2 Physical properties.

3.7.2.1 Wet tape adhesion. After curing for 72 hours at standard conditions, the primer applied to panels in accordance with 4.7 shall be tested in accordance with 4.8.3 and Table IV, with no loss of adhesion between the primer and metal substrate.

3.7.2.2 Repairability. The primer shall have suitable adhesion to an aged film of itself. The primer shall show satisfactory bonding when applied over a cured and aged film of the same material when tested as specified in 4.8.7.

3.7.2.3 Film hardness. The hardness of the cured primer film shall have a minimum of 35 Shore A hardness when tested in accordance with 4.8.3 and Table IV.

3.8 Applied primer film resistance properties.

3.8.1 Salt spray resistance. Three test panels prepared in accordance with 4.1 and exposed to 5 percent salt spray for 500 hours for qualification testing and 300 hours for acceptance testing as specified in 4.8.3 and Table IV shall exhibit no corrosion.

3.8.2 Humidity resistance. Three test panels prepared in accordance with 4.7 and exposed in a humidity chamber for 30 days at 95 percent RH minimum and 34.7°C (120°F) as specified in 4.8.3 and Table IV shall exhibit no loss of adhesion, blistering, softening, or other evidence of film failure when inspected immediately after removal from the test conditions.

3.8.3 Heat resistance. Test panels prepared in accordance with 4.1 and exposed to dry heat in an air circulating oven at 127.5°C ± 2°C (230°F ± 5°F) for 16 hours shall meet the requirements specified in 3.6.4 and test condition B of Table II. Slight color change shall not constitute failure.

3.8.4 Low temperature resistance. Test panels prepared in accordance with 4.7 and exposed as specified in 4.8.3 shall show no failure upon bending around a 1/4 inch diameter cylindrical mandrel.

3.8.5 Adhesion. (Wet tape test) When tested as specified in 4.8.3 and Table IV, the primer film shall not exhibit more than a 1/8 inch maximum widening of either scribe mark.

3.9 Topcoated primer film properties.

3.9.1 Topcoat materials. The topcoat materials shall be MIL-C-81773 and MIL-C-83286 applied over primer coated panels in accordance with 4.7.

3.9.2 Topcoat compatibility. Panels prepared in accordance with 4.1 and tested as specified in 4.8.9 shall not inhibit the cure rate of aliphatic polyurethane coatings or bleed through the topcoatings and shall meet the wet tape adhesion specified in 3.9.3.

3.9.3 Wet tape adhesion. Panels primer coated in accordance with 4.7 and topcoated as specified in 4.7.4 shall be cured for 72 hours at standard conditions and then tested in accordance with 4.8.3 and Table IV with no loss of adhesion between topcoat and primer and between primer and metal substrate.

3.9.4 Impact flexibility. Panels primed and topcoated as specified in 4.7 through 4.7.4 shall meet the flexibility requirements of Table II. The gloss color to be evaluated shall be white meeting color number 17875 of FED-STD-595. The camouflage color to be evaluated shall be olive drab meeting color number 34102 of FED-STD-595. Panels for this test shall be 3 by 5 by 0.020 inch, 2024-T0 alclad aluminum. The test procedure shall be in accordance with 4.8.3 and Table IV with the exception that the impacting mandrel shall be dropped from a height of 24 inches as measured from the impacting surface of the mandrel to the surface of the coated test panel. The elongated surfaces of the impacted coated panels shall be examined under 10 X magnification for cracking of the coating system (primer and topcoat) immediately after testing and 72 hours after test. The presence of cracking of the coating system at either evaluation period shall constitute failure. Adhesion of the coating system to the elongated surfaces of the impacted panels shall be determined by placing masking tape conforming to UU-T-106 over the elongated surface, insuring that the tape is well adhered, and then removing the tape with one abrupt pull. Any topcoat removal from the primer or primer removal from the metal substrate shall constitute failure.

TABLE II. Impact flexibility requirements

Test Condition		Materials	
		Gloss Colors (percentage)	Camouflage colors (percentage)
A	After normal 7 days cure of the coating system at standard conditions.	60	20
B	After normal 7 days cure of the coating system at standard conditions, and aging 16 hours at 225°F (107°C)		

Table II. Cont'd

Test Condition		Materials Gloss colors (percentage)	Materials Camouflage colors (percentage)
C	After normal 7 days cure of the coating system at standard conditions and 500 hours weatherometer exposure. (300 hours for quality acceptance)	60	20
D	After normal 7 days cure of the coating system at standard conditions and 24 hours immersion in diester lubricating oil at 225°F ± 5°F. (107°C ± 2°C)	60	20

3.9.5 Salt spray resistance. Three test panels, primed and topcoated in accordance with 4.7 through 4.7.4 and exposed to 5 percent salt spray for 500 hours as specified in 4.8.3 and Table IV shall exhibit no corrosion.

3.9.6 Humidity resistance. Three test panels, primed and topcoated in accordance with 4.7 through 4.7.4, and exposed in the humidity chamber for 30 days at 95% RH minimum and 49° ± 1°C (120°F ± 2°F) as specified in 4.8.3 and Table IV shall exhibit no loss of adhesion between topcoat and primer or primer and metal substrate, blistering, softening, or other evidence of film failure when inspected immediately after removal from the test conditions.

3.9.7 Heat Resistance. Two test panels for each topcoat material, primed and topcoated in accordance with 4.7 through 4.7.4 and exposed vertically to dry heat for 16 hours at 107°C ± 1°C (225°F ± 2°F) shall meet the requirements specified in 3.9.5 and test condition B of Table II. Slight yellowing and darkening of the topcoat materials shall not constitute failure.

3.9.8 Low temperature resistance. Two test panels primed and topcoated with gloss material and two test panels primed and topcoated with camouflage material in accordance with 4.7 through 4.7.4 and exposed as specified in 4.8.8 shall show no failure when tested as follows:

a. The gloss material shall show no cracking or loss of adhesion upon bending around a 1-inch diameter cylindrical mandrel.

b. The camouflage material shall show no cracking or loss of adhesion upon bending around a 2-inch diameter cylindrical mandrel.

3.9.9 Fluid immersion resistance. When tested as specified in 4.8.3 and Table IV, panels prepared in accordance with 4.7 and exposed to the fluids as specified below shall show no blistering, film softening or other film defects. Discoloration due to chromate corrosion inhibitor leaching shall not be cause for rejection. Panels shall be inspected immediately upon removal from the test fluids for the presence of any observable defects. The panels shall then be cleaned and again inspected for defects. Cleaning of the panels shall be by wiping with lint free paper towels or cloth and then washing in detergent conforming to MIL-C-25769 or equivalent, rinsed in distilled water and dried with clean lint free paper towels or cloth.

a. Lubricating oil resistance. Diester lubricating oil composed of 98% diisooctyl adipate and 2% tricresyl phosphate by weight, at a temperature of 225° ± 4°F (121 ± 2°C) for a period of 24 hours.

b. Hydrocarbon resistance. Type III fluid of TT-S-735 for a period of 7 days at standard conditions.

c. Hydraulic fluid resistance. Hydraulic fluid of MIL-H-5606 for a period of 7 days at standard conditions.

d. Skydrol 500B hydraulic fluid. Skydrol 500B fluid for a period of 7 days at standard conditions.

e. Distilled water resistance. Distilled water at 100°F (37.8°C) for a period of 4 days.

3.9.10 Filiform corrosion resistance. Two test panels prepared as specified in 4.7 and tested as specified in 4.8.10 shall show no filiform corrosion beyond 1/8 inch on either side of the scribe line.

3.10 Workmanship. The component ingredients shall be intimately assembled and processed as required in accordance with the best practice for the manufacture of a high quality coating.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless desapproved 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 tests. The inspection and testing of the polysulfide primer shall be classified as follows:

a. Qualification inspection (4.3).

b. Quality conformance inspection (4.4).

4.2.1 The inspection terms used herein are defined in MIL-STD-109.

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

4.3.1 Qualification samples. The test samples shall consist of three (3) one-quart kits of the primer coating materials. The materials 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.
- Primer Coating Elastomeric Polysulfide Corrosion Inhibiting.
- Specification
- Manufacture's Code No.
- Name of Manufacture.
  Submitted by (Name) (date) for qualification tests in accordance with the requirements of MIL-P- under Authorization (reference authorizing letter).
- Mixing and other important 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.

4.4 Quality conformance tests. Quality conformance tests for acceptance of coatings shall consist of all the tests of this specification except that salt spray exposure for quality conformance shall be 300 hours (see 3.8.1) and with the exception of storage life.

4.4.1 Sampling. Unless otherwise specified (see 6.2), not less than a one (1) gallon kit of primer coating material shall be selected at random from each batch and subjected to the tests specified in 4.4.

4.4.1.1 Batch. A batch shall consist of all primer coating material manufactured during one continuous operation, forming part of one contract or order for delivery.

4.4.2 Sampling for examination of product. Sampling for filled containers shall be in accordance with MIL-STD-105, Level II, AQL 1.5 percent defective. The sample containers shall be subjected to the inspection specified in 4.8.11.

4.4.3 Rejection and retest. Rejected material shall not be resubmitted for acceptance without prior approval of the procuring activity. The application for resubmission shall contain full particulars concerning previous rejections and measures taken to correct these defects. Samples for retest shall be taken from previously unopened containers.

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

4.6 Test conditions

4.6.1 Standard conditions. Standard conditions shall be a temperature of 77° ± 2°F (25° ± 2PC), and a relative humidity of 50 ± 5 percent. All tests shall be conducted at standard conditions unless otherwise specified herein. (See Fed. Test Method Std. No. 141, Section 7, Paragraph 1.2).

4.7 Test panels. Except as otherwise specified in the test methods of 4.8 all test panels shall be of clad aluminum alloy conforming to QQ-A-250/5 of the size, heat treatment and quantity specified in Table III. The panels shall be cleaned, pretreated and primed as specified in 4.7.1, 4.7.2 and 4.7.3, respectively. Topcoat application shall be in accordance with 4.7.4.

4.7.1 Cleaning. All test panels shall be cleaned in accordance with the procedure specified for non-anodized aluminum panels in Fed Test Method Std. Nr. 141, Method 2013, Table II.

4.7.2 Pretreatment. All test panels shall be given a chemical film treatment conforming to type II of MIL-C-81706.

4.7.3 Priming. All test panels shall be primed with the polysulfide primer under test. The primer shall be reduced to a spray viscosity of 22 to 28 seconds in a number 2 Zahn cup using a nonphotochemically reactive solvent recommended by the manufacturer for the specific spray application technique. The primer shall be applied to a dry film thickness of 1.0 to 1.3 mils. Primer coated panels to be topcoated shall be air dried at standard conditions for a minimum of 4 hours and a maximum of 8 hours. Primer coated panels to be tested without a topcoat shall be air dried at standard conditions for 7 days.

4.7.4 Top coat application. The two components of the urethane coatings shall be mixed (one volume of component I by volume with one part by volume of component II), and reduced in accordance with the manufacturer's instructions to a viscosity of 17 to 23-seconds when measured as specified in 4.7 for spray applications. The viscosity should be suitably adjusted for other methods of application. The coating shall be applied to a total dry dilm thickness of 2.0 ± 0.3 mils in two coats. The total dry film thickness of the primer and coating shall be 2.7 to 3.6 mils. After application of the first coat, the panels shall be air dried in a

TABLE III

TEST PANEL PLAN (Number of Panels Required for Each Type of Primer)

Test Paragraph	Test Requirement	Panel Size In Inches	Aluminum Alloy and Heat Treatment	Quantity of Quantity of Panels Required
3.6.1	Working Properties	3 X 6 X 0.020	Clad 2024-T3	2
3.6.4	Pot Life	3 X 6 X 0.020	Clad 2024-T3	4
3.6.5	Drying Time	3 X 6 X 0.020	Clad 2024-T3	Use Panels from 3.6.1
3.7.2.1	Wet Tape Adhesion	3 X 6 X 0.020	Clad 2024-T3	2
3.7.2.2	Repairability	3 X 6 X 0.020	Clad 2024-T3	2
3.8.1	Salt Spray Resistance	3 X 6 X 0.020	Clad 2024-T3	3
3.8.2	Humidity Resistance	3 X 6 X 0.020	Clad 2024-T3	3
3.8.3	Heat Resistance	3 X 6 X 0.020	Clad 2024-T0	4
3.8.4	LOW Temperature resistance	3 X 6 X 0.020	Clad 2024-T0	2
3.8.5	Adhesion (Wet Tape)	3 X 6 X 0.020	Clad 2024-T3	2
3.9.2	Topcoat Compatibility	3 X 6 X 0.020	Clad 2024-T3	2
3.9.3	Wet Tape Adhesion	3 X 6 X 0.020	Clad 2024-T3	2
3.9.4A	Impact Flexibility	3 X 6 X 0.020	Clad 2024-T0	2
3.9.4B	Impact Flexibility	3 X 6 X 0.020	Clad 2024-T0	See 3.9.7
3.9.4C	Impact Flexibility	3 X 6 X 0.020	Clad 2024-T0	2
3.9.4D	Impact Flexibility	3 X 6 X 0.020	Clad 2024-T0	See 3.9.9
3.9.5	Salt Spray Resistance	3 X 6 X 0.020	Clad 2024-T3	3
3.9.6	Humidity Resistance	3 X 6 X 0.020	Clad 2024-T3	3
3.9.7	Heat Resistance	3 X 6 X 0.020	Clad 2024-T0	4
3.9.8	LOW Temperature Resistance	3 X 6 X 0.020	Clad 2024-T0	2
3.9.9a	Lubricating Oil Resistance	3 X 6 X 0.020	Clad 2024-T0	2
3.9.9b	Hydrocarbon Resistance	3 X 6 X 0.020	Clad 2024-T3	2
3.9.9c	Hydraulic Fluid Resistance	3 X 6 X 0.020	Clad 2024-T3	2
3.9.9d	Skydrol 500B Fluid Resistance	3 X 6 X 0.020	Clad 2024-T3	2
3.9.9e	Distilled Water Resistance	3 X 6 X 0.020	Clad 2024-T3	2
3.9.10	Filaform Corrosion	3 X 6 X 0.020	Clad 2024-T3	2
			TOTAL	56

horizontal position in a dust-free cabinet at standard conditions until sufficiently dry for application of the second coat. Dry to recoat shall not exceed one hour. An average of 5 film thickness measurements shall be taken in the central portion of the coated panels with a suitable filmeter. Unless otherwise specified, the coated test panels shall be air cured at standard conditions for 168 hours after application of the second coat prior to any testing.

4.8 Test methods.

4.8.1 Air pollution control regulations. The manufacturer will furnish the solvent and thinner combination by weight percentage for the primer coating he plans to submit.

4.8.2 Toxicological data and formulations. The manufacturer will furnish the toxicological data and formulations required to evaluate the toxicology of the primer coating materials to the Government Laboratory (see 6.3) which will refer the data to the appropriate medical service for determination and approval.

4.8.3 General test methods. The methods of Fed. Test Method Standard No. 141 and other applicable test methods as referenced in Table V are to be used to evaluate the primer coating materials.

4.8.4 Storage stability. A full, closed container of components I and II shall be stored under warehouse conditions at a temperature of 70° to 90°F (21.1° to 32.2°C) for 6 months, after which it shall be opened and inspected and tested for conformance to the requirements of this specification (see 3.5.6). The above storage stability testing for six months at 21°C (70°F) to 32°C (90°F) is for qualification testing only and does not exempt the supplier from meeting the requirements of 3.5.6.

4.8.5 Viscosity. The viscosity of the mixed polysulfide primers shall be determined with a number 2 Zahn cup in accordance with ASTM Method D1084-63.

4.8.5 Pot life. A one pint quantity of mixed primer coatings shall be stored in a full, closed container at standard conditions for a period of 2 hours. At the end of the 2 hour period, the coating shall be examined for lumping, seeding and separation. It shall then be tested for conformance to the requirements of 3.6.5.

4.8.6 Soluble chromate content. The soluble chromate content in the compound shall be determined by the following procedure:

a. The primer coating material used for this test must be fully cured for 7 days at standard conditions. Use a file or equivalent means to get the cured coating into small fines that will pass through an ASTM No. 40 sieve (0.0165 inch screen size). Polysulfide primer previously used for hardness determination may be used for this test. A 5 gram sample of the sieved fines shall be placed into a 500 ml beaker and 300 ml of distilled water added. The sample shall then be covered with a watchglass, placed on a hotplate and boiled for 2 hours. Decant and filter. Add 100 ml of distilled water to the coating fines in the beaker and boil for 30 minutes. Decant and filter into the above filtrate. Repeat the latter procedure to make a total volume of 500 ml.

b. Titration. Cool the filtrate to standard temperature, transfer 200 mls of the extracted solution to a 600 ml beaker and add 10 ml of concentrated hydrochloric acid and 2 grams of potassium iodide. Cover the resulting solution and allow to stand for a minimum of 5 minutes. The solution shall then be titrated with 0.10 normal sodium thiosulfate solution until the brown color of iodide is almost gone. Add 2 ml of freshly prepared starch solution. Continue the titration until the dark blue color of the iodine-starch solution is gone. Do not mistake the green color of the Cr^{+3} for the blue color of the iodine-starch complex. Record the milliters of sodium thiosulfate required for the titration.

c. Calculation. The percentage of soluble chromate shall be calculated as magnesium pentahydrate as follows:

$$\frac{(\text{ml}'Na_2S_2O_3) \times \text{Normality } Na_2S_2O_3 \times (0.0768) \times 100}{\text{Wt. of Sample in grams}} = \%Mg(Cr_2O_4\text{-}5H_2O)$$

4.8.7 Repairability. Two primer coated panels prepared in accordance with 4.7 and cured for 7 days at standard conditions shall be placed in a circulating air oven maintained at 60 ± 2°C (140 ±5°F) for 48 hours. The panels shall then be removed from the oven and cooled to ambient room temperature. Wipe the polysulfide coated panels with isopropyl alcohol and air dry at standard conditions for two hours. Apply a second coat of freshly mixed polysulfide primer over the above aged and conditioned polysulfide coated test panels. Cure the panels for 7 days at standard conditions. The panels shall then be wet tape tested in accordance with 4.8.3 and Table IV.

4.8.8 Low temperature resistance. Panels, prepared in accordance with 4.7 and cured in accordance with 4.6, and the cylindrical mandrels shall be placed in a cold box maintained at -54° ± 1.5°C (-65.°F ± 3°F for 4 hours. Without removal of the panels or mandrel from the cold box, the panels shall be exposed to the flexibility test specified in 4.8.3 and Table IV and examined for conformance to 3.8.4 and 3.9.8.

4.8.9 Topcoat compatibility. Two panels prepared in accordance with 4.7 with the exception that the polysulfide primer shall be allowed to cure only to a tack free condition, shall then be coated with gloss white coatings only. (See 3.9.1). The panels shall be observed for any evidence of primer lifting, discoloration of the topcoat, poor wetting properties of the primer by the polyurethane coating material, excessive orange peel effects of the topcoat that could be due to primer-topcoat incompatibility and for any increase in the cure rate of the topcoat. These observations shall be made after the first and second applications of the topcoat material. Cure the panels for three days at standard conditions and test the panels for conformance to 3.9.3 using the procedure specified in 4.8.3 and Table IV.

4.8.10 Filaform corrosion. Two test panels each coated with gloss and camouflage coatings, prepared as specified in 4.7 through 4.7.4 shall be tested in accordance with 4.8.3 and Table IV with the exception that the test panels shall be scribed through the coating system and through the clad to the bare aluminum alloy and the scribed panels shall be exposed over concentrated hydrochloric acid in a closed cabinet for 1 hour. The panels shall then be exposed in the humidity chamber for 30 days.

TABLE IV. Test Methods

Test	FTMS No. 141 Method Number	ASTM Method Number	Specification Requirement Number
A. Component requirements			
Condition in container	3011.1		3.5.5
Storage stability			3.5.6
Solvents		D2267	3.5.2
B. Mixed primer requirements.			
Working properties and surface appearance	4541		3.6.1
Viscosity		D1084-63	3.6.2
Settling (Reducibility and dilution stability)	4203.1		3.6.3
Drying time	4061		3.6.5
Odor	4401		3.6.6
Volatile and non-volatile content	4041.		3.6.7
C. Applied primer film properties.			
Adhesion (wet tape)	6301.1		3.7.2.1
Film hardness		D2240-75	3.7.2.3
Salt spray resistance	6061	B117	3.8.1
Humidity resistance	6201		3.8.2
Heat resistance	6051		3.8.3
Low temperature resistance	6222		3.8.4
Adhesion (wet tape)	6301.1		3.8.5
D. Topcoated primer film properties.			
Adhesion (wet tape)	6301.1		3.9.3
Flexibility (impact)	6226		3.9.4
Salt spray resistance	6061	B-117	3.9.5
Humidity resistance	6201		3.9.6
Heat resistance	6051		3.9.7
Flexibility (low temp)	6222		3.9.8
Immersion resistance	6011		3.9.9
Filaform corrosion resistance		D2803-70	3.9.10

5. PACKAGING

5.1 Packaging and packing. The polysulfide primer shall be packaged and packed in accordance with PPP-P-1792. The level of packaging shall be A or C, and the level of packing shall be A, B, or C as specified (see 6.2). The size of the containers shall be as specified in the procurement document (see 6.2).

5.1.1 Kit packaging. The primers shall be supplied as a kit packaged as a unit consisting of componentI, the polysulfide resin base and component II, the catalyst or curing agent to provide the necessary volume of mixed primer material purchased. The polysulfide primers shall be packaged in one pint, one quart, one gallon or five gallon kits.

5.2 Marking and labeling. Each component container in every kit and every exterior shipping container shall be marked in accordance with MIL-STD-129. In addition to the marking specified in MIL-STD-129, individual cans and containers shall bear a printed legible label (all labels shall be overcoated with a clear coating for weather proofing) showing the following nomenclature and information as applicable:

Component Identification:
- Component I - Polysulfide Resin Base
- Component II - Catalyst or Curing Agent

Specification:_____; Type
Manufacture name
Date Manufactured by month and year
Mixing, Thinning and Spraying Instructions
Weight per gallon
Storage Instructions

CAUTION: Keep away from flames. Protective clothing and adequate ventilation must be used during mixing and application of the coating. Consult the departmental medical service for safe handling instructions.

6. NOTES.

6.1 Intended Use. The polysulfide primers covered by this specification are intended for use as an elastomeric, corrosion inhibitive primer under aliphatic polyurethane coatings for protection of aircraft against corrosion. The polysulfide primer shall not be used on aerospace equipment that will be exposed to temperatures above 110°C (230°F).

6.2 Ordering data. Procurement documents should specify the following:

a. Title, number and date of this specification.
b. Type of primer required
c. Quantity and size of containers required.
d. Level of packaging and packing (see 5.2 and 5.2)

6.3 Government laboratory. Reference throughout this specification to a Government Laboratory shall be interpreted as the Air Force Materials Laboratory, Attn: AFML/MXA, Wright-Patterson AFB, Ohio 45433, unless otherwise specified in the procurement document.

6.4 Chemical film. The MIL-C-81706 material specified in 4.7.2 is Alodine 1200 which is available from Amchem Products, Inc., Ambler, Pa.

CUSTODIAN:

Air Force - 11

PREPARING ACTIVITY:

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