

TT-P-615d  
January 23, 1967  
SUPERSEDING  
Int. Fed. Spec. TT-P-00615c (GSA-FSS)  
December 23, 1964 and  
Fed. Spec. TT-P-615b  
September 12, 1961

## FEDERAL SPECIFICATION

### PRIMER COATING: BASIC LEAD SILICO CHROMATE, READY MIXED

This specification was approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.

#### 1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers basic lead silico chromate base, ready-mixed primer for use on iron and steel surfaces.

#### 1.2 Classification.

1.2.1 Types. Ready-mixed basic lead silico chromate base primer covered by this specification shall be furnished in the following types, as specified in the invitation for bids, contract or order (see 6.2).

- I - Basic lead silico chromate linseed oil-alkyd (4 to 1).
- II - Basic lead silico chromate base-iron oxide linseed oil-alkyd (1 to 1).
- III - Basic lead silico chromate base-iron oxide alkyd varnish primer.
- IV - Basic lead silico chromate phenolic varnish primer.
- V - Basic lead silico chromate base-iron oxide linseed oil-alkyd (2.25 to 1.0).

#### 2. APPLICABLE DOCUMENTS

2.1 Specifications and standards. The following specifications and standards of the issues in effect on date of invitation for bids, form a part of this specification to the extent specified herein.

##### Federal Specifications:

- RR-S-366 - Sieve, Test.
- TT-D-643 - Drier, Paint, Naphthenate, Liquid, Concentrated.
- TT-L-215 - Linseed Oil, Raw, (For Use in Organic Coatings).
- TT-R-266 - Resin, Alkyd; Solutions.
- TT-T-291 - Thinner; Paint, Volatile Spirits (Petroleum-Spirits).

##### Federal Standard:

- Fed. Test Method Std. No. 141 - Paint, Varnish, Lacquer, and Related Materials; Methods of Inspection, Sampling and Testing.

(Activities outside the Federal Government may obtain copies of Federal Specifications, Standards, and Handbooks as outlined under General Information in the Index of Federal Specifications and Standards and at the prices indicated in the Index. The Index, which includes cumulative monthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., 20402.

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(Single copies of this specification and other product specifications required by activities outside the Federal Government for bidding purposes are available without charge at the General Services Administration Regional Offices in Boston, New York, Washington, D.C., Atlanta, Chicago, Kansas City, Mo., Dallas, Denver, San Francisco, Los Angeles, and Seattle, Wash.

(Federal Government activities may obtain copies of Federal Specifications, Standards, and Handbooks and the Index of Federal Specifications and Standards from established distribution points in their agencies.)

Military Specification:

MIL-Z-15486 - Zinc Oxide.

(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 document form as a part of this specification. Unless otherwise indicated, the issue in effect on date of invitation for bids shall apply.

American Society for Testing Materials (ASTM) Standard:

D 1648-61 - Basic Lead Silico Chromate.

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

3. REQUIREMENTS

3.1 Color. Types I and IV shall have the usual color, characteristic of basic lead silico chromate. Types II, III, and V primer shall have the usual color characteristic of a blend of basic lead silico chromate and red iron oxide.

3.2 Pigment. The pigment used in the formulation of the primer shall be as specified in table I for the respective types.

3.2.1 The extracted pigment upon analysis shall conform to the quantitative requirements of table II for the respective types.

3.3 Vehicles. All vehicles shall be free from rosin and rosin derivatives when tested as described in 4.3.1. The component parts of the vehicle used in the primer shall be as indicated in table V, for the respective types.

3.3.1 Types I and V. The vehicle for types I and V primer shall consist of raw linseed oil, blended with a glyceryl-phthalate-type varnish composed of a soya-oil modified resin together with the necessary driers, and volatile thinners.

3.3.2 Type II. The vehicle for type II primer shall consist of raw linseed oil blended with a glyceryl-phthalate-type varnish composed of a soya-oil modified resin together with the necessary driers, and volatile thinners.

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Table I. Pigment composition

Pigment	(Percent by weight)									
	Type I		Type II		Type III		Type IV		Type V	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Basic lead silico chromate[1]	99.3	-	93.2	-	85.0	-	98.5	-	94.0	-
Pigment suspending agent	0.5	0.7	0.5	0.7	0.6	0.8	1.0	1.5	0.5	0.7
Red iron oxide pigment 85 percent $\text{Fe}_{27}\text{O}_{37}$ [2]	-	-	5.0	7.0	6.4	8.4	-	-	-	-
Zinc oxide (acicular)	-	-	-	-	6.0	8.0	-	-	-	-
Pure red iron oxide	-	-	-	-	-	-	-	-	3.0	5.3

[1] Test method shall be in accordance with ASTM D 1648.

[2] The iron oxide pigment shall be on a siliceous base (not calcium sulfate) conforming to TT-P-375, Type II.

Table II. Pigment composition

Pigment	Requirements (percent by weight)									
	Type I		Type II		Type III		Type IV		Type V	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Basic lead silico chromate[1]	99.3	-	93.2	-	85.1	-	98.0	-	94.0	-
Iron oxide ( $\text{Fe}_{27}\text{O}_{37}$ )	-	-	4.8	5.8	5.5	7.1	-	-	3.0	5.0
Zinc oxide	-	-	-	-	6.0	8.0	-	-	-	-

[1] Test method shall be in accordance with ASTM B 1648.

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3.3.3 Type III. The vehicle for type III shall consist of a glyceryl-phthalate-type varnish composed of a linseed-soya oil-modified resin together with the necessary amounts of driers and volatile thinners.

3.3.4 Type IV. The vehicle for type IV primer shall be a straight phenolic spar varnish suitable for grinding with basic lead silico chromate; shall consist of a 25-gallon length varnish composed of 25 gallons of tung oil and 100 pounds of a 100 percent, pure, nonheat hardening phenolic resin with the necessary driers and volatile thinners; and shall conform to the properties specified in table IV.

3.3.4.1 The resin to be used in the vehicle for type IV primer shall be of but one grade, namely, that known commercially as a 100 percent paratertiary amyl phenolformaldehyde resin and shall conform to the properties specified in table III.

Table III. Properties of the phenolic resin

Characteristics	Minimum	Maximum
Specific gravity at 25 deg. C.	1.03	1.06
Softening point (ring and ball method) deg. F.	185	210
Color (50 percent solution in xylene)	-	10
Ash, percent	-	0.03
Compatibility in ethyl alcohol (25 percent solids) [1]	Clear	

[1] Reflux with alcohol until dissolved (approx. 15 min.). Examine after 24 hours.

Table IV. Properties of the phenolic varnish

Characteristics	Minimum	Maximum
Nonvolatile content, percent by weight	59	61
Viscosity 77 deg. F.	F	H
Color	-	12
Weight per gallon in pounds	7-1/2	-
Drying time, in hours (see 4.3.5.2):		
Set to touch	-	2
Print free	-	8
Kauri reduction	120	-
Water resistance, 212 deg. F., hours (see 3.5.7)	7	-
Alkali resistance, 5 percent NaOH at 68 deg. F., hours (see 3.5.8)	7	-
Gas proofness	Shall pass test	
Appearance	Clear; free from sediment	
Skinning, 48 hours	Shall pass test	

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Table V. Vehicle composition[1]

Ingredients	(Percent by weight)									
	Type I		Type II		Type III		Type IV		Type V	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Raw linseed oil, TT-L-215	58.0	-	26.0	-	-	-	-	-	45.0	-
Alkyd resin solids, TT-R-266, type I	15.0	-	-	-	-	-	-	-	20.0	22.0
Alkyd resin solids, TT-R-266, type III	-	-	26.0	-	40.0	-	-	-	-	-
Phenolic varnish solids	-	-	-	-	-	-	47.0	-	-	-
Volatile thinner and driers	-	25.0	-	48.0	-	60.0	-	53.0	-	31.0

[1] The vehicle may contain appropriate amounts of antioxidants and wetting aids.

3.4 Primer quantitative requirements. The primer shall meet the quantitative requirements specified in table VI for the respective types.

Table VI. Quantitative requirements of the primer

Characteristics	Requirements									
	Type I		Type II		Type III		Type IV		Type V	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Pigment, percent by weight of primer	64.0	-	57.0	-	48.0	-	57.0	-	64.0	-
Nonvolatile vehicle, percent by weight of vehicle	75.0	-	52.0	-	40.0	-	47.0	-	69.0	-
Phthalic anhydride, percent by weight of nonvolatile vehicle	4.6	-	15.0	-	30.0	-	-	-	7.0	-
Oil acids, percent by weight of non- volatile vehicle	-	-	-	-	47.0	-	-	-	-	-
Kauri reduction on supercentrifuged vehicle, percent	-	-	-	-	-	-	120	150	-	-
Uncombined water, percent by weight of primer	-	0.5	-	0.5	-	0.5	-	0.5	-	0.5
Coarse particles and skins (retained on No. 325 standard sieve[1]), percent by weight of pigment	-	1	-	1	-	1	-	1	-	1

[1] Conforming to RR-S-366.

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Table VI. Quantitative requirements of the primer (Continued)

Characteristics	Requirements									
	Type I		Type II		Type III		Type IV		Type V	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Consistency:										
Krebs-Stormer, shearing rate, 200 r.p.m.:										
Grams	165	260	140	205	140	225	160	225	160	220
Equivalent K.U.	75	90	70	83	70	86	74	86	74	85
Weight per gallon, pounds	15.2	-	13.5	-	12.2	-	13.2	-	14.9	-
Drying time:										
Set to touch, hours	-	6	-	4	1/4	1	1/4	1	-	6
Dry through, hours	-	36	-	16		8	-	6	-	36
Flashpoint deg. F.	80	-	80	-	80	-	80	-	80	-
Fineness of grind	4	-	4	-	4	-	4	-	4	-

### 3.5 Qualitative requirements.

3.5.1 Condition in container. The respective types of primer shall not show excessive settling in a freshly-open, full can, and shall be easily redispersed with a paddle to a smooth, homogeneous state. The primer shall show no curdling, livering, caking, or color separation, and shall be free from lumps and skins (see 6.4).

3.5.2 Dilution stability. The primer shall remain stable and uniform after reduction in the proportions of eight parts by volume of mineral spirits conforming to TT-T-291, grade 1.

3.5.3 Brushing properties. The primer as received shall brush easily, possess good leveling properties, and show no running or sagging tendencies when applied at a spreading rate of 500 square feet per gallon to smooth steel vertical surfaces.

3.5.4 Spraying properties. The primer when reduced as specified in 3.5.2, shall spray satisfactorily, show no tendency to orange-peel, sag, creep, or run, and show satisfactory spraying properties in all other respects.

3.5.5 Skinning. The primer shall not skin within 48 hours in a three-quarters filled, closed container.

3.5.6 Appearance. The primer shall dry to a smooth uniform finish free from roughness, grit, unevenness, and other surface imperfections (see 4.3.3.1). The primer shall show no streaking or separation when flowed on clean glass (see 4.3.3.2).

3.5.7 Hot water resistance (type IV, varnish only). The phenolic varnish film after recovery from immersion in boiling water (see footnote 2 table VII) shall show no evidence of blistering, dulling whitening, or loss of adhesion.

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3.5.8 Alkali resistance (type IV, varnish only). The phenolic varnish film after recovery from alkali immersion (see footnote 2 to table VII) shall show no change in appearance such as haze spots, pits, or loss of adhesion.

3.5.9 Water resistance, type IV primer. When exposed to cold distilled water as specified in 4.3.2, the film of paint shall show no blistering or wrinkling immediately upon removal of panel. There shall be no softening of the film and not more than a very slight whitening when examined 2 hours after removal.

3.5.10 Storage stability. The primer shall show no curdling, gelling, or hard caking when stored for 12 months from the date of delivery to the Government procuring agency, in a full, tightly-covered container, at a temperature of 21 deg. to 32 deg. C. (70 deg. to 90 deg. F.).

#### 4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements specified herein. Except as otherwise specified, the supplier may utilize his own facilities or any commercial laboratory acceptable to 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.

4.2 Sampling and inspection. Sampling and inspection shall be performed in accordance with method 1031 of Fed. Test Method Std. No. 141.

#### 4.3 Test procedures.

4.3.1 The following tests in table VII shall be conducted in accordance with Fed. Test Method Std. No. 141 except as specified herein.

Table VII. Index

Characteristics	Requirement reference	Applicable Fed. Test Method Std.	Paragraph reference
Percentage of pigment	Table VI	4021	
Iron oxide (Fe <sub>2</sub> O <sub>3</sub> )	Table II	7141	
Isolation of vehicle		4032	
Nonvolatile in vehicle	Table VI	4041	
Phthalic anhydride	Table VI	7021	
Oil acids	Table VI	7031	
Uncombined water	Table VI	4081	
Consistency	Table VI	4281	
Coarse particles and skins	Table VI	4092	
Weight per gallon	Table VI	4184	
Drying time	Table VI	4061	
Condition in container	3.5.1	3011	
Dilution stability	3.4.2	4203	
Brushing properties	3.5.3	2141, 4321	
Spraying properties	3.5.4	2131, 4331	
Kauri reduction	Table VI	4151[1]	
Skinning		4141	
Rosin and rosin derivatives	3.3	5031[1]	
Flashpoint	Table VI	4293	
Color of transparent vehicle liquid	Table III and IV	4241	

[1] Make the test on a portion of the isolated vehicle.

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Table VII. Index (Continued)

Characteristics	Requirement reference	Applicable Fed. Test Method Std.	Paragraph reference
Viscosity, transparent liquid	Table IV	4271	4.3.2
Immersion resistance	Table IV	6011[2]	
Gas test (Bell jar)	Table IV	4161	
Print test	Table IV	6211	
Appearance of transparent liquids	Table IV	4261	
Ash	Table III	5261	
Storage stability	3.5.10	3022	
Fineness of grind	Table I	4411	

[2] The following immersion tests shall be made on the phenolic varnish specified in 3.3.4.2, reduced as specified in 4.3.5.2.

#### 4.3.2 Immersion resistance.

(a) Hot water resistance, type IV varnish only. The varnish shall be poured on a panel freshly cleaned with benzol and of the size and type required for the Kauri reduction test. After pouring on the varnish, it shall be allowed to spread over the entire face of the panel except for the upper 0.5 inch and then allowed to dry in a nearly vertical position for 72 hours. When dry, a 0.5 inch strip of the panel shall be cut off at the edge which was the bottom during the draining and drying period. The panel shall be cut in half and one half saved for comparison. The other half shall be entirely immersed vertically in a beaker of distilled water at 212 deg. F. for 7 hours. The panel after removal shall be allowed 2 hours' recovery before examination.

(b) Alkali resistance, type IV varnish only. Dip the closed end of a solvent (benzol) cleaned 1-by-6-inch test tube to a depth of 4 inches into the reduced varnish; remove, and allow to dry in an inverted position, that is, with the mouth of the tube down, for 72 hours; place the closed end of the test tube which was uppermost during the drying period 2 inches below the surface of a 5 percent sodium hydroxide solution at 68 deg. +/- 0.5 deg. F. for 7 hours. Remove and immediately rinse under gently running tap water, taking care not to touch the treated film. Dry 2 hours at room temperature and examine.

(c) Water resistance, type IV primer. Apply two coats of type IV primer to both sides of the solvent-cleaned panel (method 2011) by brushing (method 2141), allowing 24 hours of air-drying between coats (section 7 of Fed. Test Method Std. No. 141). After the coated panel has air-dried for 96 hours, dip the edges of the panel in a water-resisting varnish and air-dry for an additional 24 hours. Place the panel in a beaker containing approximately 3 inches of distilled water at room temperature 21 deg. to 32 deg. C. (70 deg. to 90 deg. F.) and allow to remain for 14 days. Remove, allow to dry for 2 hours at room temperature, and examine the coating for the defects specified in 3.5.9.

#### 4.3.3 Appearance of primer coat.

4.3.3.1 Examine the prepared panels for brushing and spraying properties (see 4.3.1).

4.3.3.2 Flow a portion of the primer on a 4" by 12" clean glass plate. Let dry in a nearly vertical position at room temperature and examine the area beginning 4 inches from the top.



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## 4.3.4 Analysis of phenolic resin.

4.3.4.1 Specific gravity. A piece of resin, 4 to 6 grams in weight, shall be weighted first in air and then in freshly boiled distilled water, both media being at 77 deg. F. at the time of weighing. The weighing shall be to the nearest milligram. The water shall have added to it after boiling, 0.01 percent of a surfactant know to be effective in reducing the surface tension of water. The resin shall be free from bubbles, cracks, dust, and abrupt depressions. The sample of resin shall be suspended by a piece of fine wire during the weighings. Any bubbles on the resin shall be dislodged by touching with a piece of fine wire.

$$\frac{\text{The specific gravity } 77 \text{ deg. F.}}{77 \text{ deg. F.}} = \frac{a}{a-b}$$

Where a is the weight in air and b the weight in water.

## 4.3.4.2 Softening point.

4.3.4.2.1 Apparatus (see fig. 1). The apparatus shall consists of the following.

(a) Two circular brass plates, 1/16 inch thick and 2-3/8 inches in diameter; one plate has three holes spaced about its center, each 5/8 inch in diameter. A shoulder 1/32-inch deep and 9/128-inch wide is cut around each hole so that the molds will fit snugly without danger of sliding off. These plates shall be attached to one end of a threaded steel rod, 1/8 by 12-inches, through their center, by means of 3/16-inch hexagonal nuts, in such manner that their opposing faces are 7/8 inch apart and parallel.

(b) Three corrosion-resisting steel molds, 3/4-inch outside diameter, 5/32-inch deep, diameter of hole at top 11/16-inch diameter of hole at bottom 3/8-inch; permissible variation in all dimensions of 0.01 inch.

(c) Steel ball bearings, 5/16-inch in diameter, and weighing between 1.97 and 2.07 grams.

(d) Glass beaker, 1.5 liter capacity.

(e) Well-annealed glass test tube, 8 inches long by 2-1/2 inches inside diameter.

(f) Two standardized thermometers, 0 deg. to 400 deg. F. range, 0.25 inch in diameter, and 16 inches long.

4.3.4.2.2 Preparation of sample. Powder the sample in mortar or break into pieces the size of wheat grains. Place the empty molds on an amalgamated brass plate, fill with the ground resin, apply slight heat to the brass plate, and pack the melting resin down into the mold with a spatula. Continue until the mold is filled level with the top and there are no bubbles showing. Separate the mold from the amalgamated plate and trim off the excess resin with a knife. It is convenient to make an indentation of not more than 1 millimeter in the center of the molded resin to prevent the steel ball from rolling off. The resin in the molds should be clear, fused masses. Only enough heat is applied during filling to melt the resin sufficiently to be packed down smooth. All this operation should be done as rapidly as possible to avoid excessive loss of easily volatilized substances in the resin.

4.3.4.2.3 Procedure. Assemble the apparatus as illustrated by figure 2. See that the bottom of the inner thermometer is even with the bottom of the steel ball on top of the molded resin and the bulb of the outer thermometer is so suspended as to be opposite the lower brass plate. Fill the beaker with water-white glycerine to within 1/2-inch of the top when the test tube is immersed. Heat the beaker containing the glycerine, with test tube and outer thermometer in place, to 150 deg. F. (66 deg. C.). Introduce the resin

rings and inner thermometer so that the bottom plate is 1-1/4-inches above the bottom of the test tube. Continue heating and regulate it so that there will be a rise in temperature of 4 deg. to 5 deg. F. (2 deg. to 3 deg. C.) per minute in the bath. The temperature recorded by the inner thermometer at the present instant the ball drops through the ring and touches the bottom brass plate shall be taken as the softening point of the sample.

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#### 4.3.5 Analysis of phenolic varnish.

4.3.5.1 Tests on varnish as specified. The following tests to be run on the varnish as specified for use in type IV paint before the addition of driers and additional thinners; nonvolatile, viscosity, color, and weight per gallon (see 4.3.1).

4.3.5.2 Tests on varnish after thinning and adding driers. All other tests to be run of the varnish specified (3.3.4.2) shall be made after the following additions of driers and thinners: Sufficient naphthenate driers conforming to the requirements for types I (lead), II (cobalt), and III (manganese) of TT-D-643 shall be added to the varnish to give 0.3 percent lead, 0.03 percent cobalt, and 0.015 percent manganese, expressed as metals and based on the oils in the varnish. Sufficient thinner conforming to TT-T-291, grade 1, shall also be added to give a viscosity of C-E (Gardner Bubble Viscometer). Driers should be allowed an incorporation time of 48 hours before proceeding with any of the tests.

4.3.6 Packaging, packing, and marking. The paint shall be inspected for compliance with the packaging, packing, and marking requirements of section 5 in accordance with Tt-P-143.

### 5. PREPARATION FOR DELIVERY

5.1 Packaging, packing and marking. The paint shall be packaged, packed, and marked in accordance with Tt-P-143. The levels of packaging and packing shall be A, B, or C, as specified (see 6.2). The paint shall be furnished in 1-quart or 1-gallon multiple friction top containers, in 5-gallon lug cover steel pails or in 55-gallon steel drums as specified (see 6.2). In addition to the marking required by TT-P-143, each container shall be marked as follows:

5.1.1 Precautionary marking. Each individual container of primer shall be additionally marked as follows: "The primer contains toxic pigments. Adequate precautions shall be taken when spraying."

5.1.2 Additional marking. Warning-Harmful if swallowed:  
 Contains lead silica chromate  
 Wash hands thoroughly after using  
 If swallowed, induce vomiting and call physician immediately  
 Keep out of the reach of children

### 6. NOTES

#### 6.1 Intended use of the primer.

6.1.1 Types I, II, and V. Types I, II, and V primer are intended for use on bridges, similar structural steel, and other ferrous metal surfaces. They are suitable for priming and body coats, either in the shop or field, where good resistance to the corrosive effects of usual atmospheric environments is required.

Types II, III, and V have excellent weathering properties, chalk resistance, and color retention. If so desired they could be used in topcoats. Types I and V primer may be used wherever priming schedules do not demand recoatings in less than 36 hours. The vehicle solids being principally linseed oil offer the best opportunity to wet the metal surface primed and therefore to obtain an intimate bond of the primer with the surface despite the presence of small amounts of corrosion products found impractical to remove.

The pigment in types I and V are essentially the same except for the inclusion of a small amount of red iron oxide in type V. A greater amount of alkyd resin in type V improves the drying and handling under adverse atmospheric conditions. Type II primer is designed for use where priming schedules require handling and recoating in 16 hours. The presence of the specified amount of free linseed oil in this type of primer is desirable for the purpose of obtaining intimate bonding with the metal surface due to the wetting characteristics of the oil.

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6.1.2 Type III. Type III primer is intended for use in priming thoroughly clean iron and steel surfaces and for touch-up work where drying within an 8-hour period is desired. It is intended for use on smooth steel particularly, as an industrial primer for priming articles fabricated at the factory, such as railroad care, wind sash, air-conditioning conduits, etc. It may be used as a general maintenance primer for touch-up work on thoroughly cleaned steel where rapid drying is essential and where the application of two coats within a day is desired. It is essential that primer of this type be applied to exceptionally clean surfaces since due to its fast drying properties it does not have the surface wetting properties which characterize paints containing free linseed oil. Thus, because structural steel (bridges, tanks, etc.) is rarely cleaned free of corrosion products, this primer is not generally intended for such use, although with due consideration to surface preparation it can be so used for spot priming.

6.1.3 Type IV. Type IV primer is intended for use as a primer on iron and steel surfaces particularly those subjected to severe humid or fresh water immersion. In addition to its excellent water impermeability, the primer film exhibits good resistance to acid and alkaline environments. Water storage tanks, structural work on dams, structural metal and equipment in bottling plants, laundries, and mines are typical of the steel surfaces for which this paint is particularly effective as a protective coating. The same precautionary steps should be taken to insure a clean surface for application as required for the type III primer.

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 required (see 1.2).
- (c) Levels of packaging and packing required (see 5.1).
- (d) Size of container required (see 5.1).
- (e) Date of manufacture (see 6.5).

6.3 Primer covered by this specification should be purchased by volume, the unit being one U.S. gallon of 231 cubic inches at 68 deg. F. (20 deg. C.).

6.4 It is suggested to procurement officers making purchases of basic lead silico chromate paint for stock that amounts sufficient to cover the needs for not over approximately 12 months in advance be purchased at one time. Storage of the produce under normal warehouse conditions is desirable, although long exposure to either extremely high or low temperatures should be avoided.

6.5 Attention of Government procuring agencies is directed to 3.5.10. In order that the testing laboratory may make the "storage stability" determination, it will be necessary that the date of delivery be marked on the sample submitted for test or that this information be contained in the letter of transmittal.

6.6 Samples of delivered primer of types I, II, III, and V may be taken in the regular manner and submitted for test. In order to determine compliance of type IV primer with the specification, however, it will be necessary for the purchaser to submit to the testing laboratory samples of the resin and the varnish used in the manufacture of the paint in addition to a sample of the finished primer.

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6.7 Typical formulas (with all materials by weight) for the five types of primer meeting this specification are as follows:

	Type I	Type II	Type III	Type IV	Type V
Basic lead silico chromate	1000	800	600	853	950
Red iron oxide pigment (1) (85 percent $\text{Fe}_{27}\text{O}_{37}$ )	-	50	50	-	-
Pure iron oxide	-	-	-	-	50
Zinc oxide (acicular)	-	-	50	-	-
Pigment suspending agent	6	5	5	11	6
Raw linseed oil, TT-L-215	309	163	-	-	267
Alkyd resin varnish, TT-R-266, type III	-	319	585	-	-
Mineral spirits, TT-T-291, grade 1	81	114	-	97	99
Aromatic petroleum spirits (2)	-	-	118	-	-
Alkyd resin varnish, TT-R-266, type I, class A	112	-	-	-	170
Phenolic varnish (3)	-	-	-	490	-
Dipentene, TT-D-376	-	-	-	18	-
Lead naphthenate (24 percent Pb), TT-D-643	-	-	6.0	5.7	-
Cobalt naphthenate (6 percent Co), TT-D-643	-	1.1	2.4	1.1	1.3
Manganese naphthenate (6 percent Mn), TT-D-643	2.6	2.2	2.4	1.1	-
Zirconium dry (6 percent Zr) (4)	9.7	7.3	-	-	3.9
Calcium naphthenate (4 percent Ca)	-	-	-	-	4.8
Antiskin agent	0.8	1.0	1.5	4.5	1.0
Soya lecithin	2.0	-	-	-	-
Wt. per gallon (pounds)	15.4	13.6	12.4	13.4	15.1
Pigment volume (PV)	37.5	37.4	39.1	42.7	37.9
Approximate gallonage	97	107	114	110	102

## TT-P-615d

(1) A siliceous type of red iron oxide containing not less than 85 percent  $\text{Fe}_2\text{O}_3$  and conforming to the additional requirements listed below:

	Min.	Max.
Total iron oxide as $\text{Fe}_2\text{O}_3$ (percent)	85.0	-
Coarse particles (total residue retained on 325 sieve) percent	-	1.0
Calcium oxide as $\text{CaO}$ (percent)	-	0.5
Moisture and other volatile matter (percent)	-	2.0
Water soluble matter (percent)	-	1.5
Siliceous matter (percent)	-	
Organic colors (percent)	-	
	Balance none	

(2) The Aromatic Petroleum spirits should have the following properties:

Initial boiling point deg. F.	312 (minimum)
50 percent shall distill below	335 deg. F.
Dry point deg. F.	355 (maximum)
End point deg. F.	365
Specific gravity at 60 deg./60 deg. F.	0.871 (minimum)
Weight per gallon (pounds)	7.25 (minimum)
Mixed aniline point deg. F.	61 (maximum)
Kauri butenol value	90 (minimum)

(3) A typical formula, with all percentages by weight, for varnish meeting the requirements for type IV is as follows: 100 percent pure phenolic resin (see 3.3.4.1) 20.25, tung oil (TT-T-775) 39.75, mineral spirits (TT-T-291, grade 1) 40.00. These ingredients should produce a varnish meeting the requirements specified (see 3.3.4.2) when cooked according to the following schedule: Heat all the resin and oil to 465 deg. F. in 40 minutes. Hold the batch at this temperature long enough (35 to 40 minutes) to obtain the desired viscosity when thinned to the specified solids content. Water cool and thin with the mineral spirits.

(4) Zirconium dry. The zirconium is described as a zirconium organic complex containing 6 percent zirconium metal.

	Min.	Max.
Zirconium	5.9	6.1
Color (Gardner)	-	4
Viscosity (Gardner Holdt)	Less than A	
Specific gravity (68 deg. F.)	0.855	0.875

6.8 The use of a small amount of pigment suspension agent in all 5 types of primer is required to insure loose suspension of the pigment in the vehicle during storage.

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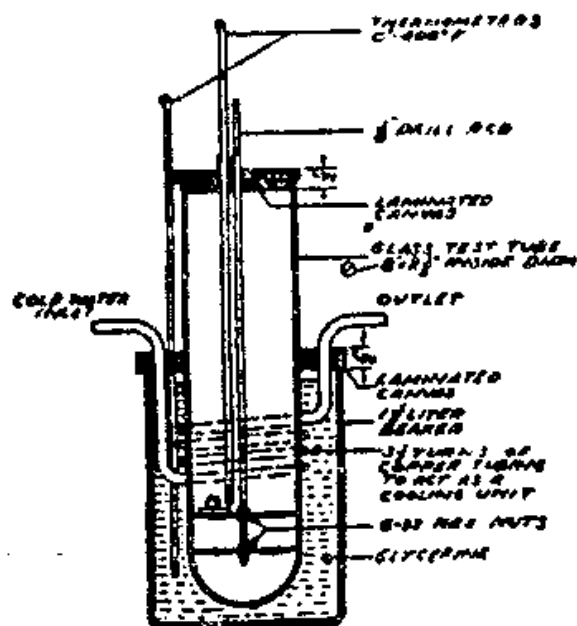


FIGURE 2.—Cross section of softening point apparatus assembly.

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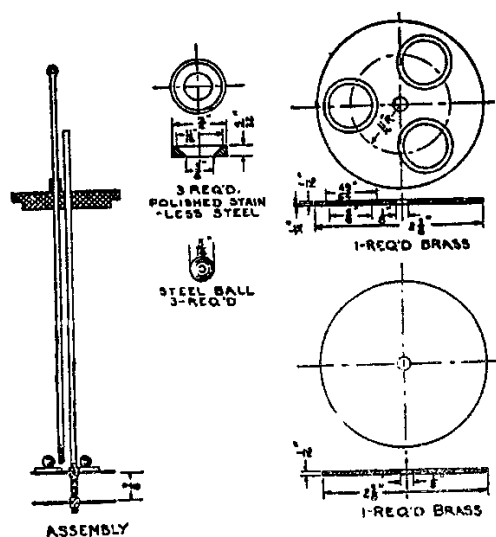


FIGURE 1.—Detail of softening point apparatus for phenolic resin in type IV paint.

TT-P-615D  
AMENDMENT-3  
June 19, 1972  
SUPERSEDING  
AMENDMENT-2  
November 21, 1967

FEDERAL SPECIFICATION  
PRIMER COATING: BASIC LEAD CHROMATE  
READY MIXED

This amendment, which forms a part of a Federal Specification TT-P-615D, dated January 23, 1967, was approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.

PAGE 1

Paragraph 1.2.1, line 7, delete "IV - Basic lead silico chromate phenolic varnish primer."

PAGE 2

Paragraph 3.1, line 1, change "Types I" to "Type I" and delete "and IV".

3.3 Vehicles. The vehicle specified for each type shall conform to the requirement in table IV. All vehicles shall be free from rosin and rosin derivatives. Thinner used for each type shall be a thinner conforming to TT-T-291, type II, grade A or a solvent system complying to "Rule 66". [1]

Paragraphs 3.3.1 and 3.3.2: Delete in their entirety.

PAGE 3

In tables I and II, delete "type IV and its requirements".

PAGE 4

Paragraphs 3.3.3, 3.3.4 and 3.3.4.1: "Delete in their entirety".

Tables III and IV: "Delete in their entirety."

PAGE 5

In tables V and VI, delete "Type IV and its requirements".

PAGE 6

In tables VI, delete "Type IV and its requirements."

Paragraph 3.5.2, line 2, insert after volume of "packaged material and one part by volume of" and change "TT-T-291, grade 1" to "TT-T-291, type II, grade A."

PAGE 7

In table VII, line 20, delete "Color of transparent vehicle liquid, tables III, and IV, and 4241."

PAGE 8

Paragraph 4.3.2 delete in its entirety.

PAGE 10



Paragraphs 4.3.5 and 4.3.5.1 delete in their entirety.

[1] Information on Rule 66 may be obtained from Air Pollution Control District, County of Los Angeles, 434 South San Pedro Street, Los Angeles, California 90013.

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PAGE 11

Paragraph 6.1.3 delete in its entirety.

PAGE 12

In the table, delete "Type IV and its requirements.

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