TT-C-535B
August 2, 1972
SUPERSEDING
Fed. Spec. TT-C-535A
October 23, 1964

FEDERAL SPECIFICATION

COATING, EPOXY, TWO COMPONENT, FOR INTERIOR USE ON METAL, WOOD, WALLBOARD, PAINTED SURFACES CONCRETE AND MASONRY

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 a two-epoxy, epoxy coating for interior use for producing a high gloss finish, extremely washable and resistant to chemicals, stain and abrasion. The coating imparts a tile-like finish.

1.2 Classification.

1.2.1 Types. The epoxy coating may be furnished in two types.

Type I - Clear
II - Pigmented

2. APPLICABLE DOCUMENTS

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

Federal Specifications:

TT-P-143 - Paint, Varnish, Lacquer, and Related Materials: Methods of Inspection, Sampling and Testing.

Fed. Std. No. 595 - Colors.

(Activities outside the Federal Government may obtain copies of Federal Specification, Standards, and Handbooks as outlines 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 dale on a subscription basis by the Superintendent of Documents, U. S. Government Printing Office, Washington, DC 20402.

(Singles copies of this specification and other Federal Specifications required by activities outside the Federal Government for bidding purposes are available without charge from Business Service Centers at the General Services Administration Regional Offices in Boston, New York, Washington, DC, Atlanta, Chicago, Kansas City, MO, fort Worth, Denver, San Francisco, Los Angeles, and Seattle WA.

(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.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless a specified 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:

D 476 - Titanium Dioxide Pigments.
D 1653 - Moisture Vapor Permeability of Organic Coating.
D 2088 - Test for Low Lead Concentration.
E 29 - Recommended Practices for Designating Signified Places in Specified Limiting Values
E 84 - Test for Surface Burning Characteristics of Building Materials.

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

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

3. REQUIREMENTS

3.1 Materials. The coating, furnished in a kit shall consist of epoxy resin of epichlorohyrin/bisphenol type in separate container. The coating may be furnished in clear and pigmented (see 6.2). The coating (pigmented) shall not contain lead (calculated as metal), in excess of 0.5 percent by weight of nonvolatile matter.

3.2 Composition.

3.2.1 Pigment (type II only). Any combination of pigments for any specific color shall make up the basic hiding pigmentation provided the coating complies to all requirements specified herein. The titanium dioxide shall be rutile chalk resisting type conforming t type III of ASTM D 476. Small amounts of shading pigments and extenders to match the color desired may be used provided these addition pigments have good color permanence.

3.2.2 Vehicle. The vehicle shall be as specified in table I.

TABLE I. Vehicle

	Type I		Type II	
Composition	Min.	Max.	Min.	Max.
Epoxy (100 percent) Resin-epichlorohydrin/ bisphenol Type:				
Epoxide equivalent	450	550	450	550
Melting point, degree centigrade	65	75	65	75
Epoxy resin content, percent by weight of solution	43.50	44.50	49.50	51.40
Solvent portion, percent by weight of solution	55.50	56.50	48.60	50.60
Polyamide resin:				
Amine value	85	95	85	95
Color (Gardner)	--	12	--	12
Viscosity poises at 150 deg. C.	7	12	7	12
Polyamide resin content, percent by				

weight of solution	37.7	38.7	40.5	--
Additive (silicone resin), percent by weight of polyamide resin	--	3	--	3
Solvent portion, percent by weight of solution	61.3	62.3	--	59.5

3.2.2.1 Solvent portion. The solvents or solvent blend of the epoxy resin and polyamide resin shall be of two types:

(a) Type I, for general use. Any suitable solvent provided the finish coating complies to all requirements specified herein.

(b) Type II, for limited use. The solvents or solvent blend for this type shall conform to the following requirements by volume. A certificate of compliance to this effect is necessary.

(1) Aromatic compounds with eight or more carbon atoms except ethyl benzene: 8 percent maximum.
(2) Ethyl benzene and toluene: 20 percent maximum.
(3) Solvents with an olefinic or cyclo-olefinic type of unsaturation: negative.
(4) Ketones: negative.
(5) Total of 1 + 2: 20 percent maximum.

3.3 Quantitative requirements.

3.3.1 The quantitative requirements shall be as specified in table II.

TABLE II. Quantitative requirements

Characteristics	Requirements			
	Type I		Type II	
	Min.	Max	Min.	Max.
Pigment, percent by weight of pigmented epoxy resin	---	---	40	42
Vehicle, percent by weight of pigmented epoxy resin	---	---	58	60
Viscosity (Stormer Viscosimeter at 77 deg. F.) KU of mixture	50	60	74	79
Coarse particles, percent by weight (325 mesh sieve) of mixture	---	---	---	0.5
Fineness of grind of mixture	---	---	7	---
Drying time of mixture:				
Set to touch (hour)	1/2	---	---	1/2
Dust free (hour)	1	---	---	1
Dry hard (hour)	6	---	---	6
Hiding power (contrast ratio) of mixture (white) [1]	---	---	0.94	---
Reflectance of mixture (white)	---	---	0.84	---
Gloss of mixture, 60 deg. specular	100	---	100	---
Flash point of mixture, degree F.	---	---	80	---
Impact resistance of mixture, inch-pound [2]	---	---	160	---
Weight per gallon, pound	8.0	---	10.0	---
Water vapor transmission rate:				
1.5 mils	---	---	0.28	0.36
3.0 mils	---	---	0.19	0.25
Workable pot life, number of hours at room temperature	8	---	8	---
Lead content, percent by weight of nonvolatile matter	---	---	---	0.5

[1] Dry film thickness of 0.0015 inch maximum.
[2] One coat, 3 mils dry film thickness cured for one week, over 0.375 in cold rolled steel prepared in accordance with method 2011.1 of Fed. Test Method Std. No. 141.

3.3.2 Hiding power of tinted coating. The minimum dry-film contrast ratios for tinted coating shall be as specified in table III when tested as in 4.3.5.

TABLE III. Minimum dry film contrast ratios for tints

Apparent reflectivity of tints	Contrast ratio	Apparent reflectivity of tints	Contrast ratio
Percent		Percent	
82	0.94	70	0.97
80	.94	68	.97
78	.95	66	.98
76	.95	64	.98
72	.96	60 or below	.98

3.4 Qualitative requirements.

3.4.1 Condition in container (type I and type II). The separately packaged components of the coating kit when tested as in 4.3.2, shall be free from skins, lumps, thickening, dry hard caking or settling.

3.4.2 Storage stability (type I and type II).

3.4.2.1 Partially full container. Each component of the kit when tested as in 4.3.3.1 shall show no skinning. It shall mix readily to a smooth homogeneous state.

3.4.2.2 Full container. When tested as in 4.3.3.2 each component of the kit shall show no skinning, livering, dry hard caking, tough gummy sediment or pigment settling of the pigmented epoxy resin. A certificate of compliance to this effect is necessary (see 4.3.3.2).

3.4.3 Brushing properties (type I and type II). The finish coatings (clear and pigmented) shall brush satisfactorily in all respects and shall dry to a smooth uniform film free from seeds, sags, streaks or brush marks when tested as in 4.3.4.

3.4.4 Spraying properties (type I and type II). The finish coatings shall spray satisfactorily in all respects with conventional spray equipment and shall dry to a smooth uniform finish free from seeds, sags, pronounced orange peel and streaks when tested as in 4.3.5.

3.4.5 Baking properties (type I and type II). When tested as in 4.3.6 the baked films shall show no discoloration and no loss of gloss when compared to an air-dry film.

3.4.6 Abrasion resistance (type I and type II). The finish coats when tested as in 4.3.7 shall show no evidence of wearing through the bare panels after 1500 strokes (750 cycles).

3.4.7 Color (type II). The color of the finish coat shall approximately match the color standard in Fed. Std. No. 595 when tested as in 4.3.8.

3.4.8 Fire resistance (type I and type II). The ratings of the finish coatings shall have a maximum flame spread of 5, smoke density of 0, and fuel contribution of 0, when tested as in 4.3.9.

3.4.9. Stains resistance (type I and type II). When tested as in 4.3.10. The finish coatings shall show no discoloration or staining after 16 hours of contact with stains.

3.4.10 Steam resistance (type I and type II). The finish coatings when tested as in 4.3.11 shall show no blistering, peeling or other film defects immediately upon removal from test. After 24 hours of recovery period, the film shall exhibit hardness and adhesion comparable to a panel prepared at the same time but not subjected to the test.

3.4.11 Application on damp surface (type I and type II). When tested as in 4.3.12 the finish coats shall not show loss of gloss, discoloration and loss of adhesion as compared to the film applied to a dry surface.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, 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.

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

4.2 Test procedures.

4.2.1 The tests shall be conducted in accordance with Fed. Test Method Std. No. 141, except as otherwise specified (see table IV).

TABLE IV. Index

Characteristics	Requirement Reference	Applicable Test Fed. Test Method Std. 141	Applicable Test Paragraph Reference
Condition in container	3.4.1	3011.1	4.3.2
Storage Stability	3.4.2	3021, 3022	4.3.3
Brushing properties	3.4.3	4321.1	4.3.4
Spraying properties	3.4.4	4331.1	4.3.5
Baking properties	3.4.5	4542	4.3.6
Abrasion resistance	3.4.6	----	4.3.7
Color	3.4.7	4250	4.3.8
Fire resistance	3.4.8	----	4.3.9
Stain resistance	3.4.9	----	4.3.10
Steam resistance	3.4.10	----	4.3.11
Application on damp surface	3.4.11	----	4.3.12
Epoxy resin content:	Table I	7403	4.3.15
Epoxy equivalent	Table I	7403	4.3.16
Melting point	Table I	----	4.3.17
Solvent portion	Table I	----	4.3.23
Polyamide resin content	Table I	7391	4.3.18
Amine value	Table I	----	4.3.21
Color	Table I	4248	4.3.19
Viscosity poises	Table I	4287	4.3.20
Solvent portion	Table I	----	4.3.23
Pigment content	Table II	4021.1	----
Vehicle	Table II	4021.1	----
Viscosity	Table II	4281	----
Lead content	Table II	----	4.3.24
Coarse particles	Table II	4091	----
Fineness of grind	Table II	4411.1	----
Drying time	Table II	4061.1	----
Hiding power	Table II	4122.1	----
Reflectance	Table II	4301.1	----
Gloss	Table II	6101	----
Flash point	Table II	4291, 4293	[1]
Impact resistance	Table II	----	----
Weight per gallon	Table II	4184.1	----
Water vapor transmission	Table II	----	4.3.13
Workable pot life	Table II	----	4.3.14

[1] Method 4291 for type I and method 4293 for type II.

4.3 Test methods.

4.3.1 Test conditions. The routine and referee testing conditions shall be in accordance with section 7 of Fed. Test Method Std. No. 141 except as otherwise specified. When testing film properties allow one hour induction time before application.

4.3.2 Condition in container. Determine packaged condition of the

components in the kit in accordance with method 3011.1 of Fed. Test Method Std. No. 141 and observe for compliance with 3.4.1.

4.3.3 Storage stability.

4.3.3.1 Partially full container. Determine skinning after 48 hours for each component in the kit in accordance with method 3021 of fed. Test Method. Std. No. 141 except use a 3/4 filled 1/2 pint can. Observe for compliance with 3.4.2.1.

4.3.3.2 Full container. In accordance with method 3022 of Fed. Test Method Std. No. 141, allow a full quart can of the component material to stand undisturbed for one year, then examine for compliance with 3.4.2.2. A certificate of compliance to this affect is acceptable.

4.3.4 Brushing properties. Determine brushing properties of the finish coats in accordance with method 4321.1 of Fed. Test Method Std. No. 141 for compliance with 3.4.3.

4.3.5 Spraying properties. This the finish coats in accordance with manufacturer's direction. If thinning is not necessary spray the finish coats using conventional spray gun on aluminum panels to approximately 1 mil dry film thickness and observe spraying properties in accordance with method 4331.1 of Fed. Test Method Std. No. 141 for compliance with 3.4.4

4.3.6 Baking properties. Prepare four cold rolled steel panels in accordance with method 2011.1 of Fed. Test Method Std. No. 141 using aliphatic naptha-ethylene glycol monoethyl ether mixture. On two panels, spray a finish coat of type I to a dry film thickness of approximately 1-1/2 mils and on the other two panels spray a finish coat of type II on the same procedure. Allow all four panels to dry at room temperature for 4 hours then bake two panels, (one, type I and the other type II) at 150 deg. F. for 40 minutes. Remove the baked panels, allow for cool for 1/2 hour, then compare against the air-dried panels but not baked. Observe for compliance with 3.4.5.

4.3.7 Abrasion resistance. The panels shall be prepared in accordance with method 2011.1 of Fed. Test Method Std. No. 141 using aliphatic naptha-ethylene glycol monoethyl glycol monoethyl ether mixture. Spray the coatings on the panels to approximately 3 mils dry film thickness and allow to dry at room temperature (77 deg. +/- 2 deg. F.) for 168 hours. Run abrasion test using Gardner washability machine as described in method 6141 of Fed. Test Method Std. No. 141 except the sponge should be covered with a wet or dry sand paper of No. 280 grit. The panel should be kept wet with distilled water at all times while machine is in motion until 1500 strokes are reached. Remove the panel and observe for compliance with 3.4.6.

4.3.8 Color. Determine the color of the coating specified (see 6.2) in accordance with method 4250 of Fed. Test Method Std. No. 141 for compliance with 3.4.7.

4.3.9 Fire resistance. Determine fire resistance of the coatings in accordance with ASTM E 84 for compliance with 3.4.8.

4.3.10 Stains resistance (spot test). Prepare two panels (6" by 2") in accordance with method 2011.1 of Fed. Test Method Std. No. 141 using aliphatic naptha-ethylene glycol monoethyl ether mixture. On one of the panels brush a coat of type I coating to approximately 1-1/2 mils dry film thickness and on the other panel brush a coat of type II coating to the same film thickness, then allow to dry at 77 deg. +/- 2 deg. F. for 24 hours. After 24 hours apply the second coat to the same dry film thickness on the respective panels and allow to dry for 7 days at 77 deg. F. and 50 percent relative humidity. On the dried coatings apply the following straining agents in puddles or blobs on each panel: (1) black raspberry jam, (2) lemon juice, (3) vinegar (cider). (4) mustard, (5) catsup, (6) mayonnaise, (7) butter, (8) crisco, (9) tincture of mertiolates, (10) crushed onion, (11) coffee, (12) toothpaste (any brand), (13) tea, (14) tide solution(1-1/2 percent), (15) sodium hydroxide, (10 percent solution). Cover the puddles with watch glass and allow to stay for 16 hours at the end of the exposure time, wash off the test film with dilute solution of commercial detergent, rinse thoroughly with clean water. Condition for 1/2 hours them examine for compliance with 3.4.9.

4.3.11 Steam resistance. Prepare four steel panels in accordance with method 2011.1 of Fed. Test Method Std. No. 141 (procedure D) except using 18 gauge (50 +/- 5 mils). On tow of the panels spray type I coating in accordance with manufacturer's direction to a minimum dry film thickness of 6 mils and on the other two panels spray type II coating in the same manner. Allow the panels to dry at room temperature for 168 hours. Then expose two panels (one coated with type I coating and the other coated with type II) in a closed ventilated box (see figure 1). Steam heat the water to bring the temperature of the atmosphere above the water to 207 deg. +/- 50 deg. F. for 30 minutes. Subject the panels for 6 hours at 207 deg. +/- 50 deg. F, then observe for compliance with 3.4.10.

4.3.12 Application on damp surface. Prepare four concrete panels in accordance with method 2051 procedure C of Fed. Test Method Std. No. 141. The panels shall be thoroughly dry in the air before using. Immerse completely in water two of the panels (cement blocks) for one hour, them remove and allow to drain for 5 minutes. Immediately brush a coat of type I on one of immersed block and a coat of type II on the other immersed block. On the unimmersed panels, brush the type I and type II coats one each and allow all four panels to air dry at room temperature for 24 hours. Examine and compare for adhesion and gloss between the dry and wet substrates and evaluate for compliance with 3.4.11.

4.3.13 Water vapor transmission rate. Apply type I and type II coatings on amalgam plates using doctor blade to obtain dry film thickness of 1.5 mils and 3.0 mils, respectively. Use four plates each film thickness of type I and type II. Allow the films to cure at room temperature for 7 days. Place the desiccant in the test cup or desiccator maintaining the ambient relative humidity at 100 percent. Four specimens for each thickness should be used in the test and use the average for compliance with table II. Transmission (mg. H_2O/sq. cm/24 hours). (This method is similar to ASTM D 1653-62 only it is modified t minimize the danger of wetting the film surface during handling.)

4.3.14 Workable pot life. Pour the coating (1 to 1 blend) of type I and type II into a pint can, half full. Close the can tightly, every two hours open the can and examine the content for compliance with table II.

4.3.15 Determine epoxy content in the epoxy resin solution in accordance with method 7403 of Fed. Test Method Std. no. 141 for compliance with table I.

4.3.16 Determine epoxy equivalent in accordance with method 7402 of Fed. Test Method Std. No. 141 for compliance with table I.

4.3.17 Determine melting point of epoxy resin in accordance with ASTM E 29 for compliance with table I.

4.3.18 Determine the amine content of the polyamide resin in accordance with method 7391 of Fed. Test Method Std. No. 141 with compliance with table I.

4.3.19 Color of the polyamide resin solution. In accordance with method 4248 of Fed. Test Method Std. No. 141 run the test for compliance with table I.

4.3.20 Viscosity of the polyamide resin solution. Using Brookfield RVF viscosimeter No. 3 spindle, 20 r.p.m. determine the viscosity in accordance with method 4287 of Fed. Test Method Std. No. 141 for compliance with table I.

4.3.21 Amine value. the amine value is the amine alkalinity of the resin sample and is determined by titration (potentiometrically) with standard perchloric acid (see 6.3).

4.3.22 Non-volatile matter (resin content). Place a portion of the thoroughly mixed epoxy resin solution and polyamide resin (hardner) in a stoppered flask or weighing bottle. Weigh to the nearest milligram the container and sample. Transfer from 2.5 to 3.5 grams the sample to a weight aluminum dish. Spread the material uniformly over the bottom of the dish. Weigh the container, etc. and calculate the exact weight of the portion transferred to the dish. Place the dish in a well ventilated convection-type oven maintained at 105 deg. +/- 2 deg. C. for three hours. Cool in a desiccator and weigh. From the weight of the residue in the dish and the weight of the sample taken, calculate the percentage of nonvolatile matter as resin solid for compliance with table I.

4.3.23 Solvent portion. Calculate the percentage of the volatile matter from the weight of the residue in the dish and the weight of the sample taken for its respective use (see 4.3.22).

4.3.24 Lead content. Lead content shall be determine in accordance with ASTM D 2088.

4.3.24.1 Calculation

$$\text{Lead (percent by weight of nonvolatile matter)} = \frac{A \times 0.86623 \times B}{\text{x } 100}$$

$$C$$

Where: A = Grams of lead oxide (PbO_2) in ash.
B = Percent ash by weight of coating divided by 100.
C = Percent total non-volatile of coating divided by 100.

4.3.25 Inspection of preparation for delivery. The coatings, (each component) shall be examined for compliance with 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 coating kit and its separately packaged components shall be packaged, packed and marked in accordance wit TT-P-143. The level of packaging shall be A, B, or C and the level of packing shall be A, B, or C, as specified by the procuring activity. The components shall be furnished in a separate container of 1-quart can, 1-gallon can, or 5-gallon pail and necessary amounts of solvents (see 6.2).

5.2 Marking and labeling. Each component container in every kit and every exterior shipping container shall be marked in accordance with TT-P-143.

5.2.1 Additional marking. Preparation of surface and directions for application shall be furnished by the supplier.

5.2.2 Special marking.

(1) Mix the components of type I and type II in accordance with manufacturers direction or in the absence of manufacturer's instruction mix the components at 1 to 1 by volume.
(2) Mix only that amount which can be used in one day.
(3) Allow one hour induction time (from mixing to application).
(4) Epoxy-polyamide coating from one supplier shall never be mixed with another.
(5) Thinning for spray application shall be in accordance with manufacturer's instruction.

6. NOTES

6.1 Intended use. The coating, type I and type II covered by this specification are intended for interior use on metal, wood, concrete, masonry surfaces and painted surfaces where high gloss or glaze type finish extreme washability and resistance to abrasion and stains where the maintenance of sanitary conditions is important.

6.2 Ordering data. Procurement documents should specify the following:

(a) Title, number and date of this specification.
(b) Type required (see 1.2.1).
(c) Color required (see 3.4.7).
(d) Level of packaging and packing required (see 5.1 and 5.2).

6.3 General Mills Method.

Apparatus:

1. pH Meter, equipped with external electrodes and having a sensitivity capable of = (0.05)

   pH unit reading or similar potentiometric titrator.

   a. Calomel electrode, sleeve type, silicon rubber sleeve, range 5 deg. to 100 deg. C.
   b. Glass electrode, range 5 deg. to 100 deg. C.

2. Magnetic stirrer with "Teflon" coated stirring bar.
3. Acetic Anhydride, ACS grade.
4. Nitrobenzene, MP 5-6 deg., Eastman 387 or equivalent.
5. Acid potassium phthalate, NBS primary standard.
6. Glacial acetic acid, ASC grade.
7. Berzelius, Tall form, 200 ml.

8. Perchloric acid in glacial acetic acid, 0.1N. Add 28.4 g. of perchloric acid (ACS grade, 70-72 percent) to 1000 ml of glacial acetic acid in a 2000 ml beaker, while stirring. Carefully add 64.6 g of acetic anhydride while stirring. Carefully pour the solution through a glass funnel into a 2000 ml volumetric flask, and dilute to mark with glacial acetic acid. Mix the solution and allow to stand for twenty-four hours before standardizing.

Standardization:

Weigh 0.31-0.39 g of finely ground and dried acid potassium phthalate into a 250 ml beaker on an analytical balance. Add 50 ml of glacial acetic acid and warm gently to dissolve the sample. Cool, and add an additional 50 ml of glacial acetic acid to wash down the sides of the beaker. Insert a stirring bar into the beaker and titrate while

stirring, with the perchloric acid solution, using the millivolt scale. Record the millivolt readings every ml., but in the vicinity of the end point, record the millivolt reading every 0.1 ml. Plot a graph showing the millivolts against the titration. The end point is the mid-point of the inflection on the titration curve. The strength of the perchloric acid is expressed in terms of its normality.

$$\text{Normality of perchloric acid solution} = \frac{\text{Grams acid potassium phthalate} \times 4.8967}{\text{ML of perchloric acid solution}}$$

CAUTION: Perchloric acid is very hazardous and should be handled with caution. Wearing of eye shields or goggles is imperative since on drop of the concentrated acid in the eye will almost certainly be disastrous. Avoid spills or contact with the body or clothing. If spilled on the operator, remove all contaminated clothing quickly and wash with copious quantities of water and soap. If the eyes are involved, irrigate carefully for fifteen minutes with warm water. Burns should be treated as caustic burns.

Any acid spilled on desk tops, floor, or shelves should be wiped up immediately and washed thoroughly with a large amount of water. The washing cloth should be rinsed out well with water to eliminate the possibility of a fire starting after the cloth has dried out.

If the concentrated perchloric acid (70-72 percent) should become discolored by contamination with an outside substance, the acid should be disposed of immediately. The contaminated acid should be poured into a glass beaker of cold water containing at least ten times the volume of the acid. Pour the diluted solution down the drain and flush with large amounts of cold water.

Procedure:

1. Weigh the approximate amount of well mixed resin to give a titration in the range of 12-18 ml into a tared 200 ml Berzelius tall form beaker on an analytical balance. Cover the beaker with aluminum foil to minimize contact with air.

2. From a graduated cylinder, carefully add 90 ml of nitrobenzene, inset a stirring bar, cover the beaker with foil and stir on a magnetic stirrer to dissolve the sample. Add the nitrobenzene immediately after weighing the sample. Nitrobenzene is highly toxic and a fume hood should be used for all operations.

3. From a graduated cylinder, add 200 ml of acetic acid to the sample solution and stir for several minutes.

4. Immerse the electrodes into the sample solution, stir for two minutes and titrate potentiometrically with 0.1N perchloric acid using the millivolt scale. Record the millivolt readings every ml., but in the vicinity of the endpoint.

5. Conduct a blank determination on 90 ml of nitrobenzene and 20 ml of acetic acid. The blank need only be determined once for each lit of nitrobenzene used. On the majority of lots used, the blank has been found to be zero.

Calculation:

$$\text{Amine value} = \frac{(\text{Sample Titration} - \text{Nitrobenzene Blank}) \times \text{Normality} \times 56.1}{\text{Weight of sample}}$$

CIVIL AGENCY INTEREST

GSA	HEW	D.C. Gov't
FSS	NIH	DCS
HUD	DOT	DOT
HHE	RDS	Coast Guard
VA	GSA	
DMS	PBO	

Preparing activity

GSA-FSS

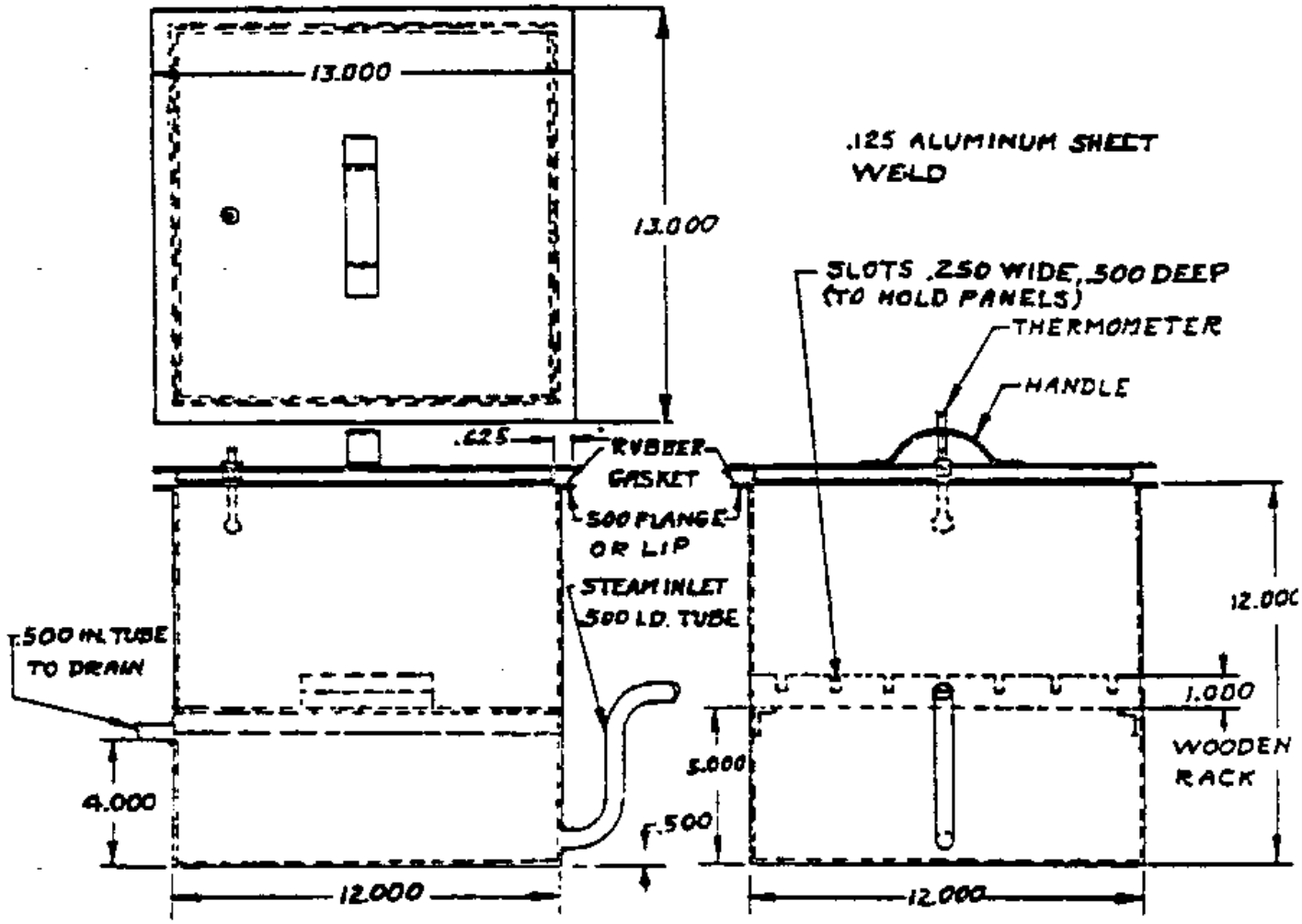

Figure 1

MILITARY INTERESTS:

Review Activities:

NAVY - CG

CIVIL AGENCY COORDINATING ACTIVITIES:

D. C. GOV'T - DCG
HEW - NIH
VA - IMS
DOT-RDS
HUD-HHE
GSA-FMS, PBO

PREPARING ACTIVITY: GSA-FSS

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. Price 15 cents each.

TT-C-535B
AMENDMENT - 2
June 23, 1977
SUPERSEDING
Amendment - 1
August 12, 1974

FEDERAL SPECIFICATION

COATING, EPOXY, TWO COMPONENT, FOR INTERIOR USE ON METAL, WOOD, WALLBOARD, PAINTED SURFACES CONCRETE AND MASONRY

This amendment, which forms a part of Federal Specification TT-C-535B, dated August 2, 1972, was approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.

PAGE 1

Paragraph 2.1, under "Federal Specifications", change "TT-P-143" to "PPP-P-1892".

PAGE 2

Paragraph 2.2, delete all references to "American Society for Testing and Materials (ASTM) Standards", and add the following:

American Society for Testing and Materials (ASTM) Standards:

D 93 - Flash Point by Pensky-Martens Closed Tester.
D 185 - Coarse Particles in Pigments, Pastes, and Paints.
D 476 - Titanium Dioxide Pigments.
D 523 - Specular Gloss.
D 562 - Consistency of Paints Using the Stormer Viscosimeter.
D 1210 - Fineness of Dispersion of Pigment-Vehicle Systems.
D 1475 - Density of Paint, Varnish, Lacquer, and Related Products.
D 1544 - Color of Transparent Liquids (Gardner Color Scale).
D 1652 - Epoxy Content of Epoxy Resins.
D 1653 - Moisture Vapor Permeability of Organic Coating Films.
D 1729 - Visual Evaluation of Color Differences of Opaque Materials.
D 2196 - Rheological Properties of Non-Newtonian Materials.
E 29 - Indicating Which Places of Figures Are To Be Considered Significant in Specified Limiting Values.
E 84 - Surface Burning Characteristics of Building Materials.

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Paragraph 3.1, line 3, change "0.5 percent" to "0.06 percent".

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Paragraph 3.3.1, table II, type I, Drying time of mixture, delete quantitative values for Set to touch (hours), Dust free (hours), Dry hard (hours), under minimum and replace with equal values under maximum.

Paragraph 3.3.1, table II, last 2 lines referring to "Lead content, percent by weight of nonvolatile matter", add a maximum requirement of 0.06 for type I and change the maximum requirement for type II from "0.5" to "0.06".

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Paragraph 4.2 and table IV, delete and substitute the following:

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4.2 Test procedures.

4.2.1 The tests shall be conducted in accordance with the test methods specified in table IV.

TABLE IV. Index

Characteristics	Requirement Reference	Applicable Test ASTM	Fed. Test Method Std. 141	Paragraph Reference
Condition in container	3.4.1	----	3011	4.3.2
Storage Stability	3.4.2	----	3021, 3022	4.3.3
Brushing properties	3.4.3	----	4321	4.3.4
Spraying properties	3.4.4	----	4331	4.3.5
Baking properties	3.4.5	----	4542	4.3.6
Abrasion resistance	3.4.6	----	----	4.3.7
Color	3.4.7	D 1729	----	4.3.8
Fire resistance	3.4.8	----	----	4.3.9
Stain resistance	3.4.9	----	----	4.3.10
Steam resistance	3.4.10	----	----	4.3.11
Application on damp surface	3.4.11	----	----	4.3.12
Epoxy resin content:	Table I	D 1652	----	4.3.15
Epoxy equivalent	Table I	D 1652	----	4.3.16
Melting point	Table I	----	----	4.3.17
Solvent portion	Table I	----	----	4.3.23
Polyamide resin content	Table I	----	7391	4.3.18
Amine value	Table I	----	----	4.3.21
Color	Table I	D 1544	----	4.3.19
Viscosity poises	Table I	D 2196	----	4.3.20
Solvent portion	Table I	----	----	4.3.23
Pigment content	Table II	----	4021	----
Vehicle	Table II	----	4021	----
Viscosity	Table II	D 562	----	----
Lead content	Table II	----	----	4.3.24
Coarse particles	Table II	D 185	----	----
Fineness of grind	Table II	D 1210	----	----
Drying time	Table II	-----	4061	----
Hiding power	Table II	-----	4122	----
Reflectance	Table II	-----	4301	----
Gloss	Table II	-----	6101	----
Flash point	Table II	D 93	----	----
Impact resistance	Table II	----	----	----
Weight per gallon	Table II	D 1475	----	----
Water vapor transmission	Table II	----	----	4.3.13
Workable pot life	Table II	----	----	4.3.14

Paragraph 4.3.8, line 2, delete "method 4250 of Fed. Test Method Std. No. 141" and substitute "ASTM D 1729".

Paragraph 4.3.15, lines 1 and 2, delete "method 7402 of Fed. Test Method Std. No. 141" and substitute "ASTM D 1652".

Paragraph 4.3.16, line 1, delete "method 7402 of Fed. Test Method Std. No.

141" and substitute "ASTM D 1652".

Paragraph 4.3.19, lines 1 and 2, delete "method 4248 of Fed. Test Method Std. No. 141" and substitute "ASTM D 1544".

Paragraph 4.3.20, line 2, delete "method 4287 of Fed. Test Method Std. No. 141" and substitute "ASTM D 2196".

Paragraph 4.3.24, delete in its entirety and substitute the following:

4.3.24 Lead Content.

4.3.24.1 Sample preparation. Using a 0.006-inch film applicator and a mechanical applicator plate, duplicate drawdowns for each sample of well-mixed paint shall be made on a standard paint penetration chart and dried for 24 hours. The drawdown shall be at least 10 inches long on the sealed portion of the penetration chart. The drawdown shall be cut into discs of appropriate size to fit the sample holder of a fluorescence X-ray spectrometer.

4.3.24.2 Procedure. Lead content shall be determined using an X-ray fluorescence spectrometer capable of determining lead content at a minimum level of 0.03 percent by weight of the total nonvolatile. The settings for a wavelength dispersive fluorescence spectrometer shall be as follows: [1]

Element	Analytical Line	Angle	Crystal	Detection	Colli-meter	X-ray tube (MO)
Pb	L	33.93	LiF(200)	Flow S.C.	Fine	60Kv 45Ma
Pb (backgrd I)		33.00	LiF(200)	Flow S.C.	Fine	60Kv 45Ma
Pb (backgrd II)		35.50	LiF(200)	Flow S.C.	Fine	60Kv 45Ma
MO	K	20.33	LiF(200)	Flow S.C.	Fine	60Kv 45Ma

Pulse height selection shall be used in all measurements and counting time shall be 100 seconds. Place the sample disc in the wavelength dispersive unit. Measure the count rates of lead, lead background, and the Molybdenum Compton scattered background from the X-ray tube.

4.3.24.3 Calculation.

$$R = \frac{I_{[Pb]} - \frac{I_{[Pb]}\ (\text{Background I}) + I_{[Pb]}\ (\text{Background II})}{2}}{I_{[Mo]}}$$

Where I equals gross intensity. These results shall be compared to those obtained using a 0.06 percent lead standard made up from the same type of paint sample, and evaluated for compliance with the requirement in table II.

[1] Energy dispersive fluorescence spectrometers shall be set up according to the manufacturer's manual.

Paragraph 4.3.25, change "TT-P-143" to "PPP-P-1892".

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Paragraph 5.1, line 2, change "TT-P-143" to "PPP-P-1892".

Paragraph 5.2, line 2, change "TT-P-143" to "PPP-P-1892".