[METRIC]
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INTERIM REVISION OF
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INTERIM FEDERAL SPECIFICATION

COATING, POLYURETHANE, OIL-FREE, MOISTURE CURING

This interim federal specification was developed by the General Services Administration Federal Supply Service, based upon currently available technical information. The General Services Administration has authorized the use of this interim federal specification, for all federal agencies.

1. SCOPE AND CLASSIFICATION.

1.1 Scope. This specification covers one type and two classes of single component, aromatic, oil-free, moisture curing polyurethane coating with a VOC level of 350 g/L maximum for pigmented, and 400 g/L maximum for clear. This material is cured by chemical reaction with moisture from the air. The coating offers good resistance to abrasion, chemicals, and stains, and provides maximum washability and durability. It imparts a glossy, tile-like finish.

1.2. Classes:

Class A - Clear
Class B - Pigmented

2. APPLICABLE DOCUMENTS

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

Federal Standards

FED-STD-595 - Colors used in Government Procurement

2.2 Other publications. The following documents form a part of this description to the extent specified herein. Unless a specific issue is identified, the issue in effect on date for invitation for bids or request for proposal shall apply.

American Society for Testing and Materials (ASTM) Standards:

Standard Test Methods for:

D 522 - Mandrel Bend Test of Attached Organic Coatings
D 523 - Specular Gloss
D 562 - Consistency of Paints Using the Stormer Viscometer
D 1210 - Fineness of Dispersion of Pigment-Vehicle Systems
D 1308 - Effect of Household Chemicals on Clear and Pigmented Organic Finishes
D 1640 - Drying, Curing, or Film Formation of Organic Coatings at Room Temperature
D 1729 - for Visual Evaluation of Color Differences of Opaque Materials
D 2805 - Hiding Power of Paints by Reflectometry
D 3359 - Measuring Adhesion by Tape Test
D 3363 - Film Hardness by Pencil Test
D 3432 - Unreacted Toluene Diisocyanates in Urethane Prepolymers and Coating Solutions by Gas Chromatography.
D 3960 - Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings
D 4060 - Abrasion Resistance of Organic Coatings by the Taber Abraser

3. REQUIREMENTS

3.1 Materials. An aromatic, oil free, moisture curing, polyurethane resin shall be used that will produce a single component coating to meet the requirements of this specification.

3.1.1 Prohibited materials. The manufacturer shall certify that the coating does not contain lead, chromates, mercury, benzene, chlorinated solvents, or ethylene-based glycol ethers and their acetates.

3.2 Qualitative requirements.

3.2.1 Color. When tested as specified in Table II, at complete hiding, the coating shall match that of the specified color chip in Federal Standard 595.

3.2.2 Condition in container. The coating, in a freshly opened full can, shall show no skinning, livering, seeding or lumps. Any settling or caking shall be easily redispersed to a homogeneous state.

3.2.3 Application properties. The coating shall be capable of being easily applied by brush, roller or spray to a smooth, glossy, uniform film free from lap marks, excessive brush marks, seeds, runs and streaks.

3.2.4 Flexibility. A film of the coating, prepared and tested as in 4.2.1, shall be rated as pass.

3.2.5 Resistance to chemicals. When tested as in 4.2.3.1, the coating shall show no softening, blistering or discoloration.

3.2.6 Resistance to hydrocarbons. A film of the coating, when tested as in 4.2.3.2, shall show no blistering or wrinkling immediately upon removal from the test fluid. After 24 hours of air drying, the portion of the panel which was immersed shall be indistinguishable with regard to adhesion, color, gloss, and firmness from a panel prepared at the same time but not immersed.

3.2.7 Resistance to water. A film of the coating, prepared and tested as in 4.2.3.3, shall show no blistering or wrinkling immediately upon removal from the water. When examined 2 hours after removal, there shall be no softening, whitening, or dulling, and no difference between the immersed portion and the unimmersed portion with regard to adhesion, color and gloss.

3.3 Quantitative requirements. Quantitative requirements shall be as specified in Table I.

TABLE I. Requirements.

	Class A		Class B	
Characteristics	Min	Max	Min	Max
Free diisocyante, % (wt) of coating	—	0.2	—	0.1
Volatile Organic Content, g/L	—	400	—	350
Adhesion	3B	—	3B	—
Viscosity, Cp	—	500	—	500
Fineness of Grind	—	—	6	—
Hardness,(pencil)	3H	—	3H	—
Abrasion resistance	—	45	—	60
Drying time				
Tack free (hrs)	---	2	—	2
Dry through (hrs)	---	12	—	12
Contrast Ratio	—	—	0.95	—
Specular Gloss, 60°	85	---	70	—

4. QUALITY ASSURANCE PROVISIONS

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 as specified herein, using facilities approved by the Government. The Government reserves the right to perform any of the inspections set forth herein when deemed necessary to assure that the coating conforms to the prescribed requirements.

4.2 Test methods. The coating shall be tested in accordance with the methods specified in Table II, and as otherwise specified herein, to determine compliance with the requirements of Section 3. Unless otherwise specified, all tests shall be conducted at standard conditions of 21°C to 32°C (70°F to 90°F) and a relative humidity of 50%. All test reports shall contain the individual values utilized in expressing the final results. Failure to pass any tests, or noncompliance with any requirement, shall be cause for rejection of the sample.

TABLE II. Index

Test	Requirement	ASTM	Test
Free diisocyante	Table I	D 3432	—
Viscosity	Table I	D 562	—
Grind	Table I	D 1210	—
Color	3.2.1	D 1729	—
Condition in Container	3.2.2	—	—
Application properties	3.2.3	—	—
Volatile Organic Content	Table I	D 3960	—
Flexibility	3.2.4	D 522	4.2.1
Adhesion	Table I	D 3359	4.2.2
Resistance to chemicals	3.2.5	D 1308	4.2.3.1.
Resistance to hydrocarbons	3.2.6	D 1308	4.2.3.2
Resistance to water	3.2.7	D 1308	4.2.3.3
Pencil hardness	Table I	D 3363	4.2.4
Abrasion resistance	Table I	D 4060	4.2.5
Dry time	Table I	D 1640	4.2.7
Specular Gloss	Table I	D 523	—
Contrast Ratio	Table I	D 2805	4.2.6

4.2.1 Flexibility. Apply a film of coating to produce a 0.038 mm dry film thickness (DFT) on a solvent-cleaned 8 X 16 x 0.06 cm steel panel. Air dry the panel for 24 hours, then heat to 60°C for 24 hrs. Bend the panel over a 3 mm (1/8 inch) mandrel in accordance with procedures in ASTM D 522, Method B. and check for compliance with 3.2.4.

4.2.2 Adhesion. Apply the coating to a DFT of 0.038 mm on a primed aluminum panel, using a suitable primer that is compatible with polyurethane coating. Air dry the panel for 24 hours, then heat to 60°C for 24 hrs. Condition the panel under standard testing conditions for 1 hour, then test in accordance with Method B of ASTM D 3359 and check for compliance with Table I.

4.2.3 Resistance tests (preparation of panels). Prepare three steel panels with 2 coats at 0.038 mm DFT, applied 4 hours apart, then air dry for 24 hrs, followed by 24 hours at 60°C. On two panels, the back and all sides shall also be coated.

4.2.3.1 Resistance to chemicals. On one of the test panels prepared in 4.2.3, place 1 mL of each of the following in separate puddles:

Hydrochloric acid, 10% (v/v)	Sulfuric acid, 10% (v/v)
Sodium hydroxide, 10% (w/v)	Diesel Fuel
Sodium chloride, 20% (w/v)	SAE #20 Motor Oil

Test in accordance with ASTM D 1308, paragraph 7.2, for 2 hours. Check for compliance with 3.2.5.

4.2.3.2 Resistance to hydrocarbons. Use one of the panels prepared in 4.2.3, with the back and all edges coated. Test in accordance with ASTM D 1308, paragraph 7.4, for 2 hours in a mixture of 70% iso-octane and 30% toluene by volume. Examine for compliance with 3.2.6.

4.2. 3.3 Resistance to water. Use one of the panels prepared in 4.2.3, with the back and all edges coated. Test in accordance with ASTM D 1308, paragraph 7.4, for 2 hours, and evaluate for compliance with 3.2.7.

4.2.4 Pencil hardness. Apply a film of coating on a solvent cleaned 8 X 16 x 0.06 cm steel panel to produce a DFT of 0.038 mm. Air dry the panel for 24 hours, then heat to 60°C for 24 hrs. Condition the panel under standard conditions for 1 hour, then test in accordance with ASTM D3363 for gouge hardness. Evaluate for compliance with Table I.

4.2.5. Abrasion resistance. Apply a film of the coating, to a DFT of 0.038 mm, on a clean steel plate. Air dry the panel for 24 hours, then heat to 60°C for 24 hrs. Condition the panel under standard conditions for 1 hour. Determine the wear index of the coating in accordance with ASTM D 4060, using a CS-17 Calibrase Wheel, a 1000 g weight and 1000 revolutions. Evaluate for compliance with Table I.

4.2.6. Contrast ratio. Drawdown the coating on a sealed black and white chart to form a DFT of 0.038 mm (1.5 mil). Measure the contrast ratio in accordance with ASTM D 2805, paragraph 3.2.1.1. Evaluate for compliance with Table I.

4.2.7. Dry time. Apply the coating to a blasted steel panel at a DFT of 0.038 mm. Test for tack free and dry through time in accordance with ASTM D 1640. Evaluate for compliance with Table I.

5. PREPARATION FOR DELIVERY

5.1 Packaging, packing and marking. The product shall be packaged, packed and marked as specified in the contract or order.

6. NOTES

6.1 Reference to previous version. This specification covers only Type II of TT-C-542E. Type I is deleted.

6.2 Intended use. This product can be used indoors to provide a chemical and abrasion resistant , easy to clean coating for concrete floors and as a topcoat for metal equipment. Since yellowing will occur with exposure to sunlight, this product is not recommended for outdoor use. It is intended for application in one or two coats on properly prepared concrete floors, brick, masonry, metal and wood. Abrasive granules can be incorporated for a skid resistant surface.

6.3 Surface Preparation. Surfaces to be coated must be cleaned thoroughly and free of oil, grease, wax, detergent, residue, dust, dirt, loose paints or sealers, or other contaminants to ensure proper adhesion.

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

(a) Title and date of this specification
(b) Class required
(c) Color number for Class B
(d) Size of container required
(e) Packaging required
(f) Marking required

PREPARING ACTIVITY

GSA-FSS