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SUPERSEDING
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FEDERAL SPECIFICATION

PRIMER COATING, ZINC CHROMATE, LOW-MOISTURE-SENSITIVITY

This specification was approved by the Assistant Administrator, Office of Federal Supply and Services, General Services Administration, for the use of all Federal Agencies.

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers the requirements for two types and colors for one grade of a low-moisture-sensitivity, corrosion-inhibiting primer, primarily intended for spray application on surface-treated aluminum surfaces or on surfaces coated with pre-treatment coating in accordance with MIL-C-8514 or DOD-P-15328. This primer may be used either with or without top coating. When suitably thinned, the primer may be used for dip or flow-coat application. This specification is suitable for use under air pollution regulations.

1.2 Classification. The zinc chromate primer coating furnished under this specification shall be of the following types and colors, as specified (see 6.2):

1.2.1 Types.

Type I - Bulk
Type II - Aerosol

1.2.2 Colors.

Color Y - Yellow primer
Color T - Primer tinted green to match color number 34151 of FED-STD-595

2. APPLICABLE DOCUMENTS

2.1 Government publications. The issues of the following documents, in effect on date of invitation for bids or solicitation for offers, form a part of this specification to the extent specified herein.

FSC 8010

Federal Specifications

- QQ-A-250/5 - Aluminum Alloy Alclad 2024, Plate and Sheet
- RR-S-366 - Sieve, Test
- TT-L-32 - Lacquer, Cellulose Nitrate, Gloss, For Aircraft Use
- TT-P-600 - Primer Coating, Zinc Chromate (in Pressurized Dispensers)
- TT-S-735 - Standard Test Fluids, Hydrocarbon
- PPP-P-1892 - Paint, Varnish, Lacquer, and Related Materials, Packaging, Packing, and Marking of
- PPP-T-60 - Tape, Packaging, Waterproof

Federal Standards

- FED-STD-141 - Paint, Varnish, Lacquer, and Related Materials, Methods of Inspection, Sampling, and Testing
- FED-STD-313 - Material Safety Data Sheets, Preparation and Submission of
- FED-STD-595 - Colors

(Activities outside the Federal Government may obtain copies of Federal specifications, standards, and commercial item descriptions, as outlined under General Information in the Index of Federal Specifications, Standards and Commercial Item Descriptions. The Index, which includes cumulative bimonthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

(Single copies of this specification, and other Federal specifications and commercial item descriptions required by activities outside the Federal Government for bidding purposes are available without charge from General Services Administration Business Service Centers in Boston, MA; New York, NY; Philadelphia, PA; Washington, DC; Atlanta, GA; Chicago, IL; Kansas City, MO; Fort Worth, TX; Houston, TX; Denver, CO; San Francisco, CA; Los Angeles, CA; and Seattle, WA.

(Federal Government activities may obtain copies of Federal standardization documents and the Index of Federal Specifications, Standards, and Commercial Item Descriptions from established distribution points in their agencies.)

Military Specifications

- MIL-C-8514 - Coating Compound, Metal Pretreatment, Resin-Acid
- MIL-A-8625 - Anodic Coatings, For Aluminum and Aluminum Alloys
- DOD-P-15328 - Primer (Wash) Pretreatment (Formula No. 117 For Metals) (Metric)
- MIL-T-81772 - Thinner, Aliphatic, Polyurethane Coating

Military Standards

- MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes
- MIL-STD-129 - Marking for Shipment and Storage

(Copies of military specifications and standards 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 a specific issue is identified, the issue in effect on date of invitation for bids or request for proposal shall apply.

American Society for Testing and Materials (ASTM) Standards

- B117 - Salt Spray (Fog) Testing
- D444 - Zinc Yellow Pigment (Zinc Chromate Yellow), Chemical Analysis of
- D523 - Specular Gloss
- D563 - Phthalic Anhydride Content of Alkyd Resins and Resin Solutions
- D1014 - Exterior Exposure Tests of Paints on Steel, Conducting
- D1200 - Viscosity of Paints, Varnishes and Lacquers by Ford Viscosity Cup
- D1210 - Fineness of Dispersion of Pigment - Vehicle Systems
- D1296 - Odor of Volatile Solvents and Diluents
- D1308 - Effect of Household Chemicals on Clear and Pigmented Organic Finishes
- D1475 - Density of Paint, Varnish, Lacquer and Related Products
- D1542 - Rosin in Varnishes, Qualitative Tests for
- D1729 - Visual Evaluation of Color Differences of Opaque Materials
- D1849 - Package Stability of Paint
- D2244 - Color Differences of Opaque Materials, Instrumental Evaluation of
- D2369 - Volatile Content of Paints
- D2698 - Pigment Content of Solvent-Type Paints by High Speed Centrifuging, Determination of

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

3. REQUIREMENTS

3.1 Materials. The ingredient materials used in the manufacture of this product shall conform to applicable government specifications except as otherwise specified herein.

3.2 Composition. The composition of the corrosion-inhibiting primer shall be as specified in tables I, II and III.

TABLE I. Solids content (see 4.5.1)

Zinc chromate primer	Minimum requirements	
	Type I	Type II
Total solids (percent by weight of primer)	59	13
Pigment content (percent by weight of total solids)	53	53

TABLE II. Pigment content (see 4.5.1)

Pigment <u>1/</u>	Requirements	
	Minimum	Maximum
Zinc chromate (percent by weight)	85	--
Siliceous extenders (percent by weight)	--	15

1/ Carbon black or lampblack are the prime pigments recommended for tinting. However, if required, small quantities of other pigments may be used.

TABLE III. Nonvolatile-vehicle content

Ingredients <u>1/</u>	Requirements	
	Minimum	Maximum
Oil-modified phenol-aldehyde resin (percent by weight) <u>2/</u>	16	19
Alkyd resin (percent by weight) <u>3/</u>	81	84

1/ The use of rosin or rosin derivatives is prohibited. (See table V - ASTM D1542.)

2/ A highly heat-polymerized, oil-modified resin having the following characteristics:

- a. Plasticizer content: 7 percent maximum on solids basis.
- b. Acetone-extractable content: 37 percent maximum on solids basis.
- c. Drying effected by evaporation of solvent.

3/ The resins shall consist of drying-type phthalic alkyds, containing a minimum of 37 percent of phthalic anhydride, and a minimum of 40 percent of oil modification on a nonvolatile basis. The use of phenolic modified alkyd resins is prohibited. (See table V.)

3.3 Volatile content. The volatile content of the primer shall consist of a non-photochemically reactive solvent. A non-photochemically 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 4.5.3):

- a. A combination of hydrocarbons, alcohols, aldehydes, esters, ethers, or ketones having an olefinic or cyclo-olefinic type of 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.

3.3.1 Thinner. The primer shall be compatible with thinner conforming to MIL-T-81772, type III.

3.3.2 Toxicity. The manufacturer shall certify that the primer contains no substances of known toxicity under normal conditions of usage. A material safety data sheet shall be prepared in accordance with FED-STD-313 and submitted as specified in the contract. Questions pertinent to the effect of the zinc chromate primer coating on the health of personnel when used for its intended purpose shall be referred by the procuring activity to the appropriate medical service who will act as adviser to the procuring activity.

3.4 Physical requirements.

3.4.1 Condition in container. The zinc chromate primer shall be free from excessive pigment flotation, skins, lumps, and grit, and shall be capable of being easily mixed to a smooth homogeneous condition, both in the original container and when reduced as specified in 4.4.4.1 (see 4.5.1).

3.4.2 Coarse particles and skins. Coarse particles and skins retained on a number 325 sieve conforming to RR-S-366 shall not exceed 0.3 percent, calculated on the total weight of the primer (see 4.5.1).

3.4.3 Water content. The water content shall not exceed 0.5 percent by weight (see 4.5.1).

3.4.4 Odor. When tested as specified in 4.5.1, the odor of the wet paint and of the film, at any interval of drying, shall not be obnoxious or objectionable.

3.4.5 Color. Color Y primer shall be yellow (characteristic of the zinc

chromate pigment). Color T primer shall be a good visual match with green, color number 34151 of FED-STD-595.

3.4.6 Viscosity. The undiluted viscosity of the type I primer shall be 20 to 25 seconds through a number 2 Zahn cup. The viscosity shall be determined as specified in 4.5.4.

3.4.7 Suspension properties. The primer, reduced and tested as specified in 4.5.5, shall be equal or superior in suspension properties to the simultaneously tested control formula product. After shaking as specified, the primer shall be completely redispersed to a smooth homogeneous state.

3.4.8 Fineness of grind. The primer shall have a minimum grind value of 6.0 (see 4.5.1).

3.4.9 Storage stability. The previously unopened packaged product (see 4.5.12) shall meet all the tests specified in 4.5 through 4.5.11 for a period of one year, provided that the daily mean temperature of the ambient air at the storage location falls within the range of 1.7° to 35°C (35° to 95°F), and the peak ambient air temperature does not exceed 46°C (115°F) (see 4.2).

3.5 Film properties. When used in a finish system, the primer shall produce a hard tough film and shall be equal or superior to the control formula product in all respects.

3.5.1 Application. The packaged type I primer shall be a freely working product and shall exhibit satisfactory spraying characteristics with acceptable leveling properties when the primer is reduced with thinner conforming to 3.3 (see 5.3.1 for thinning directions). For the type II primer, a minimum of 98 percent of the contents shall be sprayable in a pattern that deposits a uniform film.

3.5.2 Drying time. A sprayed coat of primer shall dry hard within 15 minutes (see 4.5.6).

3.5.3 Surface appearance. When applied on glass plates by spraying, the primer shall dry to a hard smooth finish free from grit, seeds, streaks, blisters, or other irregularities of surface (see 4.5.7).

3.5.4 Gloss. The 60 degree gloss shall not exceed 6 units (see 4.5.11).

3.5.5 Adhesion.

3.5.5.1 Knife test. The films of primer, prepared and tested as specified in 4.5.9, shall be difficult to furrow off with the knife and shall not flake nor powder. The knife cut shall show fine, feathered, beveled edges down to the metal.

3.5.5.2 Wet tape test. When tested as specified in 4.5.10, top coated primer, prepared as specified in 4.4.4.1, except that the lacquer top coat shall be dried 6 hours in lieu of 48 hours before immersion in water, shall show no greater removal of film from the panel than may occur with a similarly prepared and tested system using the control formula primer.

3.5.6 Flexibility (mandrel test). A primer film, top coated as specified in 4.4.4.1, applied on a 0.020 inch thick test panel, air-dried for 30 minutes, and baked at 95° to 105°C (203° to 221°F) for 24 hours, shall withstand bending over a 1/8 inch mandrel without cracking or flaking. Hairline cracking shall be permissible (see 4.5.1).

3.5.7 Smoothness (lacquer holdout). A panel, prepared as specified in 4.4.4.1 with lacquer top coat, shall exhibit a minimum 60 degree specular gloss of 65. The combination of the lacquer and primer shall produce a film free from blisters, coarse particles, or other irregularities of surface.

3.6 Resistance properties. The resistance properties of the primer shall be equal or superior to that of the control formula product.

3.6.1 Lacquer resistance, primer absorption. The combination of sprayed primer films shall be prepared as specified in 4.4.4.1 with lacquer top coat, except that 1 coat of lacquer is to be used. The lacquer top coat shall be applied after the primer coats have air-dried 10 minutes, 30 minutes, 1, 6, 16 and 48 hours and shall not show excessive embrittlement, bleeding, blistering, wrinkling, lifting, or other surface irregularities. Comparison shall be made with an identical system utilizing the control formula product (see 4.5.1).

3.6.2 Water resistance. Primer films air-dried for 48 hours shall withstand immersion in distilled water at room temperature for 24 hours. After immersion, examination shall show no blistering or other defects. The film shall show no more color change and shall be equal to or superior in toughness and anchorage to a similarly prepared and tested control formula product film. An applied coating of primer top coated as specified in 4.4.4.1 with 2 coats of test lacquer and immersed in water for 24 hours shall be equal or superior in all respects to similarly prepared films using the control formula product (see 4.5.1).

3.6.3 Hydrocarbon resistance. Primed panels air-dried for 48 hours shall withstand immersion in fluid conforming to TT-S-735, type III, at room temperature for 4 hours. Twenty-four hours after removal, they shall be equal in hardness, toughness, and anchorage to the similarly prepared and tested control formula product. Panels top coated as specified in 4.4.4.1, except that the panels shall be air-dried 24 hours and then baked at 95° to 105°C (203° to 221°F) for 2 hours, shall show no blistering after immersion in the test fluid for 4 hours and shall be equal or superior to system panels prepared and tested with the control formula product. The coated panels, air-dried for 24 hours after removal from the hydrocarbon fluid, shall exhibit

no flaking when subjected to a bend of 180 degrees over 1/2 inch mandrel and shall be equal in adhesion to a similarly tested and prepared control system (4.5.1).

3.6.4 Salt-spray resistance. When tested as specified in 4.5.8, the primer shall exhibit no blistering, lifting, or substrate corrosion after exposure to five percent salt-spray for 1000 hours.

3.6.5 Weather resistance (durability). Duplicate panels, prepared as specified in 4.5.13, shall withstand 12 months of exposure to weather at an angle of 45 degrees facing south at 25 degrees north latitude without showing loss of metal-protecting properties, checking, cracking, embrittlement, or loss of adhesion.

3.7 Workmanship. The component ingredients shall be assembled and processed in a manner that will assure conformance to all requirements of this specification.

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 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 the prescribed requirements.

4.1.1 Report of tests. The manufacturer shall submit notarized test reports, signed by a responsible official of its management, to the Government representative for each batch, showing the results including numerical values, when applicable, of all the examinations and tests specified herein. In addition, the manufacturer shall submit a notarized certification, also signed by a responsible official of its management, attesting that the primer will meet all the requirements of 3.4.9, storage stability, and 3.6.5, weather resistance, when tested as specified in 4.5.12 and 4.5.13. Reports of numerical tests as satisfactory are not acceptable.

4.2 Classification of inspection. The inspection requirement specified herein is classified as quality conformance inspection. The quality conformance inspection shall consist of all the examinations and tests specified under 4.5 of this specification, except for weather resistance and storage stability (see 4.1.1), and such other tests as are deemed necessary to check the manufacturer's data. If a test specimen fails to meet any of the tests required by this specification, the lot represented by the sample shall be rejected.

4.2.1.1 Additional tests. In addition, the Government reserves the right to conduct weather resistance tests and to have any tests of this specification rerun at a Government laboratory at any time within 1 year from the date of manufacture of this primer, as attested by the date appearing on the label. Samples for these tests shall be taken from a previously unopened container of the submitted acceptance sample, which shall have been stored as described in 4.5.13.

4.3 Sampling.

4.3.1 Sampling for tests. Quality conformance test samples shall be selected as required by FED-STD-141.

4.3.1.1 Ingredient materials. When requested by proper authority, a sample from each lot of the ingredient materials shall be taken for test purposes.

4.3.1.2 Sampling for visual inspection of filled containers. A random sample of filled containers shall be selected in accordance with MIL-STD-105, inspection level S-4, and an acceptable quality level (AQL) of 2.5 percent defective for examination as specified in 4.5.2.

4.4 Test conditions. The laboratory testing conditions shall be in accordance with FED-STD-141 and as described herein.

4.4.1 Thinning of primer for laboratory tests. The type I primer shall be thinned by the addition of thinner conforming to MIL-T-81772, type III to a viscosity suitable for spray application.

4.4.2 Test lacquer. Whenever top coating is specified, the test lacquer shall be TT-L-32, type 2, glossy teal blue, color number 15042 of FED-STD-595.

4.4.3 Control formula product. The control product to be used as a standard of comparison for judging the performance of the manufacturer's product shall be assembled in strict conformance with the formula in table IV.

4.4.4 Test panels. With the exception of the flexibility test, all panels used for test purposes shall be aluminum alloy conforming to QQ-A-250/4 (T3 temper), 0.020 by 3 by 6 inches in size, and shall be treated with materials meeting MIL-C-81706 to produce coatings conforming to MIL-C-5541. For the flexibility test, the test panels shall be aluminum alloy conforming to QQ-A-250/4 (0 temper), anodized in accordance with MIL-A-8625, Type I (see 3.5.6).

4.4.4.1 Panel preparation. Three by six inch test panels shall be used. Test panels shall be sprayed with primer to a dry-film thickness of 0.0006 to 0.0009 inch. Packaged primer reduction shall be with thinner conforming to MIL-T-81772, type III. The primer shall be air-dried for 30 minutes and top coated with 2 coats of type 2 test lacquer conforming to 4.4.2, 30 minutes apart. The primer shall only be top coated with type 2 lacquer. Each lacquer top coat shall be applied to a dry-film thickness of 0.0008 to 0.0010 inch. Unless otherwise specified, after the second coat of lacquer is applied, it shall be air-dried for 72 hours.

TABLE IV. Control formula 1/

Group A ingredients <u>5/</u>	Weight in grams
Zinc-yellow	702
Extender pigment <u>2/</u>	120
Alkyd resin solution (60 percent in xylene) <u>3/</u>	170
Maleic anhydride	2.5
Xylene	360
10 percent aluminum stearate gel	93
Group B ingredients <u>5/</u>	Weight in grams
Xylene	103
Alkyd resin solution (60 percent in xylene) <u>3/</u>	710
Dispersion resin solution (50 percent solids) <u>4/</u>	225
Lead naphthenate drier	10.0
Cobalt naphthenate drier (6 percent metal)	2.5
Antiskinning agent	2.5

1/ The table IV formulation, with the specified proprietary raw materials, represents a product of established outdoor weathering durability. The listing of these proprietary materials is not to be construed as an endorsement thereof or as precluding primer formulated with raw materials from other proprietary sources or other formulation within the compositional framework of table I, II and III. Such products may provide equivalent or even superior performance to the control formula. However, the table IV formulation should be employed as the comparison standard for control purposes.

2/ Whittaker, Clark and Daniels Superfine Talc or equal.

3/ Aroplaz 1365 (60 percent solids). (May be acquired from Ashland Chemical Co. Div. of Ashland Oil and Refining Co.)

4/ Bakelite CKU-2266 (50 percent solids).

5/ Load all of group A ingredients in a pebble mill half full of pebbles and grind for 40 hours, after which all the material of group B ingredients are added and the grinding continued for 4 hours more.

4.5 Test methods.

4.5.1 The tests listed in table V shall be conducted in accordance with FED-STD-141, ASTM Test Methods and as hereinafter specified.

TABLE V. Primer coating properties

Characteristics	Paragraph		Test method	
	Requirement	Test	FED-STD-141	ASTM
Total solids	Table I	--	--	D2369
Pigment content	Table I	--	--	D2698
Analysis of zinc chromate pigment	Table II	--	--	D444
Vehicle isolation	Table III	--	--	D2698
Vehicle solids	Table III	--	--	D2698
Rosin	Table III	--	--	D1542
Phthalic anhydride	Table III	--	--	D563
Solvent content of lacquers and thinners	3.3	--	7360	--
Volatile content	3.3	4.5.3	--	--
Condition in container	3.4.1	--	3011	--
Skinning	3.4.1	--	3021	--
Coarse particles and skins	3.4.2	--	4092	--
Water content	3.4.3	--	4081	--
Odor	3.4.4	--	--	D1296
Color	3.4.5	--	--	D1729, D2244
Viscosity	3.4.6	4.5.4	--	D1200
Suspension properties	3.4.7	4.5.5	--	--
Fineness of grind	3.4.8	--	--	D1210
Storage stability	3.4.9	4.5.12	--	D1849
Application	3.5.1	--	4331	--
Drying time	3.5.2	4.5.6	4061	--
Surface appearance	3.5.3	4.5.7	--	--
Gloss	3.5.4	4.5.11	--	D523
Knife test	3.5.5.1	4.5.9	6304	--
Wet tape test	3.5.5.2	4.5.10	--	--
Flexibility (mandrel)	3.5.6	--	6221	--
Smoothness	3.5.7	4.4.4.1	--	D523
Lacquer resistance	3.6.1	--	6252	--
Water resistance	3.6.2	--	--	D1308
Hydrocarbon resistance	3.6.3	--	6011	--
Salt-spray resistance	3.6.4	4.5.8	--	B117
Weather resistance	3.6.5	4.5.13	--	D1014

4.5.2 Examination of product. All primer shall be examined as specified in 4.5.2.1 and 4.5.2.2 to determine conformance to this specification with respect to material and workmanship.

4.5.2.1 Examination for container fill. The size sample of 4.3.1.2 shall be adjusted to inspection level S-3 of MIL-STD-105, except that the sample size derived from MIL-STD-105 shall be rounded off to the next highest increment of five. At no time shall the sample size be less than five, unless the lot consists of less than five containers in which case all containers shall be used to determine the fill. The sample unit shall be one filled container. The lot shall be rejected if the average volume per container is less than that specified.

4.5.2.2 Examination of preparation for delivery. The samples selected in accordance with 4.3.1.2 shall be examined for packaging, packing, marking, leakage and workmanship. Any package having one or more defects shall be rejected. If the number of defective packages exceeds the acceptable quality level (AQL) of 2.5 percent defective in accordance with MIL-STD-105, the lot represented by the sample shall be rejected.

4.5.3 Solvent analysis.

4.5.3.1 Separation of volatile portion. Construct the apparatus shown in Figure 1 keeping dead volume to a minimum, particularly in the air introduction segment. Immerse the receiver in a dry ice-acetone bath of sufficient depth that the bath liquid reaches to the bottom level of the rubber stopper. Pour approximately 15 grams of sample into the 50ml distillation flask and immediately follow with 10ml of tricresyl phosphate. Without delay, mix the contents of the flask, assemble the apparatus, close the needle-valve and stopcock attached to the capillary tubing. Immerse the distillation flask by raising a pre-heated silicone oil bath until it reaches the side arm. Maintain the bath temperature at 155° - 160°C (311° - 320°F) and adjust the oil bath level as high as is practical. Allow the distillation to proceed for 15 minutes without vacuum. Apply vacuum slowly and carefully to avoid bumping or rapid distillation until 0 - 2 mm of mercury is reached. This should require about 10 minutes. Next, carefully open the stopcock. After bubbling subsides, adjust the needle valve so as to regulate the flow of air at a rate of 60 - 80 bubbles per minute, at a bubble counter. Pass air through the system for a total of 30 minutes, keeping the dry ice bath at its maximum cold. Release the vacuum very slowly with the air flowing to prevent back-up of the primer. Remove the receiver containing the solvents and warm the contents only to the temperature of cold running tap water. Transfer promptly to an air-tight container for subsequent analysis.

4.5.3.2 Determination of solvent composition.

4.5.3.2.1 Apparatus. A gas chromatograph, equipped with a thermal conductivity detector and suitable recorder and provision for programmed temperature operation, shall be used.

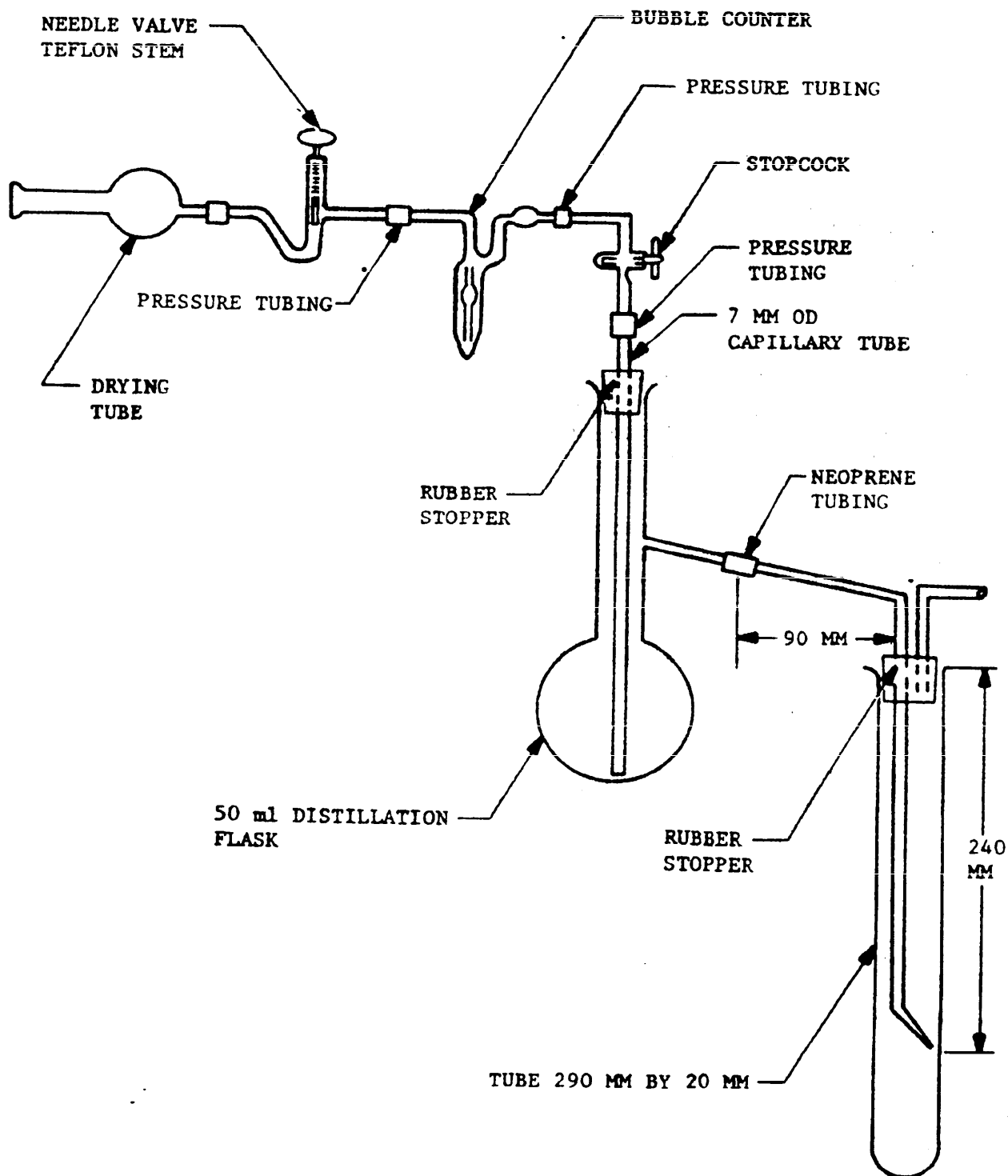


FIGURE 1. Distillation apparatus.

4.5.3.2.2 Column preparation. Two lengths of 1/4 inch copper tubing, an 8 foot section packed with 20 percent by weight of N, N Bis(2 cyano-ethyl) formamide on 60 to 80 mesh Chromosorb P, a 12 foot length packed with 30 percent by weight of diethylene glycol succinate on 60 to 80 mesh Chromosorb P. The two sections are then coupled together and installed so that the sample passes first through the 8 foot section.

4.5.3.2.3 Operation conditions.

Detector cell temperature, °C (°F)	300 (572)
Detector cell current, ma	160
Injection port temperature, °C (°F)	250 (482)
Helium flow at exit, ml/minute	100
Column heating rate, °C/minute (°F)	2 (3.6)
Initial column temperature, °C (°F)	60 (140)
Terminal column temperature, °C (°F)	440 (284)

4.5.3.3 Procedure. Weigh 5 ml of the isolated solvent into a small stoppered flask. Rapidly weigh 1 ml of internal standard, ethyl acetate, into the same flask. Mix thoroughly and inject about 3 microliters of sample onto the column and chromatograph according to the directions described above. If the solvent mixture contains ethyl acetate, alternate internal standards such as methyl isobutyl ketone, butyl acetate, or other standards may be used.

4.5.3.4 Calculation. Measure the area of each solvent peak and relate to the area of the known amount of internal standard. Compute percentages on either a weight or volume basis as required, as follows:

$$\text{Percent solvent (weight basis)} = \frac{A \times F \times P}{I \times S}$$

Where:

A = area of solvent peak
 F = detector response correction factor for weight (see method 7360 of FED-STD-141)
 P = weight of internal standard X 100
 I = area of internal standard peak
 S = weight of sample

$$\text{Percent solvent (volume basis)} = \frac{A \times F \times P}{I \times S}$$

Where:

A = area of solvent peak

F = detector response correction factor for volume (see note)
P = volume of internal standard X 100
I = area of internal standard peak
S = volume of sample

NOTE: Detector response correction factors for volume can be calculated from the specific gravity of each solvent and the weight basis correction factors.

4.5.4 Viscosity. The viscosity shall be determined in accordance with ASTM D1200, except that a number 2 Zahn cup or equal shall be used.

4.5.5 Suspension properties. Two hundred ml each of the primer and control formula product, thinned for spraying as specified in 4.4.4.1, shall be placed in glass stoppered 250 ml glass graduates. The graduates shall stand undisturbed for 24 hours. At the end of this time, the primer shall show no more settling than the control formula product. The graduates shall be shaken vigorously for 30 seconds. The contents of each shall be re-examined for evidence of separation or undispersed pigment.

4.5.6 Drying time. The dry-hard time shall be determined in accordance with method 4061 of FED-STD-141. Test panels shall be coated with primer as specified in 4.4.4.1.

4.5.7 Surface appearance. Primer shall be thinned as specified in 4.4.1. Primer shall be sprayed on glass plates and examined in the wet and dry conditions.

4.5.8 Salt spray resistance. The test panels shall be primed as directed in 4.4.4.1. Two intersecting lines shall be scribed across the surface of each panel so that the substrate is exposed. The panels shall then be placed in a five percent salt-spray cabinet for 1000 hours as described in ASTM B117 and examined for conformance to 3.6.4.

4.5.9 Knife test. Allow the panels tested in 4.5.8 to air dry for 72 hours. Perform the knife test in accordance with method 6304 of FED-STD-141 and inspect for compliance with 3.5.5.1.

4.5.10 Wet tape test. Panels shall be immersed for 24 hours in distilled water at room temperature. After 24 hours of immersion, each panel shall be removed from the water and wiped dry with a soft cloth. Immediately thereafter, using a stylus, two parallel scratches, down to metal, shall be made 1 inch apart on the portion of panel previously immersed. One minute after removal from water, a 1-inch wide strip of masking tape, Code No. 250, Minnesota Mining and Manufacturing Company or equal (only newly manufactured tape shall be used), shall be applied, adhesive side down, across the scratches. The tape shall

immediately be pressed down, using two passes of a rubber-covered roller weighing 4-1/2 pounds, approximately 3-1/2 inches in diameter by 1-3/4 inches in width, the surface of which has a Shore "A" durometer hardness value within the range of 70 to 80. Immediately thereafter, the tape shall be removed in one abrupt motion and the panel examined for damage, such as removal of lacquer from primer or the entire system from metal.

4.5.11 Gloss. Gloss shall be determined in accordance with ASTM D523, except that ~~the~~ primer shall be sprayed in accordance with 4.4.4.1.

4.5.12 Storage stability. In accordance with ASTM D1849 and the conditions specified in 3.4.9, allow a closed, full can of the primer to stand for one year. The contents shall then be subjected to all the test specified under 4.5 through 4.5.11 for compliance to 3.4.9.

4.5.13 Weather resistance (durability). Panels 5 by 16 inches, coated with the primer under test and separate panels coated with the control formula, shall be prepared as specified in 4.4.4 and 4.4.4.1, both with and without lacquer top coat. The panels shall be exposed in accordance with ASTM D1014 for 1 year in the area of Key West, Florida. After exposure, the panels shall be examined for any deterioration of the system finish for conformance to 3.6.5.

5. PACKAGING

5.1 Preservation and packing. The primer shall be packaged in accordance with PPP-P-1892. The level of preservation and the level of packing shall be as specified (see 6.2).

5.2 Aerosol dispenser (type II only). Type II primer shall be packaged in an aerosol dispenser conforming to TT-P-600.

5.3 Marking of shipments. Interior packages and exterior shipping containers shall be marked in accordance with MIL-STD-129. The identification shall be composed of the following information listed in the order shown:

PRIMER COATING, ZINC CHROMATE, LOW-MOISTURE-SENSITIVITY
TT-P-1757A

Type (I or II)

Color (Y or T)

Stock number or other identification number as specified in the acquisition document 1/

1/ The contractor shall enter the National Stock No. specified in the acquisition document or as furnished by the acquiring activity. When the National Stock Number is not provided or available from the acquiring activity, leave space therefor

and enter the stock number or other identification as provided by the acquiring activity.

5.3.1 Additional markings. In addition to the marking specified in 5.3, the following shall be included on type I containers:

"Use thinner conforming to MIL-T-81772, Type III."

"Application directions: Apply by spray, brush, or dip to deposit a hiding coat of primer. A wet coat is necessary to secure maximum adhesion and corrosion-inhibiting properties."

For color T material, the label shall contain the following:

"Pretinted to match Interior Green, Color number 34151 of FED-STD-595."

5.3.2 Precautionary markings. In addition the markings specified by PPP-P-1892, the following caution label shall appear on each container:

CAUTION

Contains zinc chromate
Avoid breathing of vapor
Use with adequate ventilation

6. NOTES

6.1 Intended use. The primer covered by this specification is intended primarily for use as a corrosion-inhibiting primer on aluminum aircraft or airborne equipment metal surfaces either alone or top coated with lacquer or enamel. It should be applied to a dry-film thickness between 0.6 - 0.9 mil. The primer is satisfactory for application over a wide range of temperature and humidity conditions. This primer is intended for spray application over surface-treated metal or pretreatment coating. If used for dip or flow-coat application, the suitability should be determined by the user. Suggested tests are as follows:

6.1.1 Suitability for dip application. A 4 by 12 inch test panel, dipped full length in the primer reduced as specified by the manufacturer, should, upon removal, exhibit a film uniform in appearance and free from color separation, sagging, running, or streaking.

6.1.2 Suitability for flow-coat application. The surface appearance of flow-coat on glass panel should be examined. Slight silking is permissible provided a continuous film is produced. Exact thinning ratios for dip or flow-coat production will vary depending on the type of equipment and should be

worked out by the using activity.

6.2 Ordering data. Purchasers should select the preferred options permitted herein and include the following information in procurement documents.

- (a) Title, number, and date of this specification
- (b) Type and color required (see 1.2.1 and 1.2.2)
- (c) Size of the containers in which the primer is to be furnished
- (d) Level of preservation and packing required (see 5.1)
- (e) Toxicity report (see 3.3.2)

6.2.1 Unit of acquisition. The primer covered by this specification should be acquired by volume, the unit being one U.S. gallon of 231 cubic inches. The volume is equal to the net weight in pounds divided by the weight per gallon determined as specified herein.

MILITARY INTERESTS:

Custodians

Army-ME
Navy-AS

Review Activities

Army-GL, MD, MI, AR
Navy-SH

User Activities

Army-AV, ME, AT, MI
Navy-OS, SH

CIVIL AGENCY COORDINATING ACTIVITIES:

GSA-FSS

PREPARING ACTIVITY:

NAVY-AS

(DOD Project 8010-0921)

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STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions - Reverse Side)

1. DOCUMENT NUMBER

TT-P-1757A

2. DOCUMENT TITLE

Primer Coating, Zinc Chromate, Low-Moisture-Sensitivity

3a. NAME OF SUBMITTING ORGANIZATION

4. TYPE OF ORGANIZATION (Mark one)

VENDOR

USER

MANUFACTURER

OTHER (Specify): _____

b. ADDRESS (Street, City, State, ZIP Code)

5. PROBLEM AREAS

a. Paragraph Number and Wording

b. Recommended Wording

c. Reason/Rationale for Recommendation

6. REMARKS

7a. NAME OF SUBMITTER (Last, First, MI) - Optional

b. WORK TELEPHONE NUMBER (Include Area Code) - Optional

c. MAILING ADDRESS (Street, City, State, ZIP Code) - Optional

8. DATE OF SUBMISSION (YYMMDD)

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82 MAR

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