TT-P-28G
July 8, 1985
SUPERSEDING
Fed. Spec. TT-P-28F
June 9, 1979

FEDERAL SPECIFICATION

PAINT, ALUMINUM, HEAT RESISTING (1200 deg. F)

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

1.1 Scope. This specification covers an aluminum, heat-resistant paint that will withstand solvents, normal weather exposure, and temperatures up to 1200 deg. F.

1.2 Classification. Heat resisting aluminum paint covered by this specification shall be of one type that meets air pollution regulation 442 of South Coast Air Quality Management District in addition to the solvent requirements of this specification.

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.

Federal Specifications:

TT-P-320	- Pigment, Aluminum, Powder and Paste, for Paint.
TT-S-735	- Standard Test Fluids; Hydrocarbon.
PPP-B-601	- Boxes, Wood, Cleated Plywood.
PPP-B-621	- Box, Wood, Nailed and Lock-Corner.
PPP-B-636	- Box, Shipping, Fiberboard.
PPP-C-96	- Can, Metal, 28 Gage and Lighter.
PPP-D-729	- Drums, Shipping and Storage, Steel, 55 Gallon (208 Liters).
PPP-D-732	- Drum, Metal, 55 Gallon Reconditioned (for Shipments of Noncorrosive Material).
PPP-P-704	- Pails, Metal: (Shipping, Steel, 1 Through 12 Gallons).

FSC 8010

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

Federal Standards:

Fed. Test Method Std. No. 141 - Paint, Varnish, Lacquer, and Related Materials; Methods of Inspection, Sampling, and Testing.
FED-STD-123 - Marking for Shipment (Civil Agencies).
FED-STD-313 - Material Safety Data Sheets, Preparation and Submission of.

(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, 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 Description from established distribution points in their agencies.)

Military Standards:

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.
MIL-STD-129 - Marking for Shipment and Storage.
MIL-STD-147 - Palletized Unit Loads.

(Copies of specifications, standards, and drawings required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer.)

2.2 Other publications. The following document(s) form a part of this specification to the extent specified herein. The issues of the documents which are indicated as DoD adopted shall be the issue listed in the current DoDISS and the supplement thereto, if applicable.

American Society for Testing and Materials (ASTM) Standards:

A 366 - Steel, Carbon, Cold-Rolled Sheet, Commercial Quality.
A 569 - Steel, Carbon (Oils Maximum, Percent), Hot-Rolled-Sheet and Strip, Commercial Quality.

B 117 - Salt Spray (Fog) Testing.
D 562 - Consistency of Paints Using the Stormer Viscometer.
D 609 - Preparation of Steel Panels for Testing Paint, Varnish, Lacquer, and Related Products.
D 1014 - Conducting Exterior Exposure Test of Paints on Steel.
D 1308 - Effect of Household Chemicals on Clear and Pigmented Organic Finishes.
D 2698 - Determination of the Pigment Content of Solvent Type Paints by High Speed Centrifuging.
D 3272 - Vacuum Distillation of Solvents from Solvent-Based Paints for Analysis.
D 3924 - Standard Environment for Conditioning and Testing Paint, Varnish, Lacquer, and Related Materials.
D 3951 - Standard Practice for Commercial Packaging.

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

South Coast Air Quality Management District (SCAQMD) Regulations:

Rule 442 - Usage of Solvents.

(Application for copies should be addressed to the South Coast Air Quality Management District, 9150 East Flair Dr., El Monte, CA 91731.)

Federal Regulations:

49CFR178 - Department of Transportation (DOT) Shipping Container Specifications.

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

National Motor Freight Traffic Association. Inc., Agent:

National Motor Freight Classification.

(Application for copies should be addressed to the American Trucking Associations, Inc., National Motor Freight Traffic Association, Inc., 2200 Mill Road, Alexandria, VA 22314.)

Uniform Classification Committee, Agent:

Uniform Freight Classification.

(Application for copies should be addressed to the Uniform Classification Committee, Room 1106, 222 South Riverside Plaza, Chicago, IL 60606.)

(Industry association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, the text of this specification shall take precedence.

3. REQUIREMENTS

3.1 Qualification. The paints 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 4.2 and 6.4). Any change in the formulation of a qualified product will necessitate its requalification. The material supplied under contract shall be identical, within manufacturing tolerances, to the product receiving qualification.

3.2 Composition.

3.2.1 Pigment. The pigment shall be aluminum conforming to TT-P-320, type I or type II, class A.

3.2.1.1 Vehicle. The nonvolatile vehicle shall be a silicone or a modified silicone resin together with driers, if necessary. In addition to the solvent requirements of this specification, the volatile portion of the vehicle shall conform to the following requirements by volume when tested as specified in 4.3.3:

a. Aromatic compounds with eight or more carbon atoms except ethyl benzene: 8 percent maximum.
b. Ethyl benzene and toluene: 20 percent maximum.
c. Solvents with an olefinic or cyclo-olefinic type of unsaturation: negative test (see 6.5).
d. Ketones: negative.
e. Total of a + b: 20 percent maximum.

3.3 Quantitative requirements. The paint shall conform to the quantitative requirements specified in table I when tested as in 4.3.

TABLE I. Quantitative requirements.

Characteristics	Requirements	
	Minimum	Maximum
Total solids, percent by weight of paint.	40	--
Pigment, percent by weight of paint.	23	27
Vehicle solids, percent by weight of paint.	13	--

TABLE I. Quantitative requirements. (continued)

Characteristics	Requirements Minimum	Maximum
Silica, (SiO_2), percent by weight of vehicle solids.	11	--
Water content, percent by weight of paint.	--	0.2
Consistency (package) Krebs Stormer shearing rate 200 RPM (grams).	75	125
Equivalent Krebs Units (KU).	54	67
Drying time, hours:		
Set to touch, air dry.	--	1
Dry hard, air dry.	--	3
Full hardness, baked at 400 deg. F.	--	1

3.4 Qualitative requirements.

3.4.1 Condition in container. No evidence of gas build-up, such as bulging of can, shall be observed. A freshly opened full container of the paint tested as in 4.3.7 shall be free from grit, seeds, skins, lumps, abnormal thickening or livering and shall show no more pigment settling or caking than can be readily reincorporated to a smooth homogeneous state.

3.4.2 Storage stability.

3.4.2.1 Partially full container. A three-quarter filled, closed 8-ounce glass jar of the paint shall show no skinning after being tested for 48 hours as specified in 4.3.8.1. At the end of the 7 day heat test as specified in 4.3.8.1, the treated sample shall be cooled to room temperature and it shall show no pressure buildup; also, no livering, curdling, hardcaking or gummed sediment shall be observed. The paint shall mix readily to a smooth homogeneous state, and any skin formed shall be continuous and easily removed. The aged paint after the 7 day treatment shall be suitable for the purpose intended.

3.4.2.2 Full container. A full quart can of the paint shall show no "gas" pressure in the can, no skinning, livering, curdling, hard dry caking, or tough gummy sediment when tested as specified in 4.3.8.2. The paint shall mix readily to a smooth homogeneous state and shall be suitable for the purpose intended.

3.4.3 Brushing properties. The paint shall brush easily with good flow and leveling properties when tested as specified in 4.3.9 and shall dry to a smooth uniform film free from seeds, runs, sags, or streaks.

3.4.4 Spraying properties. The paint, tested as specified in 4.3.10, shall spray satisfactorily in all respects and shall show no running, sagging, or streaking. The dried film shall show no dusting or mottling and shall present a smooth uniform finish free from seeds.

3.4.5 Heat resistance. Films of paint prepared and tested as specified in 4.3.11 shall show no cracking, blistering, flaking, or peeling. When the knife test is done as specified in 4.3.11, the paint shall adhere tightly to the metal.

3.4.6 Salt spray resistance. Films of paint prepared and tested as specified in 4.3.12 and examined immediately after removal from the test shall show no more than a trace of rusting and no more than 5 scattered blisters none of which is larger than 1 mm in diameter. Some dulling or staining unaccompanied by red rusting shall be permitted. On removal of the paint from the panels tested as specified in 4.3.12.2 the surface of the steel shall show no more than a trace of rusting, pitting, or corrosion (No. 9-1, Method 6451 of Fed. Test Method Std. No. 141).

3.4.7 Water resistance. A film of paint prepared and tested as specified in 4.3.13 shall show no wrinkling or blistering immediately upon removal of the panel from the water. The paint shall not be significantly affected when examined 2 hours after removal, and after 24 hours air drying, the portion of the paint which was immersed shall show no more than an insignificant whitening or dulling in comparison to the portion that was not immersed.

3.4.8 Hydrocarbon fluid resistance. A film of the paint prepared and tested as specified in 4.3.14 shall show no wrinkling or blistering immediately after removal from the fluid. After 24 hours air drying, the portion of the panel which was immersed shall be almost indistinguishable with regard to hardness and adhesion from a panel prepared by the same time but not immersed.

3.4.9 Weather resistance. A film of paint prepared and tested as specified in 4.3.15 shall show no checking, cracking, or significant film deterioration. Dulling or staining unaccompanied by red rusting shall be permitted. On removal of the paint from the panels the surface of the steel shall show no more than a trace of rusting, pitting, or corrosion (No. 9-1, Method 6451 of Fed. Test Method Std. No. 141).

3.4.10 Toxicity. The paint shall contain no benzene (benzol), methanol, chlorinated compounds, hydrolyzable chlorine derivatives, or other ingredients which are toxicologically hazardous under normal conditions of usage (see 4.3.16).

3.5 Quantities. The paint shall be furnished in 1-quart, 1-gallon, 5-gallon, and 55-gallon quantities.

3.6 Material safety data sheet. A material safety data sheet shall be prepared by the manufacturer in accordance with FED-STD-313, and submitted to the contracting officer (see 6.2).

3.7 User instruction masking. In addition to the markings specified in 5.4, all containers shall be legibly marked or labeled with the following:

CAUTION: Avoid contact with skin or eyes. Keep container tightly closed. Avoid prolonged or repeated breathing of vapors. Use with adequate ventilation.

4. QUALITY ASSURANCE PROVISION

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements specified herein. Except as otherwise specified in the contract or order, 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 that supplies and services conform to the prescribed requirements.

4.1.1 Sampling and inspection. Sampling and inspection shall be in accordance with MIL-STD-105.

4.2 Classification of inspections. Inspections shall be classified as follows:

a. Qualification testing (see 4.2.1).
b. Acceptance testing of individual lots (see 4.2.2).
c. Inspection of preparation for delivery (see 4.4).

4.2.1 Qualification testing. Qualification testing shall consist of all the tests of this specification.

4.2.2 Acceptance testing. Acceptance testing of individual lots shall consist of testing for all requirements of section 3 with the exception of storage stability (see 3.4.2.2 and 4.3.8.2) and weather resistance (see 3.4.9 and 4.3.15).

4.3 Tests.

4.3.1 Test conditions. The routine and referee testing conditions shall be in accordance with ASTM D 3924 except as otherwise specified herein. The dry film thickness shall be measured after the coated panel has been baked at 400 deg. +/- 5 deg. F for 15 minutes.

4.3.2 Test methods. The following tests shall be conducted in accordance with applicable methods or as required by this specification. The right is reserved to make any additional tests deemed necessary to determine that the

paint meets the requirements of this specification. Failure to pass any test and non-compliance to the requirements of section 3 shall be cause for rejection of the lot.

TABLE II. Index of test procedures and requirements.

Item	Applicable method in Fed. Test Method Std. No. 141	ASTM Method	Test paragraph	Requirement paragraph
Total solids.	--	--	4.3.3	Table I
Pigment content.	--	D 2698	--	Table I
Vehicle solids.	--	D 2698	--	Table I
Silica.	--	--	4.3.4	Table I
Water content.	--	--	4.3.17, 6.6	Table I
Aromatic hydrocarbons.	7356	--	--	3.2.1.1
Olefinic and cycloolefinic compounds.	7356	--	--	3.2.1.1
Ketones.	--	--	4.3.5	3.2.1.1
Consistency.	--	D 562	--	Table I
Drying time:				
Set to touch.	4061	--	4.3.6.1	Table I
Dry hard.	4061	--	4.3.6.1	Table I
Full hardness	--	--	4.3.6.2	Table I
Condition in container.	3011	--	4.3.7	3.4.1
Storage stability:				
Partially full container.	3021	--	4.3.8.1	3.4.2.1
Full container.	3022	--	4.3.8.2	3.4.2.2
Brushing properties.	4321	--	4.3.9	3.4.3
Spraying properties.	4331	--	4.3.10	3.4.4
Heat resistance:				
Hot rolled steel.	--	--	4.3.11.1	3.4.5
Cold rolled steel.	--	--	4.3.11.2	3.4.5
Salt spray resistance:				
Hot rolled steel.	--	B 117	4.3.12.1	3.4.6
Cold rolled steel.	--	B 117	4.3.12.2	3.4.6
Water resistance.	--	D 1308	4.3.13	3.4.7
Hydrocarbon fluid resistance.	--	D 1308	4.3.14	3.4.8
Weather resistance.	--	D 1014	4.3.15	3.4.9
Benzene.	7356	--	4.3.16	3.4.10
Methanol.	5133	--	4.3.16	3.4.10
Chlorinated solvents.	5132	--	4.3.16	3.4.10

4.3.3 Nonvolatile (total solids) content. Place a portion of the thoroughly mixed sample in a dropping bottle and weigh to the nearest 0.1 mg. Weigh a 60 mm diameter aluminum dish to the nearest 0.1 mg. Transfer a small sample that does not exceed 0.3 g to the dish, determine its exact weight by loss in weight of the bottle. Dissolve the sample in 2 ml of A.C.S. reagent grade toluene and dry in a gravity convection oven at 105 deg. C for 30 minutes. Upon cooling, reweigh the dish to the nearest 0.1 mg. From the weight of the residue in the dish and the weight of the sample taken, calculate the percent novolatile (total solid) as required.

4.3.4 Silica content of vehicle. From a stoppered bottle or weighing pipet, weigh by difference, to the nearest 0.1 mg about 3 grams of vehicle isolated by ASTM D 2698 into a previously ignited and weighed 3-inch porcelain evaporating dish. Dry at 105 deg. C, in an oven for 3 hours. Place the dried sample in a cold muffle furnance and gradually increase the temperature, over a period of 3 hours to 800 deg. C, then maintain this temperature for an additional hour. After cooling in a dessicator, weigh the dish and contents and calculate the percent of silica as follows:

$$\text{Percent silica} = \frac{\text{Weight of ash X 100}}{\text{Weight of sample X non-volatile vehicle fraction}}$$

4.3.5 Test for ketones.

4.3.5.1 Reagent. Two grams of 2, 4-dinitrophenylhydrazine + 4 ml of concentrated sulfuric acid + 30 ml methanol (add slowly) + 10 mls water.

4.3.5.2 Procedure. Pipet 1 ml of reagent into a 20 x 170 mm test tube. Add 10 drops of distillate isolated by ASTM D 3272 and shake for 30 seconds. A yellow precipitate or cloud in the reagent layer indicates the presence of ketones. Run a blank using one milliliter of reagent and 10 drops of mineral spirits.

4.3.6 Drying time.

4.3.6.1 Air drying. Draw down a film of the paint on a glass panel using a 0.0015 inch applicator (0.0030 inch gap clearance) and determine air drying time under referee conditions in accordance with method 4061 of Fed. Test Method Std. No. 141 for compliance with table I.

4.3.6.2 Full hardness. Determine full hardness by spraying a film of paint to a dry film thickness of 0.0008 to 0.0010 inch on a steel panel that has been solvent cleaned with the aliphatic naptha-ethylene glycol monoethyl ether mixture in accordance with method 2011 of Fed. Test Method Std. No. 141. Air dry 30 minutes and then bake at 400 deg. +5 deg. F for 1 hour. Determine compliance with full hardness requirement of table I. The film shall be considered to have reached full hardness when it is very difficult to remove with a knife blade.

4.3.7 Condition in container. Determine package condition on acceptance testing in accordance with method 3011 of Fed. Test Method Std. No. 141 and observe for compliance with 3.4.1. On qualification testing, evaluate pigment settling or caking by proceeding as in method 3011 of Fed. Test Method Std. No. 141 but do not stir. Reseal and agitate the can for 3 minutes on a paint shaker. On re-examination of the contents, the disclosure of any gel bodies or undispersed pigment indicates unsatisfactory settling properties.

4.3.8 Storage stability.

4.3.8.1 Partially full container. Determine skinning after 48 hours in accordance with method 3021 of Fed. Test Method Std. No. 141 and observe for compliance with 3.4.2.1. Reseal, tape lid and all glass area with masking tape. Place taped jar in gallon can with loose fitting lid and expose to 7 days heating at 60 deg. C. Observe sample cautiously for first few days to note rupture of jar or leakage. Cool test assembly to room temperature and handle with good caution when opening jar. Observe contents for compliance with 3.4.2.1 (heat aged requirement).

4.3.8.2 Full container. In accordance with method 3022 of Fed. Test Method Std. No. 141, allow a full standard quart can of the paint to stand undisturbed for 1 year and then examine the contents. Evaluate pigment settling or caking as in 4.3.7 except agitate the can for 5 minutes on the paint shaker prior to re-examination. Check for compliance with 3.4.2.2.

4.3.9 Brushing properties. Apply the paint as packaged using a 2-1/2 inch brush and observe for brushing properties in accordance with method 4321 of Fed Test Method Std. No. 141 for compliance with 3.4.3. As a referee test for sagging, use method 4494 of Fed. Test Method Std. No. 141 except make the drawdown a minimum of 10 inches long on clear plate glass. The 4 mil strip shall not make contact with the next thicker strip at any point within the 5-1/2 inch central portion of the blade path.

4.3.10 Spraying properties. Spray the paint as packaged or thin if necessary with not more than 5 percent by volume of thinner meeting Rule 442 and compatible with the paint as supplied on a steel panel to a dry film thickness between 0.0008 and 0.0010 inch and observe for spraying properties in accordance with method 4331 of Fed. Test Method Std. No. 141 for compliance with 3.4.4. For referee test use automatic application per method 2131 of Fed. Test Method Std. No. 141.

4.3.11 Heat resistance.

4.3.11.1 Hot-rolled steel. Select eight panels which are completely free of loose mill scale and have been cut to 3 by 6 inches from 14 gauge low-carbon steel conforming to ASTM D 569. Solvent clean with the aliphatic naphtha-ethylene glycol monoethyl ether solvent mixture of method 2011 of Fed. Test

Method Std. No. 141. Spray the paint (one or two coats as necessary) on all eight panels to a total dry film thickness between 0.0008 and 0.0010 inch and air dry for at least 24 hours. Place the panels in an oven on a suitable rack or holder so that no part of the panels are in direct contact with the bottom or sides of the oven and subject to the following heating schedule:

	deg. F
8 hours (first day)	400
16 hours (overnight)	500
8 hours	600
16 hours	700
8 hours	800
16 hours	900
8 hours	1000
16 hours	1100
8 hours	1200

Remove the panels from the furnace for as short a period of time as possible and inspect (except for the knife test) for compliance with 3.4.5 at the end of each heating period. Remove two panels at the end of the 500 deg. F, 600 deg. F and 900 deg. F heating periods for use in the salt spray test (see 4.3.12.1). At the conclusion of the heating schedule, remove the remaining two panels, allow to cool in air, cut with a knife blade and observe for compliance with 3.4.5.

4.3.11.2 Cold-rolled steel. Spray the paint to a dry film thickness between 0.0008 and 0.0010 inch on two 3 by 6 inch steel panels, ASTM A 366, that have been solvent cleaned as specified in 4.3.11.1. Apply the paint to the side of the panel that has been flat polished as described in ASTM D 609, 4.3. Air dry 30 minutes and then bake at 400 deg. +/- 5 deg. F for 1 hour. Cool to room temperature. Place the panels on a rack as in 4.3.11.1 and heat for 24 hours in an oven that has been previously raised to a temperature of 1000 deg. +/- 10 deg. F. Remove from the oven, cool, and inspect for compliance with 3.4.5 performing the knife test as specified in 4.3.11.1.

4.3.12 Salt spray resistance.

4.3.12.1 Hot-rolled steel. Remove the unscored panels from the 500 deg. F, 600 deg. F and 900 deg. F heating periods of 4.3.11.1, allow them to reach room temperature and expose them to the salt spray for 24 hours in accordance with ASTM B 117. Upon removal, wash the panels gently in warm running water until free from any visible salt deposits and examine immediately for compliance with 3.4.6.

4.3.12.2 Cold-rolled steel. Prepare three 4 by 12 inch steel panels as specified in 4.3.11.2 except do not heat at 1000 deg. F. Expose the unscored panels to the salt spray as specified in 4.3.12.1 for 96 hours. Upon removal, wash the panels gently in warm running water until free from any visible salt deposits and examine immediately for compliance with 3.4.6. Strip the paint from the panels by means of lacquer thinner and inspect for compliance with 3.4.6.

4.3.13 Water resistance. Prepare a film of paint as in 4.3.11.2 except do not heat at 1000 deg. F. Coat all exposed uncoated metal surfaces with wax or suitable coating and immerse the panel for 24 hours at 23 +/- 1 deg. C in accordance with ASTM D 1308. Upon removal, observe the panel for compliance with 3.4.7.

4.3.14 Hydrocarbon fluid resistance. Prepare a film of paint as in 4.3.11.2 except do not heat at 1000 deg. F. Immerse the panels for 4 hours in a hydrocarbon fluid conforming to TT-S-735, type III in accordance with ASTM D 1308. Upon removal, examine for compliance with 3.4.8.

4.3.15 Weather resistance. Prepare two 4 by 12 inch steel panels as in 4.3.11.2 except do not heat at 1000 deg. F. Place on outdoor exposure for 12 months at an angle of 45 south in the latitude of Washington, DC and inspect for compliance with 3.4.9. Strip the paint from the panels by means of lacquer thinner or if the thinner is not effective by a commercial silicone enamel stripper and inspect for compliance with 3.4.9.

4.3.16 Toxicity. The manufacturer shall certify that the paint contains no benzene (benzol), methanol, chlorinated solvents or other ingredients which are deemed to be toxicologically hazardous under normal conditions of usage.

4.3.17 Water content. The water content shall be run on the vehicle as isolated in 4.3.4 using the following procedure:

1. Weigh a syringe (plus needle) containing several milliters of the vehicle to the nearest milligram (w_1).
2. Introduce about 1 gram of the vehicle into the assembled titration vessel of a Karl Fischer automatic titrator (see 6.6).
3. Reweigh the syringe plus needle plus residual vehicle (w_2).
4. Calculate the vehicle sample weight (V_w) as $w_1 - w_2$.
5. Titrate the sample and determine the micrograms of water present.
6. Calculate the $\%H_2O$:

a. $$\%H_2O \text{ in the vehicle} = \frac{\text{micrograms } H_2O}{10{,}000 \times V_w}$$

b. $$\%H_2O \text{ in the paint} = \%H_2O \text{ in the vehicle} \times \frac{100 - TP}{100}$$

where TP = % pigment in the paint as determined by ASTM D 2698.

4.4 Inspection of preparation for delivery.

4.4.1 Quality conformance inspection of preparation for delivery.

4.4.1.1 Unit of product. For the purpose of inspection, a complete pack prepared for shipment shall be considered a unit of product.

4.4.1.2 Sampling. Sampling for examination shall be in accordance with MIL-STD-105.

4.4.1.3 Examination. Samples selected in accordance with 4.4.1.2 shall be examined for the following defects. The AQL shall be 2.5 percent defective.

No.	Defect	A	B	Comm
101.	Unit containers not of the sizes specified.	5.1.1		5.1.1
102.	Unit containers not as specified.	5.1.1.1		5.1.1.2
103.	Intermediate containers not as specified.	5.1.2.1		5.1.2.2
104.	Packing not as specified.	5.2.1	5.2.2	5.2.3
105.	Palletization, when required, not as specified.	5.3	5.3	5.3
106.	Marking not as specified.	5.4.1	5.4.1	5.4.1

5. PREPARATION FOR DELIVERY

5.1 Packaging. Packaging shall be level A or commercial as specified (see 6.2).

5.1.1 Unit containers. The unit containers for the aluminum paint (see 3.5), shall be 1-quart or 1-gallon metal multiple friction plug containers, 5-gallon lug cover steel pails or 55-gallon steel drums, as specified (see 6.2).

5.1.1.1 Level A. The metal unit containers, of the types and sizes specified in 5.1.1, shall comply with the following requirements:

a. Multiple friction plug containers shall be in accordance with PPP-C-96, type V, class 2. Interior coatings as applicable, shall be as specified therein. Exterior coatings, including side seam stripping, shall be as specified therein for plan B. Wire handles as specified therein, shall be provided for the 1-gallon container. Closure of the properly filled and sealed cans shall be as specified in the appendix thereto.

b. Lug cover steel pails shall be in accordance with PPP-P-704, type II or III, class as applicable. Interior coatings and exterior coatings shall be as specified therein. Closure of properly filled and sealed pails shall be as specified in the appendix thereto.

c. The 55-gallon steel drums shall conform to PPP-D-729. Alternatively, when specified (see 6.2), the 55-gallon drums shall conform to PPP-D-732. Drum types shall be as applicable and drum classes shall be optional.

d. The containers shall comply with the requirements of the Uniform Freight Classification (UFC), the National Motor Freight Classification (NMFC), and the applicable requirements of the Code of Federal Regulations 49CFR, Department of Transportation (DOT).

5.1.1.2 Commercial. Unit containers of the types and sizes specified in 5.1.1 (see 6.2), shall be those containers normally used for products of this nature providing there will be no interaction chemically or physically with the contents so as to damage the container or alter the strength, quality or purity of the contents. The containers shall comply with the requirements of the UFC, the NMFC and the requirements of 49CFR.

5.1.2 Intermediate containers. The aluminum paint, in the unit containers specified in 5.1.1, shall be placed in intermediate containers in the following manner:

a. Twelve 1-quart unit containers shall be placed in an intermediate container.

b. Four 1-gallon unit containers shall be placed in an intermediate container.

c. Intermediate containers shall not be required for 5-gallon pails or the 55-gallon drum.

5.1.2.1 Level A. Intermediate containers, for the unit container sizes and quantities specified in 5.1.2, shall comply with the requirements of PPP-B-636, type CF, grade V3c or W5c, as applicable, style optional. The containers shall be close-fitting and closure shall be in accordance with method V of the appendix thereto. The containers shall comply with UFC, NMFC and 49CFR requirements.

5.1.2.2 Commercial. Intermediate containers, for the unit container sizes and quantities specified in 5.1.2, shall be close-fitting corrugated fiberboard boxes in accordance with UFC, NMFC and 49CFR requirements.

5.2 Packing. Packing shall be level A, level B or commercial as specified (see 6.2).

5.2.1 Level A. Intermediate containers of like size unit containers of paint shall be packed in close-fitting wood boxes conforming to PPP-B-601, overseas type, or PPP-B-621, class 2. Box closure and strapping shall be as specified in the applicable box specification or the appendix thereto except that strapping shall be flat and the finish B. Five-gallon unit containers of paint shall be packed for level A in the same manner. Fifty five-gallon unit containers shall not require additional protection.

5.2.2 Level B. Level B packing shall be as specfied for level A in 5.2.1 except that boxes shall be domestic type or class and the strapping shall be finish A or B.

5.2.3 Commercial. The paint, in the unit and intermediate containers specified in 5.1, shall, as applicable, be packed in multiples of like sizes in accordance with UFC, NMFC and 49CFR requirements.

5.3 Palletization. When specified (see 6.2), the intermediate containers specified in 5.1.2 for the 1-quart and 1-gallon unit containers, and the 5-gallon and 55-gallon unit containers specified in 5.1.1, shall be palletized in accordance with MIL-STD-147. Only one size unit or intermediate container shall be placed on a pallet.

5.4 Marking.

5.4.1 Levels A and B. In addition to any special or identification markings required by the contract or purchase order, each unit container, intermediate container, shipping container and, as applicable, each palletized load shall be marked as follows:

5.4.1.1 Military agencies. Shipments consigned to military agencies shall be marked in accordance with MIL-STD-129.

5.4.1.2 Civil agencies. Shipments consigned to civil agencies shall be marked in accordance with Fed. Std. No. 123.

5.4.2 Commercial. Commercial marking shall be in accordance with ASTM D 3951. Additionally, each shipping container shall be marked with the cube and gross weight.

6. NOTES

6.1 Intended use. The paint covered by this specification is intended for use on heated steel surfaces, at temperature up to 120 deg. F. Such use may be on super-heated steam lines, boiler casings, boiler drums, super heater headers, and similar high temperature application. It is also intended for painting military equipment such as personnel heaters, rocket launchers and other components, where operating temperatures preclude the use of conventional paints. It may also be used for application to engraved, stamped, or stenciled lettering or numerals on metallic gun or weapon components for identification or functioning purposes when those components are exposed to temperatures up to 1200 deg. F.

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. Size and quantity of containers required (see 3.5).
c. Material safety data sheet (see 3.6).
d. Degree of packaging and degree of packing required (see 5.1 and 5.2).
e. When palletization is required (see 5.3).
f. Any special marking (see 5.4).

6.3 The paint should be purchased by volume, the unit being one United States liquid gallon of 231 cubic inches at 68 deg. F (20 deg. C).

6.4 Qualification. With respect to products requiring qualification, awards will be made only for products which at the time set for opening of bids, qualified 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 US Army Belvoir Research and Development Center, ATTN: STRBE-VO; Ft. Belvoir, VA 22060-5606 and information pertaining to qualification of products may be obtained from this activity.

6.5 The test for olefinic and cyclo-olefinic compounds will not be positive for solvents containing less than one percent of these compounds.

6.6 An instrument found satisfactory for determining water content of paint covered by this specification is Photovolt Aquatest II made by Photovolt Aquatest Co., 1115 Broadway, New York, NY 10010.

MILITARY INTEREST:

Custodians

Army - ME
Navy - SH
Air Force - 20

Review Activities

Army - MD
Navy - YD
Air Force - 99, 84

User Activity

Navy - OS

CIVIL AGENCY COORDINATING ACTIVITIES:

GSA - 10 FCT
APM
HCC
JFK
NBS
OSS

PREPARING ACTIVITY:

Army - ME

Project 8010-0951

Orders for this publication are to be placed with General Services Administration, acting as an agent for the Superintendent of Documents. See section 2 of this specification to obtain extra copies and other documents referenced herein.