

INCH-POUND

MIL-DTL-53022F
w/AMENDMENT 1
15 April 2021
SUPERSEDING
MIL-DTL-53022F
1 December 2019

DETAIL SPECIFICATION

PRIMER, EPOXY COATING, CORROSION INHIBITING LEAD AND CHROMATE FREE

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers a flash drying, corrosion inhibiting epoxy primer for ferrous and nonferrous substrates. The primer is lead and chromate free and meets the air pollution requirements for solvent emissions.

1.2 Types. The coating will be furnished in the following types as specified (see 6.2). Whenever one of the following coating types is not cited in a relevant contractual document or drawing, select type IV. Usage of type II and type III formulations is strictly limited to current missile bodies only and is **unauthorized** for all other DoD systems and future designs.

Type II - High solids, lead and chromate free formulation to meet a maximum volatile organic compound (VOC) content of 420 grams/liter (g/l) (3.5 pounds/gallon (lbs/gal)) as packaged. (See Appendix A)

Type III - High solids, lead and chromate free, hazardous air pollutant-free (HAP-free) formulation to meet a maximum VOC content of 340 grams/liter (g/l) (2.8 pounds/gallon (lbs/gal)) as packaged. (See Appendix A)

Comments, suggestions, or questions on this document should be addressed to: Director, U.S. Army DEVCOM Research Laboratory, Weapons and Materials Research Directorate, Specifications & Standards Office, Attn: FCDD-RLW-MC, Aberdeen Proving Ground, MD 21005-5069. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at <https://assist.dla.mil/>.

AMSC N/A

FSC 8010

DISTRIBUTION STATEMENT A: Approved for public release; Distribution is unlimited.

MIL-DTL-53022F
w/AMENDMENT 1

- Type IV - High solids, lead and chromate free, hazardous air pollutant-free (HAP-free) formulation. The corrosion performance includes 1,008 hours salt spray and 30 cycles on the cyclic corrosion test.
- Type V - Self-contained portable kits. The kits contain corrosion inhibiting epoxy primer in a touch-up system qualified to type IV or VI.
- Type VI - High solids, enhanced corrosion performance, lead and chromate free, HAP-free formulations. The enhanced corrosion performance includes 1,512 hours salt spray and 50 cycles on the cyclic corrosion test.

1.2.1 Classes. The classes of primer coatings are as follows:

- Class L - Volatile organic hazardous air pollutants-free (VOHAP-free) formulation to meet 2.8 lbs/gal (340 grams/liter (g/l)) maximum Volatile Organic Compound (VOC) content as packaged.
- Class U - Volatile organic hazardous air pollutants-free (VOHAP-free) formulation to meet 2.08 lbs/gal (250 grams/liter (g/l)) maximum VOC content as packaged.

1.3 Part or identifying number (PIN). Use the following example to create the PINs to be used for coatings acquired to this specification. When other container sizes are required, change the designator accordingly, such as 1/2P for 1/2 pint.

<u>M53022</u>	-	<u>X</u>		<u>X</u>	-	<u>XXXX</u>	-	<u>XXXXXX</u>
Specification Identifier		Coating Type Designator		Class Designator		Container Size		Color Designator
		Type II = 2 ^{/1}		L		1 quart = 001Q		SAE-AMS-STD 595
		Type III = 3 ^{/1}		U		1 gallon = 001G		Color Chip Number
		Type IV = 4				5 gallon = 005G		
		Type V = 5						
		Type VI = 6						

^{/1} See Appendix A

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, 4, and 5 of this specification are limited to types IV, V, & VI. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in sections 3, 4, and 5 of this specification, whether or not they are listed. Documents specific to primer types II and III are listed or cited within Appendix A.

2.2 Government documents

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the versions of these documents are those cited in the solicitation, the contract, or active on the date of contract award.

FEDERAL SPECIFICATIONS

TT-C-490	-	Chemical Conversion Coatings and Pretreatments for Metallic Substrates (Base for Organic Coatings).
----------	---	---

FEDERAL STANDARDS

FED-STD-313	-	Material Safety Data, Transportation Data, And Disposal Data For Hazardous Materials Furnished to Government Activities
-------------	---	---

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-DTL-12468	-	Decontaminating Agent, STB.
MIL-DTL-53039	-	Coating, Aliphatic Polyurethane, Single Component, Chemical Agent Resistant.
MIL-DTL-64159	-	Camouflage Coating, Water Dispersible Aliphatic Polyurethane, Chemical Agent Resistant.
MIL-DTL-81706	-	Chemical Conversion Materials for Coating Aluminum and Aluminum Alloys.
MIL-DTL-81772	-	Thinner, Aircraft Coating.

(Copies of these documents are available online at <https://assist.dla.mil/>).

2.2.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the versions of these documents are those cited in the solicitation, the contract, or active on the date of contract award.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA Method 311	-	Analysis of Hazardous Air Pollutant Compounds in Paints and Coatings by Direct Injection into a Gas Chromatograph.
----------------	---	--

(Copies of this document are available online at <https://www.epa.gov/emc>).

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

MIL-DTL-53022F
w/AMENDMENT 1

ASTM INTERNATIONAL

ASTM A109/A109M	-	Standard Specification for Steel, Strip, Carbon (0.25 Maximum Percent), Cold Rolled
ASTM A1008/A1008M	-	Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High Strength Low Alloy, High Strength Low Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.
ASTM B117	-	Standard Practice for Operating Salt Spray (Fog) Apparatus.
ASTM D522	-	Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings.
ASTM D523	-	Standard Test Method for Specular Gloss.
ASTM D562	-	Standard Test Method for Consistency of Paints Measuring Krebs Unit (KU) Viscosity Using a Stormer Type Viscometer.
ASTM D610	-	Standard Practice for Evaluating Degree of Rusting on Painted Steel Surfaces.
ASTM D1210	-	Standard Test Method for Fineness of Dispersion of Pigment Vehicle Systems by Hegman Type Gage.
ASTM D1308	-	Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes.
ASTM D1394	-	Standard Test Methods for Chemical Analysis of White Titanium Pigments.
ASTM D1475	-	Standard Test Method for Density of Liquid Coatings, Inks, and Related Products.
ASTM D1652	-	Standard Test Method for Epoxy Content of Epoxy Resins.
ASTM D1654	-	Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments.
ASTM D1849	-	Standard Test Method for Package Stability of Paint.
ASTM D2371	-	Standard Test Method for Pigment Content of Solvent Reducible Paints.
ASTM D2698	-	Standard Test Method for Determination of the Pigment Content of Solvent Reducible Paints by High Speed Centrifuging.
ASTM D3960	-	Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings.
ASTM D3335	-	Standard Test Method for Low Concentrations of Lead, Cadmium, and Cobalt in Paint by Atomic Absorption Spectroscopy.
ASTM D3359	-	Standard Test Methods for Measuring Adhesion by

MIL-DTL-53022F
w/AMENDMENT 1

		Tape Test.
ASTM D3363	-	Standard Test Method for Film Hardness by Pencil Test.
ASTM D3924	-	Standard Specification for Standard Environment for Conditioning and Testing Paint, Varnish, Lacquer, and Related Materials.
ASTM D3960	-	Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings.
ASTM D4214	-	Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films.
ASTM D5895	-	Standard Test Methods for Evaluating Drying or Curing During Film Formation of Organic Coatings Using Mechanical Recorders.
ASTM D7232	-	Standard Test Method for Rapid Determination of the Nonvolatile Content of Coatings by Loss in Weight.
ASTM G50	-	Standard Practice for Conducting Atmospheric Corrosion Tests Metals.

(Copies of these documents are available from <https://www.astm.org>).

GENERAL MOTORS CORPORATION

GMW14872	-	Cyclic Corrosion Laboratory Test.
----------	---	-----------------------------------

(Copies of this document are available from <https://global.ihs.com>).

SAE INTERNATIONAL STANDARDS / Aerospace Material Specifications

SAE AMS-STD 595	-	Colors Used in Government Procurement.
SAE AMS-STD 595/26622	-	Gray, Semigloss
SAE AMS-STD 595/33446	-	Tan, Flat

(Copies of these documents are available from <https://www.sae.org>).

2.4 Order of precedence. Unless otherwise noted herein or in the contract, in the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Qualification. The primer furnished under this specification shall be a product which is qualified for listing on the applicable Qualified Products Database (QPD) before contract award (see 4.2 and 6.4). Any change in the formulation of a qualified product shall necessitate its

requalification. The material supplied under contract shall be identical, within manufacturing tolerances, to the product receiving qualification. The requirements within this section are limited to types IV, V, and VI. Requirements specific to types II and III primers and limited to current missile bodies are located within Appendix A.

3.2 Color. The color of the primer shall be characteristic of titanium dioxide pigments or a light beige or gray not darker than color chip number 26622 of SAE-AMS-STD 595.

3.3 Composition. The primer shall be furnished in two components: Component A, a pigmented epoxy resin, and Component B, a catalyst. When the two components are mixed at the proper ratio, the resulting primer shall meet the applicable requirements of this specification.

3.3.1 Pigment. The composition of type IV, class L, component A shall conform to the percent by weight requirements specified in table I. All other types/classes shall be specified by the manufacturer. Pigments shall be HAP-free. Compounds of antimony, arsenic, beryllium, cadmium, cobalt, chromium, cyanide, lead, manganese, mercury, nickel, and selenium are prohibited.

TABLE I. Pigment composition.

Characteristics	Type IV, class L	
Percent by weight/pigment	Percent by weight	
	Min	Max
Titanium dioxide	16.0	-
Zinc phosphate ^{1/}	5.0	-
Corrosion inhibiting pigment ^{2/}	0.5	-
Siliceous extenders	-	60.0

^{1/} Zinc phosphate or metal phosphate complex.

^{2/} Heucorin RZ, Heubach GmbH Company or equivalent.

3.3.2 Vehicle.

3.3.2.1 Component A (epoxy resin component). Component A shall consist of a bisphenol type epoxy resin and pigment combined with necessary amounts of flow control agents and volatile solvents to meet the requirements of this specification.

3.3.2.2 Component B (catalyst component). Component B shall consist of any suitable epoxy curative along with the necessary amounts of volatile solvents to meet the requirements of the specification.

3.3.2.3 Volatile content. The volatile content of the mixed primer shall conform to the following requirements when tested as in 4.6.3.

3.3.2.3.1 For class L. The VOC content shall not exceed 2.8 pounds per gallon lbs/gal (340 grams per liter (g/l)) as packaged (see 4.7.3.1).

MIL-DTL-53022F
w/AMENDMENT 1

3.3.2.3.2 For class U. The VOC content shall not exceed 2.08 lbs/gal (250 grams per liter) as packaged (see 4.7.3.1).

3.3.2.3.3 Volatile organic hazardous air pollutant-free (VOHAP-free). The primer shall be VOHAP-free when tested in accordance with 4.7.3.2.

3.3.3 Component Mix Ratio. Component A shall be supplied in 1 quart, 1 gallon, 4 gallon, or 5 gallon primary containers (see 6.2), and component B shall be supplied in 1/2 pint, 1 quart or 1 gallon primary containers (see 6.2). Type IV class L requires a volume mix ratio of four parts component A to one part component B. The manufacturer shall specify and provide the volume mix ratio for other types and classes.

3.4 Quantitative requirements.

3.4.1 Component A (epoxy resin component). For type IV, class L primer, component A shall conform to the quantitative requirements of table II when tested as in section 4. For type IV, class U and type VI primers, the composition shall be determined by the manufacturer. A primer coating meeting the qualitative requirements of this specification shall result.

TABLE II Component A requirements.

Characteristics	Type IV, class L	
	Min	Max
Total solids, percent by weight	70.0	-
Pigment, percent by weight	45.0	-
Vehicle solids, percent by weight	18.0	-
Epoxy resin, percent by weight of vehicle solids	80.0	-
Fineness of grind	5.0	-
Viscosity, Stormer Type, shearing rate - 200 rpm equivalent, Krebs Unit (KU)	63.0	80.0

3.4.2 Specular gloss (60 degree). When tested as specified in 4.8, the admixed primer shall have a gloss reading of 10-45 units.

3.4.3 Drying time. When tested as specified in 4.9, the admixed primer shall be set to touch in a maximum of 60 minutes, dry hard in a maximum of 5 hours and dry through in a maximum of 8 hours.

3.5 Qualitative requirements.

3.5.1 Condition in container.

3.5.1.1 Component A. When tested as specified in 4.10.1, component A shall be free from grit, seeds, skins, abnormal thickening or livering in a freshly opened container and shall show no more pigment settling or caking that can be easily and completely reincorporated to a smooth homogeneous state.

3.5.1.2 Component B. When tested as specified in 4.10.2, component B shall be clear and free from sediment and suspended matter when examined by transmitted light. It shall show no livering, curdling, gelling or skinning in a freshly opened full container.

3.5.2 Storage stability.

3.5.2.1 Component A. A full quart can of component A shall show no skinning, livering, curdling, hard dry caking or tough gummy sediment when tested as specified in 4.11.1. It shall remix readily to a smooth homogeneous state, with no more than a ten (10) KU increase in viscosity, and shall meet all other requirements of the specification.

3.5.2.2 Component B. When tested as specified in 4.11.2, a full 8 ounce can of component B shall be clear and free from sediment and suspended matter when examined by transmitted light and shall be identical in appearance to the original sample. It shall show no livering, curdling, gelling, or skinning in a freshly opened container and shall meet all other requirements of the specification.

3.5.3 Mixing properties. When tested as specified in 4.12, a smooth homogeneous mixture shall result. The primer shall be free from grit, seeds, skins, or lumps. After aging as specified in 4.12, the primer shall show no signs of gelation.

3.5.4 Spraying properties. When tested as specified in 4.13, the primer shall spray satisfactorily in all respects and shall show no running, sagging, or streaking. The dried film shall show no dusting, mottling, or color separation and shall present a smooth finish free from seeds.

3.5.5 Adhesion. The assessment of the adhesion of the coating film shall be determined by its ability to not peel from the substrate when tested in accordance with ASTM D3359, as specified in 4.14. The resultant test rating shall be classified as scale 4B or better.

3.5.6 Flexibility. A film of primer, tested as specified in 4.15, shall withstand bending without cracking or flaking.

3.5.7 Water resistance. A film of primer, tested as specified in 4.16, shall show no wrinkling or blistering immediately after removal of the panel from the water. The primer shall be no more than slightly affected when examined 2 hours after removal. After 24 hours air drying, the portion of the panel which was immersed shall be the same with regard to hardness, adhesion, color and gloss as compared to the portion which was not immersed. Film softening shall not exceed a number 2 pencil hardness difference (see ASTM D3363) from an unexposed film with identical cure history prior to water exposure.

3.5.8 Hydrocarbon fluid resistance. A film of primer, tested as specified in 4.17, shall show no blistering or wrinkling and no more than a slight yellow to beige color change on submerged area of panel. Upon removal from the fluid slight softening is acceptable. After 2 hours air drying, the

MIL-DTL-53022F
w/AMENDMENT 1

panel that was immersed shall be almost indistinguishable with regard to hardness, adhesion, color and gloss from a panel prepared at the same time but not immersed. Film softening shall not exceed a number 2 pencil hardness difference (see ASTM D3363) from an unexposed film with identical cure history prior to hydrocarbon fluid exposure.

3.5.9 Corrosion resistance.

3.5.9.1 Salt spray resistance. A film of primer tested as specified in 4.18.1 and examined immediately after removal from the salt spray test shall show minimal blistering or loss of adhesion of the paint from the scribe mark (for steel, a minimum rating of 6, for aluminum, a minimum rating of 8, ASTM D1654 Procedure A). Blisters on the nonscribed areas shall cover no more than 5% of the exposed area, none of which shall be larger than 1 mm in diameter.

3.5.9.2 Cyclic corrosion resistance. A film of primer tested as specified in 4.18.2 and evaluated using ASTM D1654 procedure A shall have a rating of not less than seven (7). Blisters shall cover no more than 5% of the exposed area, none of which shall be larger than 1mm in diameter.

3.5.9.3 Atmospheric corrosion resistance. For type IV primer, a film of the coating system tested as specified in 4.18.3 shall show no blistering or loss of adhesion of the paint from the scribe mark (a minimum rating of 6 on ferrous substrates and minimum of 8 on aluminum, ASTM D1654 Procedure A). For type VI primer, a film of the coating system tested as specified in 4.18.3 shall show no blistering or loss of adhesion of the paint from the scribe mark (a minimum rating of 7 on ferrous substrates and minimum of 8 on aluminum, ASTM D1654 Procedure A). Blisters shall cover no more than 5 percent of the exposed area, none of which shall be larger than 1 mm in diameter.

3.5.10 Topcoating. A film of primer, tested as specified in 4.19, shall show no blistering, wrinkling or other evidence of lifting. The topcoat shall be difficult to remove from the primer and the primer from the panel when cut with the knife blade. The resultant rating shall be classified as scale 4B or better.

3.5.11 Super tropical bleach (STB) resistance. When tested as specified in 4.20, a film of the coating shall show no blistering, wrinkling, or film softening when examined immediately after washing with water. Film softening shall not exceed a number 2 pencil hardness difference (see ASTM D3363) from an unexposed film. After drying, there shall be a maximum Delta (Δ) E color change of 2.5 CIE $L^*a^*b^*$ units when comparing a portion of the untested panel to that of the tested area. The STB composition shall be in accordance with MIL-DTL-12468.

3.5.12 Toxic ingredients. Other than parachlorobenzotrifluoride (PCBTF), the primer shall contain no benzene (benzol), chlorinated solvents, or ethylene based glycol ethers and their acetates (see 4.21). The paint shall have no adverse effects on the health of personnel when used for its intended purpose.

3.6 User instruction markings. All primary containers shall be legibly marked or labeled "Component A (epoxy resin component)" or "Component B (catalyst component)" as applicable,

with the manufacturer's mixing and thinning instructions, the VOC content (in pounds per gallon or grams per liter), HAP content and the following:

PRECAUTION: The Surgeon General requires airline respirators to be used unless air sampling shows exposure to be below standards. Then, either chemical cartridge respirators or airline respirators are required. Avoid contact with skin and eyes. Use with adequate ventilation. For other safety recommendations refer to the Safety Data Sheet (SDS). Keep containers closed.

INSTRUCTIONS FOR USE: Mix component A well; then add 1 part by volume of component B to 4 parts by volume of component A or as specified by the manufacturer and mix well. If thinning is required for spray application, follow the manufacturer's instructions to remain within the regulatory limits. The solvents used shall be HAP-free material and stay within the regulatory VOC limits. The admixed coating may require a 30 minute induction time before use. Follow the manufacturer's recommendations. During spray application, avoid inhalation and eye or skin contact.

TYPE IV AND VI MATERIALS HAVE A POTLIFE OF UP TO 4 HOURS AFTER MIXING THE COMPONENTS.

3.7 Safety Data Sheets (SDS). SDS has been phased into the system as of June 1, 2015. As of June 1, 2016, the MSDS is no longer used and you must ensure that each hazardous chemical in your workplace has an SDS and only an SDS as specified in the OSHA Brief - <https://www.osha.gov/dsg/hazcom/> and as specified in Appendix D of 29 CFR 1910.1200 (see: <https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.1200AppD>).

3.8 Toxicity clearance. All new chemicals and materials being added to the Army supply system shall have a toxicity clearance. A toxicity clearance involves a toxicological evaluation of materials prior to introduction into the Army supply system. The Army program manager shall be responsible for identifying technically feasible materials and requesting a toxicity clearance for use of that material within their program (see 6.7).

4. VERIFICATION

4.1 Scope of inspections. The inspections assembled within this section are limited to types IV, V, and VI. Inspections specific to types II and III primers for current missile bodies are located within Appendix A.

4.1.1 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. Qualification inspection (see 4.2).
- b. Conformance inspection (see 4.3).

4.2 Qualification inspection. Qualification shall be conducted by the qualifying activity (see 6.4). The qualification test sample shall consist of all components required for mixing. The samples shall be legibly identified (see 6.4.4). Qualification inspection shall consist of tests for all

MIL-DTL-53022F
w/AMENDMENT 1

requirements specified in section 3 and table III. Qualification inspection shall examine for user instruction markings (see 3.6). The results of each test shall be compared with the applicable requirement in section 3. Failure to conform to any requirement shall be counted as a defect and paint represented by the sample test shall not be approved for inclusion in the QPD under this specification.

4.3 Conformance inspection. The manufacturer shall forward from each production lot (see 4.3.1) a batch validation letter detailing the batch number, manufacturer's code, specification and type number, QPL number and batch volume to U.S. Army DEVCOM Research Laboratory (ARL), ATTN: FCDD-RLW-MC, Camouflage, Coatings and Corrosion Team, Building 4600, 6300 Rodman Road, Aberdeen Proving Ground (APG), MD 21005-5066. The manufacturer shall perform conformance inspection testing on each production lot and have these test results on file when requested by the contracting officer. Conformance inspection for individual lots shall test for VOC, condition in container, total solids, fineness of grind, mixing properties, spraying properties, drying time, and 60 degree specular gloss. There shall be no failures (see 6.5).

4.3.1 Lot and batch formation. Unless otherwise specified in the contract or purchase description (see 6.2), a lot shall consist of all coatings of the same type, composition and color, from a single uniform batch, produced and offered for delivery at one time (see 6.4.2). Unless otherwise specified in the contract or purchase description (see 6.2), a batch shall consist of all coating material (in U.S. gallons) manufactured during one continuous operation and forming part of one contract or order for delivery (see 6.4.2). The addition of any substance to a batch shall constitute a new lot.

4.4 Inspection conditions. Unless otherwise specified, all inspections shall be performed in accordance with ASTM D3924. Also, unless otherwise stated in the test method or paragraph, room temperature shall be 73 ± 4 degrees Fahrenheit ($^{\circ}\text{F}$) (23 ± 2 degrees Celsius ($^{\circ}\text{C}$)) and a 40 - 70 percent relative humidity.

4.5 Safety Data Sheet. The SDS shall address all individual components as they are supplied and be in compliance with 3.7. Noncompliance to 3.7 shall be cause for rejection.

4.6 Test methods.

4.6.1 Test conditions. Except as otherwise specified herein, the routine testing and referee testing shall be conducted in accordance with ASTM D3924. A dry film thickness of 1.5 ± 0.2 mils (37.5 ± 5 microns) shall be used whenever film thickness is requested in any test, unless otherwise required by the test. Failure of any test result to fall within the specified ranges in section 3 shall constitute failure of the applicable test. For all tests requiring the use of the mixed primer, components A and B shall be mixed in the proportions specified in paragraph 4.12.

4.6.2 Test panels. Steel test panels shall be cold-rolled SAE 1010 steel conforming to ASTM A109/A109M or ASTM A1008/A1008M, treated with a zinc phosphate coating in accordance with TT-C-490, type I. The panels shall have a Rockwell B hardness of 55 to 75 and a surface roughness of 30 to 45 micro inches (0.76 to 1.14 microns) (arithmetic average) as rolled. Aluminum test panels shall be aluminum alloy 2024-T3 treated with MIL-DTL-81706, type II, class 1A.

MIL-DTL-53022F
w/AMENDMENT 1

TABLE III. Test methods.

Item	ASTM Test Method	Test Paragraph	Requirement Paragraph or Table
Pigment analysis	D2371	4.7.1	3.3.1; Table I
Titanium dioxide	D1394	4.7.1.1	Table I
Zinc phosphate	-	4.7.1.2	Table I
Hexavalent chromium	-	4.7.1.3	-
Nonvolatile content	D7232	4.7.2	Table II
Isolation of vehicle (Supercentrifuge)	D2698	-	3.3.2
VOC	D3960	4.7.3.1	3.3.2.3.1 & 3.3.2.3.2
VOHAP ^{1/}	D3271	4.7.3.2	3.3.2.3.3
Pigment solids	D2371	-	Table II
Vehicle solids	D2371	-	Table II
Viscosity	D562	-	Table II
Fineness of grind	D1210	-	Table II
<u>Epoxy resin</u>			
component A	D1652	4.7.4.1	Table II
component B	-	4.7.4.2	-
Lead metal	D3335	4.7.5	3.3.1
60° specular gloss	D523	4.8	3.4.2
Drying time	D5895	4.9	3.4.3
<u>Condition in container</u>			
component A	-	4.10.1	3.5.1.1
component B	-	4.10.2	3.5.1.2
<u>Storage stability</u>			
<u>Full container</u>			
component A	D1849	4.11.1	3.5.2.1
component B	-	4.11.2	3.5.2.2
Mixing properties	-	4.12	3.5.3
Spraying properties	-	4.13	3.5.4
Adhesion	D3359	4.14	3.5.5
Flexibility	D522 method B	4.15	3.5.6
Water resistance	D1308	4.16	3.5.7
Hydrocarbon resistance	-	4.17	3.5.8
Salt spray resistance	B117	4.18.1	3.5.9.1
Cyclic corrosion resistance ^{2/}	-	4.18.2	3.5.9.2
Atmospheric corrosion resistance	G50	4.18.3	3.5.9.3
Topcoating	-	4.19	3.5.10
STB resistance	-	4.21	3.5.11
Toxic ingredients	-	4.22	3.5.13

^{1/} EPA Method 311.

^{2/} General Motors Standard: GMW 14872.

4.6.3 Test procedures. Tests (see table III) shall be conducted in accordance with ASTM, GM, EPA, SAE or as specified herein. The right is reserved to make any additional tests deemed necessary to determine that the primer meets the requirements of this specification.

4.6.4 Polyurethane topcoat. When a topcoat is required by the test method use a polyurethane coating conforming to either MIL-DTL-53039 or MIL-DTL-64159, Tan 686A, color number 33446 of SAE-AMS-STD 595 Colors Used in Government Procurement. Apply the coating to a total dry film thickness of 2 ± 0.2 mils (50 ± 5 microns). If applied in two coats, allow the first coat to air dry for 60 minutes prior to application of the second coat. After application of the topcoat to the required thickness and prior to testing, allow the coating to air dry for not less than 168 hours.

4.7 Analysis of primer.

4.7.1 Pigment analysis. Extract the pigment as in ASTM D2371, but use ethanol for the extraction. Make appropriate qualitative and quantitative tests on the extracted pigment to determine if only permissible pigments were used. Nonconformance to 3.3.1 shall constitute failure of this test.

4.7.1.1 Titanium dioxide (TiO₂) content. Determine the titanium dioxide (TiO₂) content on the extracted pigment in accordance with ASTM D1394 for compliance with table I. Nonconformance to table I shall constitute failure of this test.

4.7.1.2 Zinc phosphate content. Determine the zinc phosphate content in accordance with 4.7.1.2.1 and 4.7.1.2.2.

4.7.1.2.1 Determination of zinc.

4.7.1.2.1.1 Reagents.

- a. Buffer solution (pH 10): 350 milliliters (ml) concentrated NH₄OH + 54 grams (g) NH₄Cl + H₂O to give 1000 ml.
- b. Eriochrome black T (0.5%): 0.25 g eriochrome black T + 2.2 g hydroxylamine hydrochloride/50 ml methanol solution.
- c. Primary standard zinc oxide, 0.200N (Normal concentration solution): Accurately weigh 4.069 g of oven dried ZnO. Dissolve it in 250 ml of the buffer solution and dilute to 500 ml.
- d. 0.5N Disodium ethylenediaminetetraacetate dehydrate (EDTA): 37.2 g EDTA/liter aqueous solution.

4.7.1.2.1.2 Procedure.

- a. Accurately weigh approximately 1.0 g of pigment into a 250 ml glass stoppered Erlenmeyer flask.
- b. Add 25 ml buffer, stopper, and shake vigorously every few minutes over a period of 30 minutes.
- c. Filter through fine paper into a 400 ml beaker, washing well with water until 200 ml of filtrate are collected.
- d. Add 20.0 ml of the EDTA (an excess) to the filtrate.

- e. Add 10 drops of eriochrome black T.
- f. Titrate with standard ZnO to a wine-red end point (V_s).
- g. Run a blank by titrating 20.0 ml of the EDTA in 200 ml of an aqueous solution containing 25 ml of the buffer (V_b).

4.7.1.2.1.3 Calculations.

$$\text{Percent zinc} = \frac{(V_b - V_s) \times 0.02 \times 3.269}{\text{Sample weight}}$$

$$\text{Percent zinc phosphate} = \frac{(V_b - V_s) \times 0.2 \times 7.035}{\text{Sample weight}}$$

4.7.1.2.2 Determination of phosphate.

4.7.1.2.2.1 Reagents.

- a. Concentrated NH_4OH .
- b. Concentrated HNO_3 .
- c. NH_4NO_3 .
- d. Ammonium molybdate - Johnson's formula: Mix 55 grams of $(\text{NH}_4)_6\text{MO}_7\text{O}_{24} \cdot 4\text{H}_2\text{O}$ and 50 g of NH_4NO_3 with 18 milliliters (ml) of concentrated NH_4OH and 20 ml H_2O . Stir. Dilute to about 700 ml with H_2O . Heat with occasional stirring until all salts have dissolved. Dilute to 1000 ml. Let stand overnight. Filter through fine paper but do not wash the residue.

4.7.1.2.2.2 Procedure.

- a. Accurately weigh approximately 2 grams (g) of pigment into a 250 ml glass stoppered Erlenmeyer flask.
- b. Add 30 ml 7.5N HNO_3 and agitate the sample every few minutes over a period of 30 minutes.
- c. Filter through Whatman 50 paper into a 400 ml beaker washing well with water.
- d. Add 6 g of NH_4NO_3 , stir.
- e. Heat the clear solution to 176 °F (80 °C) (no higher) and add 75 ml of ammonium molybdate with constant stirring.
- f. Stir for several minutes and let the precipitate settle for 2 hours.
- g. Filter through a tared crucible (gooch or medium glass), transfer the precipitate and wash with 1 percent HNO_3 5 ml concentrated HNO_3 /500 ml solution. The washing shall be thorough.
- h. Give the collected precipitate a final wash with a small amount of water.
- i. Dry the crucible for 2 hours in a 221 °F (105 °C) oven.
- j. Cool crucible in a desiccator and determine the weight of the precipitate (it shall not exceed 3 g; if it does, repeat the determination with a smaller sample).

4.7.1.2.2.3 Calculations.

$$\text{Percent phosphate [PO}_4\text{]} = \frac{\text{Weight of precipitate} \times 5.029}{\text{Sample weight}}$$

$$\text{Percent zinc phosphate [Zn}_3\text{(PO}_4\text{)}_2 \cdot 2\text{H}_2\text{O}] = \frac{\text{Weight of precipitate} \times 11.18}{\text{Sample weight}}$$

4.7.1.2.2.4 Failure criteria. Nonconformance to table I shall constitute failure of this test.

4.7.1.3 Hexavalent chromium. Determine the presence or absence of hexavalent chromium by either of the following chemical reagent screening techniques.

- (a) Weigh approximately 250 milligrams (mg) of pigment into a small glass test tube. Add 5 milliliters of 25 percent aqueous KOH and shake vigorously for 1 - 2 minutes. Decant a one milliliter aliquot into a plastic micro-centrifuge tube and centrifuge for five (5) minutes at 17,000 rotations per minute, balancing the centrifuge with a tube containing one ml of the KOH solution. The resulting supernatant liquid shall be nearly colorless. Use the tube containing the KOH solution as a reference. A distinct yellow color indicates the presence of hexavalent chromium and therefore shall constitute failure of the test requirement.
- (b) Weigh approximately 50 mg of pigment into a small glass test tube. Add 5 ml of 10 percent aqueous H₂SO₄ and shake vigorously for 1 - 2 minutes. Decant a one ml aliquot into a plastic micro-centrifuge tube and centrifuge for five (5) minutes at 17,000 rotations per minute, balancing the centrifuge with a second tube containing one ml of the H₂SO₄ solution. The solution in the second tube shall act as the test "blank". Immerse a chromate ion (CrO₄²⁻) test strip into the supernatant from each tube. Shake off the excess liquid and after approximately one minute compare the color change in the reaction zone of the strips to the color scale (concentration levels) provided by the manufacturer. The appearance of a purple/violet color from the "sample" strip is indicative of hexavalent chrome and therefore shall constitute failure of the test requirement. If a color change is apparent from the "blank" strip rerun the test using fresh, chromium-free reagents. The appearance of a pronounced color change is indicative of hexavalent chrome and therefore shall constitute failure of the test requirement.

4.7.2 Nonvolatile (total solids) content. Place a portion of the thoroughly mixed sample in a dropping bottle and weigh to the nearest one-tenth mg. Weigh one 60 millimeters (mm) aluminum dish to the nearest one-tenth mg. Transfer a small sample that does not exceed 0.3 g to the dish, determine its exact weight to the nearest one-tenth mg by loss in weight of the bottle. Dissolve the sample in 2 ml of American Chemical Society reagent grade ethanol and dry in a gravity convection oven at 221 °F (105 °C) for one (1) hour. Upon cooling, reweigh the dish to the nearest one-tenth mg. From the weight of the residue in the dish and the weight of the sample taken, calculate the percent nonvolatile (total solid) as required. Nonconformance to the requirements in table II shall constitute failure of this test.

4.7.3 Solvent analysis.

4.7.3.1 VOC determination. For types IV and VI, determine the VOC of component A and component B in accordance with ASTM D3960. The density is determined by using the weight/gallon cup described in ASTM D1475. The nonvolatile content is determined by using ASTM D7232. The notarized statement of composition shall be used in the determination process. Calculate the VOC for the coating as mixed with the equation:

$$\frac{4(\text{VOC of component A}) + (\text{VOC of component B})}{5} = \text{VOC lbs/gal of mixed coating}$$

Determine compliance with 3.3.2.3.1 for class L and 3.3.2.3.2 for class U.

4.7.3.2 Solvent VOHAP determination. Hazardous solvent content of each individual coating shall be determined in accordance with ASTM D3960 or EPA Method 311, as applicable. When using ASTM D3960, determine the VOC of component A and component B in accordance with ASTM D3960. The density is determined by using the weight/gallon cup described in ASTM D1475. The nonvolatile content is determined by using ASTM D7232. The notarized statement of composition shall be used in the determination process. Calculate the VOC for the coating as mixed with the equation: $(4(\text{VOC of component A}) + (\text{VOC of component B}))/5 = \text{VOC lbs/gal of mixed coating}$. Check for compliance with 3.3.2.3.3.

4.7.4.1 Epoxy resin - component A. Determine the epoxy resin content on the extracted vehicle in accordance with ASTM D1652 for compliance with table II. Nonconformance to table II constitutes failure of this test.

4.7.4.2 Epoxy resin - component B. Place 4 drops of component B in a test tube. Add about 10 drops of toluene and 10 drops of ethyl alcohol, mix and dry completely in an oven at 221 °F (105 °C). After cooling, add 1 ml concentrated sulfuric acid and warm to about 140 °F (60 °C) in a water bath for 10 minutes. Cool and add 2 drops of 40 percent formaldehyde solution. Allow the sample to stand a few minutes. Dilute with 10 ml of water added all at one time. A blue or green color shall form almost immediately if epoxy resins of the bisphenol type are present.

4.7.5 Lead content. Determine the presence or absence of lead by weighing 50 mg of pigment into a small glass test tube. Add 5 ml of dilute HNO₃ and shake vigorously for 1 - 2 minutes. Decant a one ml aliquot into a plastic micro-centrifuge tube and centrifuge for five (5) minutes at 17,000 rotations per minute - balancing the centrifuge with a tube containing one ml of the dilute HNO₃ solution. This tube shall also act as the test "blank". Immerse a lead test strip into the supernatant from each tube. Shake off the excess liquid and after approximately one minute compare the color change in the reaction zone of the strips to the color scale (concentration levels) provided by the manufacturer. If any color change is apparent from the "blank" strip rerun the test using fresh, lead-free reagents. For the "Sample" strip, the appearance of a bright red color is indicative of lead at a concentration level above the specification limit, while no color change or a faint pink color change is indicative of lead concentrations below the specification limit. Confirmation of the exact lead concentration in the coating's solids shall be determined using any authoritative quantitative method, such as ASTM D3335.

MIL-DTL-53022F
w/AMENDMENT 1

4.8 Specular gloss (60 degree). Prepare a film of the primer on steel as specified in 4.13 and allow to dry 48 hours. Determine the 60 degree specular gloss in accordance with ASTM D523. Nonconformance to 3.4.2 shall constitute failure of this test.

4.9 Drying time. Spray the mixed coating on a test panel as specified in 4.13 to a dry film thickness of 1.5 ± 0.2 mils (37.5 ± 5 microns). Determine the drying time under ambient conditions in accordance with ASTM D5895. Check for compliance with 3.4.3.

4.10 Condition in container.

4.10.1 Component A. Upon opening a full previously unopened container, the condition of the contents shall be examined for compliance with 3.5.1.1. Reseal, then agitate the container for three (3) minutes on a paint shaker and examine for compliance with 3.5.1.1. On reexamination of the contents, the disclosure of any gel bodies or undispersed pigment indicates unsatisfactory settling properties.

4.10.2 Component B. Upon opening a full previously unopened container, the condition of the contents shall be examined for compliance with 3.5.1.2.

4.11 Storage stability.

4.11.1 Component A. Allow a full quart can of component A to stand undisturbed for one (1) year in accordance with ASTM D1849 and then examine the contents. Evaluate the pigment settling as specified in 4.10.1, except agitate the can for five (5) minutes on a paint shaker prior to reexamination. Determine viscosity and other applicable tests for compliance with 3.5.2.1.

4.11.2 Component B. Allow a full 8 ounce can of component B to stand for one (1) year under standard laboratory conditions. At the end of this period, examine the contents for compliance to 3.5.2.2.

4.12 Mixing properties. For type IV, class L, thoroughly mix four (4) parts by volume of component A with one part by volume of component B and examine for compliance with 3.5.3. For type IV, class U and type VI primer, thoroughly mix per manufactures instructions and examine for compliance to 3.5.3. Place 5 ounces of the material in an eight ounce glass jar and do not agitate or disturb for 4 hours. At the end of this period examine for compliance with 3.5.3.

4.13 Spraying properties. If necessary for application, follow the manufacturer's instructions for thinning not to exceed the VOC level (see 1.2.1). To maintain a HAP-free primer, MIL-T-81772 shall not be used unless the type used is HAP-free. Spray primer on a steel panel to a dry film thickness of 1.5 ± 0.2 mils (37.5 ± 5 microns). The coating properties of the dry sprayed surface shall be observed for compliance with 3.5.4.

4.14 Adhesion. Spray the primer as in 4.13 on a steel and aluminum panel pretreated as in 4.6.2. Air dry primer panels for seven (7) days. Perform adhesion testing as specified in ASTM D3359, method B and examine for compliance with 3.5.5.

4.15 Flexibility. Determine flexibility in accordance with ASTM D522, method B. Spray the coating on a steel panel, tinplated 0.010 inches (0.254 mm) thick to a dry film thickness of 1.5 ± 0.2 mils (37.5 ± 5 microns). Air dry for seven (7) days. Bend the coated panels over a $\frac{1}{4}$ inch mandrel at room testing temperature (see 4.4). Examine the coating for cracks over the area of the bend for compliance with 3.5.6.

4.16 Water resistance. Prepare sprayed films of primer as in 4.13 on test panels pretreated as in 4.6.2. Allow the panels to air dry seven (7) days. Coat all exposed, uncoated metal surfaces with wax or other suitable coating. Immerse the panels for 168 hours in distilled water at 73 ± 2 °F (23 ± 1 °C) as specified in ASTM D1308. On removal, observe panels for compliance with 3.5.7. Nonconformance to 3.5.7 constitutes failure of this test.

4.17 Hydrocarbon fluid resistance. Prepare films of primer as in 4.13 on test panels pretreated as in 4.6.2 and air dry seven (7) days. Do not wax or coat the exposed metal surfaces. Immerse the panels for 168 hours in a hydrocarbon fluid conforming to F24 fuel at 70 ± 5 °F (21 ± 3 °C). Panels shall be immersed at a minimum depth of 50 %. At the end of the test period, remove and examine for compliance with 3.5.8. Nonconformance to 3.5.8 shall constitute failure of this test.

4.18 Corrosion resistance. Prepare fifteen (15) pretreated steel and ten (10) aluminum 4 x 6 inch panels as specified in 4.14. Allow to air dry for seven (7) days. Coat the edges and uncoated metal surfaces of the witness panels with a suitable CARC coating prior to testing. Tape, wax, and chromated coatings are unacceptable for edge and back coatings. Five (5) each of the steel prepared panels shall be exposed to the salt spray resistance and cyclic corrosion resistance.

4.18.1 Salt spray resistance. For type IV primer, use five (5) of the steel panels and the five (5) aluminum panels from 4.18 and make an "X" scribe through the primer. Expose these scribed panels to 5 percent salt spray for 1,008 hours in accordance with ASTM B117. For type VI primer, use the same number of steel and aluminum scribed panels and expose them for 1512 hours in accordance with ASTM B117. Upon removal, wash the panel's gently in deionized water until free from any visible salt deposits and examine immediately for compliance with 3.5.9.1. Nonconformance to 3.5.9.1 shall constitute failure of this test.

4.18.2 Cyclic corrosion resistance. Use five (5) additional steel panels from 4.18 and make an "X" scribe through the primer. Expose the panels to accelerated cyclic corrosion for 30 cycles for type IV and 50 cycles for type VI in accordance with GMW 14872. Upon removal, rinse panels in deionized water until visible salt deposits are removed. Examine immediately for compliance with 3.5.9.2. Strip primer with suitable paint remover and inspect for rust, pitting or corrosion not evident with paint present. Nonconformance to 3.5.9.2 shall constitute failure of this test.

4.18.3 Atmospheric corrosion resistance. Use the remaining five (5) steel and five (5) aluminum panels air dried for 24 hours and spray polyurethane topcoat per 4.6.4. Make an "X" scribe through the coating system to the substrate. Expose these for two (2) years at a suitable test site in accordance with ASTM G50, with equivalent or greater mass loss than 1.5 mils per year (mpy), such as the ARL site at Cape Canaveral Air Force Station. Upon completion of the 2 year exposure, specimen/coupons shall be field evaluated, then returned to ARL for a final evaluation. Upon return, wash the specimens/coupons gently in or DI until free from any visible salt deposits and examine immediately for compliance with 3.5.9.3. When visual examination is indeterminate,

the specimens/coupons shall undergo coating removal along the scribe as per ASTM D1654 and inspection for rust, pitting or corrosion not evident with paint present. Nonconformance to 3.5.11 shall constitute failure of this test.

4.19 Topcoating. Prepare two (2) test panels for each topcoat as in 4.16. Allow primer to air dry 1 hour and 24 hours respectively and spray topcoats conforming to MIL-DTL-64159 and MIL-DTL-53039 over the specimens (see 4.6.4). If necessary, the topcoats shall be thinned according to the specification, with thinner conforming to the specification or manufacturer, and sprayed to a dry film thickness of 2 ± 0.2 mils (50 ± 5 microns). Visually examine the panels for evidence of lifting after the topcoat has air dried 2 hours. Allow the specimens to air dry 168 hours after topcoat application. Perform adhesion testing as specified in ASTM D3359, method B and examine its ability to resist peeling. The resultant rating shall be classified as scale 4B or better. Nonconformance to 3.5.10 constitutes failure of this test.

4.20 Super tropical bleach (STB) resistance. Prepare a steel panel as specified in 4.15. Scribe a one (1) inch diameter wax ring using a china marker on the painted surface of the panel. Place approximately one (1) milliliter of STB agent on the panel surface. Do not cover. Allow to stand 30 minutes then thoroughly wash with water. A STB slurry mix of 40 parts STB and 60 parts water by weight shall be used. Examine for compliance with 3.5.11.

4.21 Toxic ingredients. Other than PCBTF, the manufacturer shall certify that the primer contains no benzene (benzol), chlorinated solvents or ethylene based glycol ethers and their acetates. Nonconformance to 3.5.12 constitutes failure of this requirement.

5. PACKAGING

5.1 Packaging and markings. For acquisition purposes, the packaging requirements for types IV, V, and VI shall be as specified in the contract or order (see 6.2). When packaging of materiel is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or within the military service's system command. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity. For markings, containers or packaging of the coating shall be marked with a label that identifies the specification number, type, color, and material designation so that traceability to the QPD can be verified. Packaging and markings requirements for types II and III are listed within Appendix A (See A.5).

6. NOTES

(This section contains information of a general or explanatory nature for primer types IV, V, and VI that may be helpful, but is not mandatory.)

6.1 Intended use. The primer described in this specification, which is lead and hexavalent chromium free, is intended for use on clean, chemically pretreated surfaces in camouflage systems.

MIL-DTL-53022F
w/AMENDMENT 1

The class L formulations will meet a 2.8 lbs/gal (340 g/l) maximum VOC content requirement and be HAP-free. The class U formulations will meet a 2.08 lbs/gal (250 grams/liter (g/l)) maximum VOC content requirement and be HAP-free. Type VI will provide enhanced corrosion performance of 1,512 hours salt spray and 50 cycles on the cyclic corrosion test. This epoxy primer is not to be used on aircraft or any associated components of the aircraft. This primer is also not to be used with powder topcoat conforming to MIL-PRF-32348, type III. The proper aircraft primers are either MIL-PRF-23377 or MIL-PRF-85582. This primer is acceptable for use on aviation ground support equipment where MIL-PRF-85285, type II topcoat is used.

6.1.1 Application dry film thickness. The dry film thickness specified within this document is for qualification purposes only. The dry film thickness used to apply this primer to military assets and components should comply with table V of MIL-DTL-53072.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number and date of this specification.
- b. Type of coating required (see 1.2).
- c. Part or identifying number (PIN) (see 1.3).
- d. Color required (see 3.2).
- e. Size of primary container required for component A and size of primary container required for component B (see 3.3).
- f. Whether a SDS is required with each shipment (see 3.7 and 4.5).
- g. If a toxicity clearance is required (see 3.8).
- h. If qualification samples are required and where to send them (see 4.2 and 6.4).
- i. If conformance samples are required and where to send them (see 4.3).
- j. Lot and batch formation (see 4.3.1).
- k. Packaging requirements (see 5.1).

6.3 Basis of purchase. The primers covered by this specification should be purchased by volume, the unit being a kit comprised of 1 quart, 1 gallon, 5 gallons, or 55 gallons. The kit components need not be the same size.

6.4 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in the QPD, whether or not such products have actually been so listed by that date. The attention of contractors 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 purchase orders for the products covered by this specification. Samples for QPD testing (see 4.2) should be submitted to U.S. Army DEVCOM Research Laboratory, ATTN: FCDD-RLW-MC, Camouflage, Coatings and Corrosion Team, Building 4600, 6300 Rodman Road, Aberdeen Proving Ground, MD 21005-5066. An online listing of products qualified to this specification may be found in the Qualified Products Database (QPD) at <https://assist.dla.mil>.

6.4.1 Retention of qualification. In order to retain qualification of a product approved for listing in the QPD, the manufacturer will verify by certification to the qualifying activity that the manufacturer's product complies with the requirements of this specification. Unless otherwise specified, the time of periodic verification by certification will be in two year intervals from the

date of the original qualification, and will be initiated by the qualifying activity. No change will be made in formulation, raw materials or supplier(s) of raw materials, methods of manufacture, equipment, or geographic location without prior written Government approval. The Government reserves the right to re-examine the qualified product whenever deemed necessary to determine that the product continues to meet any or all of the specification requirements.

6.4.2 Conformity to qualified sample. All lots of coatings supplied under this specification must be manufactured using the same formulation, raw materials and supplier(s) of raw materials, methods of manufacture, equipment, and geographic location as the qualification sample, unless changes have been approved by the qualifying activity.

6.4.3 SDS. Contracting officers will identify those activities requiring copies of a completed SDS prepared in accordance with FED-STD-313. The pertinent Government mailing addresses for submission of data are listed in FED-STD-313.

6.4.4 Sample identification for qualification inspection. Samples for QPD testing are to be identified in a cover letter with the following information:

- a. Manufacturer's name and product number.
- b. Submitted by (name and date).
- c. Specify the number of samples.
- d. Specify the reason for submitting the samples.
- e. Specification MIL-DTL-53022F; Type_____, Class_____, Color_____,
"Primer, Epoxy Coating, Corrosion Inhibiting Lead And Chromate Free".
- f. Provide a copy of the SDS.
- g. Provide a copy of the notarized statement of composition.
- h. Provide a copy of the technical data sheet.
- i. Provide a copy of the test report.

6.5 Conformance rejection and retest. Failure in any conformance inspection will result in the rejection of the batch from which it was obtained and constitutes justification for removal from the qualified products list. Rejected material cannot be resubmitted for acceptance without written approval from the qualification activity (see 4.3). The application for resubmission will contain all details concerning previous rejections and measures taken to correct these deficiencies.

6.6 Cyclic Corrosion Laboratory Test. A properly calibrated cyclic chamber performing GM 9540P will, after 40 cycles, cause mass loss in the range of 3712 - 4312 mg on a standardized 3.18 mm thick mass loss coupon. The target range for calibration with respect to GMW 14872, Exterior, 4 sprays/cycle, Exposure C is 3660 - 4220 mg at 26 ± 3 cycles on a standardized 3.18mm mass loss coupon. The congruency of the mass loss ranges given in GM 9450P and GMW 14872 had led ARL to decide to change the required cycles for accelerated corrosion testing from 40 to 30 cycles for GMW 14872. To achieve an equal corrosive environment between the two test methods, the cycles for GMW 14872 would be 75% of the requirement that was established for GM 9540. This new requirement would be reflected into each CARC pretreatment, primer and application specification as they are amended or revised.

6.7 Toxicity request. Department of the Army Regulation (AR) 40-5, Preventive Medicine, (AR) 70-1, Acquisition Policy, and Department of the Army Pamphlet 70-3, Acquisition Procedures,

MIL-DTL-53022F
w/AMENDMENT 1

require a toxicity clearance. Army toxicity questions and/or a toxicity clearance request should be addressed to: Commander, US Army Center for Health Promotion and Preventive Medicine, ATTN: MCHB-TS-TTE, 5158 Blackhawk Road, Aberdeen Proving Ground, MD 21010-5403.

6.8 Detail specification. MIL-DTL-53072, Chemical Agent Resistant Coating (CARC) System Application Procedures and Quality Control Inspection, is available for application procedures and quality control inspection of this coating.

6.9 Subject term (key word) listing.

Aluminum
Camouflage system
CARC
HAP
Metal
Panels
Steel
VOC

6.10 Amendment notations. Excluding Appendix A, the margins of this specification are marked with vertical lines to indicate modifications generated by this amendment. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations.

MIL-DTL-53022F
w/AMENDMENT 1
APPENDIX A

PRIMER, EPOXY COATING, CORROSION INHIBITING LEAD AND CHROMATE FREE,
FOR MISSILES, TYPE II AND TYPE III

A.1. SCOPE

A.1.1 Scope. This appendix covering type II and type III primer formulations for missile bodies is based upon elements from the previous MIL-DTL-53022E revision pertaining only to types II and III of a flash drying, corrosion inhibiting epoxy primer for ferrous and nonferrous substrates. The primer is lead and chromate free and meets the air pollution requirements for solvent emissions.

A.1.2 Types. The coating will be furnished in the following types as specified (see A.6.2). Usage of type II and type III formulations is strictly limited to current missile bodies only and is **unauthorized** for all other DoD systems and future designs. Types IV, V, and VI primers are located within the main specification.

- Type II - High solids, lead and chromate free formulation to meet a maximum volatile organic compound (VOC) content of 420 grams/liter (g/l) (3.5 pounds/gallon (lbs/gal)) as packaged.
- Type III - High solids, lead and chromate free, hazardous air pollutant-free (HAP-free) formulation to meet a maximum VOC content of 340 grams/liter (g/l) (2.8 pounds/gallon (lbs/gal)) as packaged.

A.1.3 Part or identifying number (PIN). Use the following example to create the PINs to be used for coatings acquired to this specification. When other container sizes are required, change the designator accordingly, such as 1/2P for 1/2 pint.

<u>M53022</u>	-	<u>X</u>	-	<u>XXXX</u>	-	<u>XXXXX</u>
Specification Identifier		Coating type Designator		Container Size		Color Designator
		Type II = 2		1 quart = 001Q		SAE-AMS-STD 595
		Type III = 3		1 gallon = 001G		Color Chip Number
				5 gallon = 005G		

A.2. APPLICABLE DOCUMENTS

A.2.1 General. The documents listed in this appendix are specified in sections A.3, A.4, and A.5 of this specification are limited to types II and III. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in sections A.3, A.4, and A.5 of this specification, whether or not they are listed. Documents specific to primer types IV, V, and VI primers are located within the main specification.

MIL-DTL-53022F
w/AMENDMENT 1
APPENDIX A

A.2.2 Government documents.

A.2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

FEDERAL SPECIFICATIONS

TT-C-490	-	Chemical Conversion Coatings and Pretreatments for Metallic Substrates (Base for Organic Coatings).
----------	---	---

FEDERAL STANDARDS

FED-STD-313	-	Material Safety Data, Transportation Data, And Disposal Data For Hazardous Materials Furnished to Government Activities
-------------	---	---

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-DTL-12468	-	Decontaminating Agent, STB.
MIL-DTL-53039	-	Coating, Aliphatic Polyurethane, Single Component, Chemical Agent Resistant.
MIL-DTL-64159	-	Camouflage Coating, Water Dispersible Aliphatic Polyurethane, Chemical Agent Resistant.
MIL-DTL-81706	-	Chemical Conversion Materials for Coating Aluminum and Aluminum Alloys.
MIL-DTL-81772	-	Thinner, Aircraft Coating.

(Copies of these documents are available online at <https://assist.dla.mil/>).

A.2.2.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the versions of these documents are those cited in the solicitation, the contract, or active on the date of contract award.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA Method 311	-	Analysis of Hazardous Air Pollutant Compounds in Paints and Coatings by Direct Injection into a Gas Chromatograph.
----------------	---	--

(Copies of this document are available online at <https://www.epa.gov/emc>).

MIL-DTL-53022F
w/AMENDMENT 1
APPENDIX A

A.2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

ASTM INTERNATIONAL

ASTM A109/A109M	-	Standard Specification for Steel, Strip, Carbon (0.25 Maximum Percent), Cold Rolled
ASTM A1008/A1008M	-	Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High Strength Low Alloy, High Strength Low Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.
ASTM B117	-	Standard Practice for Operating Salt Spray (Fog) Apparatus.
ASTM D522	-	Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings.
ASTM D523	-	Standard Test Method for Specular Gloss.
ASTM D562	-	Standard Test Method for Consistency of Paints Measuring Krebs Unit (KU) Viscosity Using a Stormer Type Viscometer.
ASTM D610	-	Standard Practice for Evaluating Degree of Rusting on Painted Steel Surfaces.
ASTM D1210	-	Standard Test Method for Fineness of Dispersion of Pigment Vehicle Systems by Hegman Type Gage.
ASTM D1308	-	Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes.
ASTM D1394	-	Standard Test Methods for Chemical Analysis of White Titanium Pigments.
ASTM D1475	-	Standard Test Method for Density of Liquid Coatings, Inks, and Related Products.
ASTM D1652	-	Standard Test Method for Epoxy Content of Epoxy Resins.
ASTM D1654	-	Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments.
ASTM D1849	-	Standard Test Method for Package Stability of Paint.
ASTM D2371	-	Standard Test Method for Pigment Content of Solvent Reducible Paints.
ASTM D2698	-	Standard Test Method for Determination of the Pigment Content of Solvent Reducible Paints by High Speed Centrifuging.
ASTM D3335	-	Standard Test Method for Low Concentrations of

MIL-DTL-53022F
w/AMENDMENT 1
APPENDIX A

		Lead, Cadmium, and Cobalt in Paint by Atomic Absorption Spectroscopy.
ASTM D3359	-	Standard Test Methods for Measuring Adhesion by Tape Test.
ASTM D3363	-	Standard Test Method for Film Hardness by Pencil Test.
ASTM D3924	-	Standard Specification for Standard Environment for Conditioning and Testing Paint, Varnish, Lacquer, and Related Materials.
ASTM D3960	-	Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings.
ASTM D4214	-	Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films.
ASTM D5895	-	Standard Test Methods for Evaluating Drying or Curing During Film Formation of Organic Coatings Using Mechanical Recorders.
ASTM D7232	-	Standard Test Method for Rapid Determination of the Nonvolatile Content of Coatings by Loss in Weight.
ASTM G90	-	Standard Practice for Performing Accelerated Outdoor Weathering of Nonmetallic Materials Using Concentrated Natural Sunlight.

(Copies of these documents are available from <https://www.astm.org>).

SAE INTERNATIONAL STANDARDS / Aerospace Material Specifications

SAE AMS-STD 595	-	Colors Used in Government Procurement.
SAE AMS-STD 595/26622	-	Gray, Semigloss
SAE AMS-STD 595/33446	-	Tan, Flat

(Copies of these documents are available from <https://www.sae.org>).

A.2.4 Order of precedence. Unless otherwise noted herein or in the contract, in the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

A.3. REQUIREMENTS

A.3.1 Qualification. The primers furnished under this appendix shall be limited only to the products which have prior qualification for listing on the applicable Qualified Products Database (QPD) and before contract award (see A.4.2 and A.6.4). Qualification of types II and types III primers for missiles is closed to additional vendors and existing vendors shall recertify their listed

MIL-DTL-53022F
w/AMENDMENT 1
APPENDIX A

products at 2 year intervals. Any change in the formulation of a qualified product shall necessitate its recertification. The material supplied under contract shall be identical, within manufacturing tolerances, to the product receiving recertification.

A.3.2 Color. The color of the primer shall be characteristic of titanium dioxide pigments or a light beige or gray not darker than color chip number 26622 of SAE-AMS-STD 595.

A.3.3 Composition. The primer shall be furnished in 2 components: component A (a pigmented epoxy resin component) in 1 quart, 1 gallon, 4 gallon or 5 gallon primary containers (see A.6.2), and component B (catalyst component) in 1/2 pint, 1 quart or 1 gallon primary containers (see A.6.2). When mixed four parts by volume of component A to one part by volume of component B, a product meeting the applicable requirements of this specification shall result.

A.3.3.1 Pigment. The pigment portion of component A shall conform to the percent by weight requirements specified in table A-I. When the component A of the primer is tested in accordance with section A.4, the analysis shall conform to the requirements of table A-I. Hexavalent chromium shall not be present for all types. Pigments contained in these primers shall be HAP-free for type III. Compounds of antimony, arsenic, beryllium, cadmium, cobalt, chromium, cyanide, lead, manganese, mercury, nickel and selenium shall be absent. Small amounts of tinting pigments are permissible to achieve the color as in A.3.2.

TABLE A-I. Pigment composition.

Pigment	Type II		Type III	
	Percent by weight		Percent by weight	
	Min	Max	Min	Max
Titanium dioxide	32.0	-	16.0	-
Zinc phosphate ^{1/}	5.0	-	5.0	-
Corrosion inhibiting pigment ^{2/}	0.5	-	0.5	-
Siliceous extenders	-	45.0	-	60.0

^{1/} Zinc phosphate or metal phosphate complex.

^{2/} Heucorin RZ, Heubach GmbH Company or equivalent.

A.3.3.2 Vehicle.

A.3.3.2.1 Component A (epoxy resin component). Component A shall consist of a bisphenol type epoxy resin and pigment combined with necessary amounts of flow control agents and volatile solvents to meet the requirements of this specification.

A.3.3.2.2 Component B (catalyst component). For type II, component B shall consist of an aliphatic polyamide-epoxy resin adduct combined with the necessary amounts of volatile solvents to meet the requirements of the specification. For type III, component B shall consist of any suitable epoxy curative along with the necessary amounts of volatile solvents to meet the requirements of the specification.

MIL-DTL-53022F
w/AMENDMENT 1
APPENDIX A

A.3.3.2.3 Volatile content. The volatile content of the mixed primer shall conform to the following requirements when tested as in A.4.6.3.

A.3.3.2.3.1 For type II. The VOC content shall not exceed 3.5 pounds per gallon (lbs/gal) (420 grams per liter (g/l)) as packaged (see A.4.7.3.1).

A.3.3.2.3.2 For type III. The VOC content shall not exceed 2.8 lbs/gal (340 grams per liter) as packaged (see A.4.7.3.1).

A.3.3.2.3.3 Volatile organic hazardous air pollutant-free (VOHAP-free). Type III coatings shall be VOHAP-free when tested in accordance with A.4.7.3.2.

A.3.4 Quantitative requirements.

A.3.4.1 Component A (epoxy resin component). Component A shall conform to the quantitative requirements of table A-II when tested as in section A.4.

TABLE A-II. Component A requirements.

Characteristics	Type II		Type III	
	Min	Max	Min	Max
Total solids, percent by weight	70.0	-	70.0	-
Pigment, percent by weight	41.0	-	45.0	-
Vehicle solids, percent by weight	19.0	-	18.0	-
Epoxy resin, percent by weight of vehicle solids	80.0	-	80.0	-
Fineness of grind	5.0	-	5.0	-
Viscosity, Stormer Type, shearing rate - 200 rpm equivalent, Krebs Unit (KU)	65.0	80.0	63.0	80.0

A.3.4.2 Mixed primer. The mixed primer shall conform to the quantitative requirements of table A-III when tested as in section A.4.

A.3.5 Qualitative requirements.

A.3.5.1 Condition in container.

A.3.5.1.1 Component A. When tested as specified in A.4.10.1, component A shall be free from grit, seeds, skins, abnormal thickening or livering in a freshly opened container and shall show no

MIL-DTL-53022F
w/AMENDMENT 1
APPENDIX A

more pigment settling or caking that can be easily and completely reincorporated to a smooth homogeneous state.

A.3.5.1.2 Component B. When tested as specified in A.4.10.2, component B shall be clear and free from sediment and suspended matter when examined by transmitted light. It shall show no livering, curdling, gelling or skinning in a freshly opened full container.

TABLE A-III. Mixed primer requirements.

Characteristics	Type II		Type III	
	Min	Max	Min	Max
Specular gloss, 60 degrees	10	30	10	45
Drying time:				
Set to touch, minutes	-	30	-	60
Dry hard, hours	-	4	-	5
Dry through, hours	-	6	-	8
Lead metal, % by weight of total solids	-	0.06	-	0.06
Pigment: antimony, arsenic, beryllium, cadmium, cobalt, chromium, cyanide, lead, manganese, mercury, nickel, and selenium	absent		absent	

A.3.5.2 Storage stability.

A.3.5.2.1 Component A. A full quart can of component A shall show no skinning, livering, curdling, hard dry caking or tough gummy sediment when tested as specified in A.4.11.1. It shall remix readily to a smooth homogeneous state, with no more than a ten (10) KU increase in viscosity, and shall meet all other requirements of the specification.

A.3.5.2.2 Component B. When tested as specified in A.4.11.2, a full 8 ounce can of component B shall be clear and free from sediment and suspended matter when examined by transmitted light and shall be identical in appearance to the original sample. It shall show no livering, curdling, gelling, or skinning in a freshly opened container and shall meet all other requirements of the specification.

A.3.5.3 Mixing properties. When tested as specified in A.4.12, smooth homogeneous mixture shall result. The primer shall be free from grit, seeds, skins, or lumps. After aging as specified in A.4.12, the primer shall show no signs of gelation.

MIL-DTL-53022F
w/AMENDMENT 1
APPENDIX A

A.3.5.4 Spraying properties. When tested as specified in A.4.13, the primer shall spray satisfactorily in all respects and shall show no running, sagging, or streaking. The dried film shall show no dusting, mottling, or color separation and shall present a smooth finish free from seeds.

A.3.5.5 Adhesion. The assessment of the adhesion of the coating film shall be determined by its ability to not peel from the substrate when tested in accordance with ASTM D3359, as specified in A.4.14. The resultant test rating shall be classified as scale 4B or better.

A.3.5.6 Flexibility. A film of primer, tested as specified in A.4.15, shall withstand bending without cracking or flaking.

A.3.5.7 Water resistance. A film of primer, tested as specified in A.4.16, shall show no wrinkling or blistering immediately after removal of the panel from the water. The primer shall be no more than slightly affected when examined 2 hours after removal. After 24 hours air drying, the portion of the panel which was immersed shall be the same with regard to hardness, adhesion, color and gloss as compared to the portion which was not immersed. Film softening shall not exceed a number 2 pencil hardness difference (see ASTM D3363) from an unexposed film with identical cure history prior to water exposure.

A.3.5.8 Hydrocarbon fluid resistance. A film of primer, tested as specified in A.4.17, shall show no blistering or wrinkling and no more than a slight yellow to beige color change on submerged area of panel. Upon removal from the fluid slight softening is acceptable. After 2 hours air drying, the panel that was immersed shall be almost indistinguishable with regard to hardness, adhesion, color and gloss from a panel prepared at the same time but not immersed. Film softening shall not exceed a number 2 pencil hardness difference (see ASTM D3363) from an unexposed film with identical cure history prior to hydrocarbon fluid exposure.

A.3.5.9 Corrosion resistance.

A.3.5.9.1 Salt spray resistance. A film of primer tested as specified in A.4.18.1 and examined immediately after removal from the salt spray test shall show no more than a trace of rusting (ASTM D610, table I, rust grade 9) or corrosion, and no more than five scattered blisters, none larger than one (1) mm in diameter. Upon removal of the primer, there shall be no more than a trace of rusting, pitting, or corrosion on the panels.

A.3.5.10 Topcoating. A film of primer, tested as specified in A.4.19, shall show no blistering, wrinkling or other evidence of lifting. The topcoat shall be difficult to remove from the primer and the primer from the panel when cut with the knife blade. The resultant rating shall be classified as scale 4B or better.

A.3.5.11 Weather resistance. A film of the primer, exposed as specified in A.4.20, shall show no rusting, cracking, checking, flaking, or loss of adhesion. On removal of the coating system, the surface of the metal shall show no more than a trace of rusting, pitting, or corrosion (see ASTM D610, table I, rust grade 9).

MIL-DTL-53022F
w/AMENDMENT 1
APPENDIX A

A.3.5.12 Super tropical bleach (STB) resistance. When tested as specified in A.4.21, a film of the coating shall show no blistering, wrinkling, or film softening when examined immediately after washing with water. Film softening shall not exceed a number 2 pencil hardness difference (see ASTM D3363) from an unexposed film. After drying, there shall be a maximum Delta (Δ) E color change of 2.5 CIE L*a*b* units when comparing a portion of the untested panel to that of the tested area. The STB composition shall be in accordance with MIL-DTL-12468.

A.3.5.13 Toxic ingredients. Other than parachlorobenzotrifluoride (PCBTF), the primer shall contain no benzene (benzol), chlorinated solvents, or ethylene based glycol ethers and their acetates (see A.4.22). The paint shall have no adverse effects on the health of personnel when used for its intended purpose.

A.3.6 User instruction markings. All primary containers shall be legibly marked or labeled "Component A (epoxy resin component)" or "Component B (catalyst component)" as applicable, with the manufacturer's mixing and thinning instructions, the VOC content (in pounds per gallon or grams per liter), HAP content and the following:

PRECAUTION: The Surgeon General requires airline respirators to be used unless air sampling shows exposure to be below standards. Then, either chemical cartridge respirators or airline respirators are required. Avoid contact with skin and eyes. Use with adequate ventilation. For other safety recommendations refer to the Safety Data Sheet (SDS). Keep containers closed.

INSTRUCTIONS FOR USE: Mix component A well; then add 1 part by volume of component B to 4 parts by volume of component A and mix well. If thinning is required for spray application, for type II primer, consult with the manufacturer of the primer for the appropriate thinner to stay within the regulatory limits. For thinning the type III primers, follow the manufacturer's instructions. The solvents used shall be HAP-free material and stay within the regulatory VOC limits. The admixed coating may require a 30 minute induction time before use. Follow the manufacturer's recommendations. During spray application, avoid inhalation and eye or skin contact.

TYPE II AND III MATERIALS HAVE A POTLIFE OF UP TO 4 HOURS AFTER MIXING THE COMPONENTS.

A.3.7 Safety Data Sheet. A SDS shall be prepared for the primer in accordance with FED-STD-313 and forwarded to the qualifying activity (see A.6.4.3). The SDS shall be included with each shipment of the material covered by this specification and submitted to pertinent Government agencies as stated in a FED-STD-313.

A.3.8 Toxicity clearance. All new chemicals and materials being added to the Army supply system shall have a toxicity clearance. A toxicity clearance involves a toxicological evaluation of materials prior to introduction into the Army supply system. The Army program manager shall be responsible for identifying technically feasible materials and requesting a toxicity clearance for use of that material within their program (see A.6.6).

MIL-DTL-53022F
w/AMENDMENT 1
APPENDIX A

A.4 VERIFICATION

A.4.1 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. Recertification inspection (see A.4.2).
- b. Conformance inspection (see A.4.3).

A.4.2 Recertification inspection. Qualification of additional vendors to produce types II and III primers for missiles is closed therefore qualification inspection, now referred to as recertification inspection shall be conducted by the qualifying activity (see A.6.4) at recurring two (2) year intervals to existing type II and type III qualified products. To ensure compliance with all the requirements of this specification, the manufacturer shall complete DD Form 1718 (Certification of Qualified Products) for each plant location and certify that the statements listed on the DD Form 1718 are true. The time of periodic verification by certification shall be in two-year intervals from the date of original qualification.

A.4.3 Conformance inspection. The manufacturer shall forward from each production lot (see A.4.3.1) a batch validation letter detailing the batch number, manufacturer's code, specification and type number, QPL number and batch volume to U.S. Army DEVCOM Research Laboratory (ARL), ATTN: RDRL-WMM-C, Camouflage, Coatings and Corrosion Team, 6300 Rodman Road, BLDG 4600, Aberdeen Proving Ground (APG), MD 21005-5066. The manufacturer shall perform conformance inspection testing on each production lot and have these test results on file when requested by the contracting officer. Conformance inspection for individual lots shall test for VOC, condition in container, total solids, fineness of grind, mixing properties, spraying properties, drying time, and 60 degree specular gloss. There shall be no failures (see A.6.5).

A.4.3.1 Lot and batch formation. Unless otherwise specified in the contract or purchase description (see A.6.2), a lot shall consist of all coatings of the same type, composition and color, from a single uniform batch, produced and offered for delivery at one time (see A.6.4.2). Unless otherwise specified in the contract or purchase description (see A.6.2), a batch shall consist of all coating material (in U.S. gallons) manufactured during one continuous operation and forming part of one contract or order for delivery (see A.6.4.2). The addition of any substance to a batch shall constitute a new lot.

A.4.4 Inspection conditions. Unless otherwise specified, all inspections shall be performed in accordance with ASTM D3924. Also, unless otherwise stated in the test method or paragraph, room temperature shall be 73 ± 4 degrees Fahrenheit ($^{\circ}\text{F}$) (23 ± 2 degrees Celsius ($^{\circ}\text{C}$)) and a 40 - 70 percent relative humidity.

A.4.5 Safety Data Sheet. The SDS shall address components A and B and be in compliance with FED-STD-313. Noncompliance to A.3.7 shall be cause for rejection.

A.4.6 Test methods.

MIL-DTL-53022F
w/AMENDMENT 1
APPENDIX A

TABLE A-IV. Tests.

Item	ASTM Test Method	Test Paragraph	Requirement Paragraph or Table
Pigment analysis	D2371	A.4.7.1	A.3.3.1; Table A-I
Titanium dioxide	D1394	A.4.7.1.1	Table A-I
Zinc phosphate	-	A.4.7.1.2	Table A-I
Hexavalent chromium	-	A.4.7.1.3	-
Nonvolatile content	D7232	A.4.7.2	Table A-II
Isolation of vehicle (Supercentrifuge)	D2698	-	A.3.3.2
VOC	D3960	A.4.7.3.1	A.3.3.2.3.1 & A.3.3.2.3.2
VOHAP ^{1/}	D3271	A.4.7.3.2	A.3.3.2.3.3
Pigment solids	D2371	-	Table A-II
Vehicle solids	D2371	-	Table A-II
Viscosity	D562	-	Table A-II
Fineness of grind	D1210	-	Table A-II
<u>Epoxy resin</u> component A	D1652	A.4.7.4.1	Table A-II
component B	-	A.4.7.4.2	-
Lead metal	D3335	A.4.7.5	A.3.3.1
60° specular gloss	D523	A.4.8	A.3.4.2
Drying time	D5895	A.4.9	A.3.4.3
<u>Condition in container</u> component A	-	A.4.10.1	A.3.5.1.1
component B	-	A.4.10.2	A.3.5.1.2
<u>Storage stability</u> <u>Full container</u> component A	D1849	A.4.11.1	A.3.5.2.1
component B	-	A.4.11.2	A.3.5.2.2
Mixing properties	-	A.4.12	A.3.5.3
Spraying properties	-	A.4.13	A.3.5.4
Adhesion	D3359	A.4.14	A.3.5.5
Flexibility	D522 method B	A.4.15	A.3.5.6
Water resistance	D1308	A.4.16	A.3.5.7
Hydrocarbon resistance	-	A.4.17	A.3.5.8
Salt spray resistance	B117	A.4.18.1	A.3.5.9.1
Topcoating	-	A.4.19	A.3.5.10
Weather resistance	G90	A.4.20	A.3.5.11
STB resistance	-	A.4.21	A.3.5.11
Toxic ingredients	-	A.4.22	A.3.5.13

^{1/} EPA Method 311.

A.4.6.1 Test conditions. Except as otherwise specified herein, the routine testing and referee testing shall be conducted in accordance with ASTM D3924. A dry film thickness of 1.5 ± 0.2

MIL-DTL-53022F
w/AMENDMENT 1
APPENDIX A

mils (37.5 ± 5 microns) shall be used whenever film thickness is requested in any test, unless otherwise required by the test. Failure of any test result to fall within the specified ranges in section 3 shall constitute failure of the applicable test. For all tests requiring the use of the mixed primer, components A and B shall be mixed in the proportions specified in paragraph A.4.12.

A.4.6.2 Test panels. Steel test panels shall be cold-rolled SAE 1010 steel conforming to ASTM A109/A109M or ASTM A1008/A1008M, treated with a zinc phosphate coating in accordance with TT-C-490, type I. The panels shall have a Rockwell B hardness of 55 to 75 and a surface roughness of 30 to 45 micro inches (0.76 to 1.14 microns) (arithmetic average) as rolled. Aluminum test panels shall be aluminum alloy 2024-T3 treated with MIL-DTL-81706, type II.

A.4.6.3 Test procedures. Tests (see table A-IV) shall be conducted in accordance with ASTM, EPA, SAE or as specified herein. The right is reserved to make any additional tests deemed necessary to determine that the primer meets the requirements of this specification.

A.4.7 Analysis of primer.

A.4.7.1 Pigment analysis. Extract the pigment as in ASTM D2371, but use ethanol for the extraction. Make appropriate qualitative and quantitative tests on the extracted pigment to determine if only permissible pigments were used. Nonconformance to A.3.3.1 shall constitute failure of this test.

A.4.7.1.1 Titanium dioxide (TiO₂) content. Determine the titanium dioxide (TiO₂) content on the extracted pigment in accordance with ASTM D1394 for compliance with table A-I. Nonconformance to table A-I shall constitute failure of this test.

A.4.7.1.2 Zinc phosphate content. Determine the zinc phosphate content in accordance with A.4.7.1.2.1 and A.4.7.1.2.2.

A.4.7.1.2.1 Determination of zinc.

A.4.7.1.2.1.1 Reagents.

- a. Buffer solution (pH 10): 350 milliliters (ml) concentrated NH₄OH + 54 grams (g) NH₄Cl + H₂O to give 1000 ml.
- b. Eriochrome black T (0.5%): 0.25 g eriochrome black T + 2.2 g hydroxylamine hydrochloride/50 ml methanol solution.
- c. Primary standard zinc oxide, 0.200N (Normal concentration solution): Accurately weigh 4.069 g of oven dried ZnO. Dissolve it in 250 ml of the buffer solution and dilute to 500 ml.
- d. 0.5N Disodium ethylenediaminetetraacetate dehydrate (EDTA): 37.2 g EDTA/liter aqueous solution.

MIL-DTL-53022F
w/AMENDMENT 1
APPENDIX A

A.4.7.1.2.1.2 Procedure.

- a. Accurately weigh approximately 1.0 g of pigment into a 250 ml glass stoppered Erlenmeyer flask.
- b. Add 25 ml buffer, stopper, and shake vigorously every few minutes over a period of 30 minutes.
- c. Filter through fine paper into a 400 ml beaker, washing well with water until 200 ml of filtrate are collected.
- d. Add 20.0 ml of the EDTA (an excess) to the filtrate.
- e. Add 10 drops of eriochrome black T.
- f. Titrate with standard ZnO to a wine-red end point (Vs).
- g. Run a blank by titrating 20.0 ml of the EDTA in 200 ml of an aqueous solution containing 25 ml of the buffer (Vb).

4.7.1.2.1.3 Calculations.

$$\text{Percent zinc} = \frac{(Vb - VS) \times 0.02 \times 3.269}{\text{Sample weight}}$$

$$\text{Percent zinc phosphate} = \frac{(Vb - VS) \times 0.2 \times 7.035}{\text{Sample weight}}$$

A.4.7.1.2.2 Determination of phosphate.

A.4.7.1.2.2.1 Reagents.

- a. Concentrated NH₄OH.
- b. Concentrated HNO₃.
- c. NH₄NO₃.
- d. Ammonium molybdate - Johnson's formula: Mix 55 grams of (NH₄)₆Mo₇O₂₄ · 4H₂O and 50 g of NH₄NO₃ with 18 milliliters (ml) of concentrated NH₄OH and 20 ml H₂O. Stir. Dilute to about 700 ml with H₂O. Heat with occasional stirring until all salts have dissolved. Dilute to 1000 ml. Let stand overnight. Filter through fine paper but do not wash the residue.

A.4.7.1.2.2.2 Procedure.

- a. Accurately weigh approximately 2 grams (g) of pigment into a 250 ml glass stoppered Erlenmeyer flask.
- b. Add 30 ml 7.5N HNO₃ and agitate the sample every few minutes over a period of 30 minutes.
- c. Filter through Whatman 50 paper into a 400 ml beaker washing well with water.
- d. Add 6 g of NH₄NO₃, stir.
- e. Heat the clear solution to 176 °F (80 °C) (no higher) and add 75 ml of ammonium molybdate with constant stirring.
- f. Stir for several minutes and let the precipitate settle for 2 hours.

MIL-DTL-53022F
w/AMENDMENT 1
APPENDIX A

- g. Filter through a tared crucible (gooch or medium glass), transfer the precipitate and wash with 1 percent HNO₃ 5 ml concentrated HNO₃/500 ml solution. The washing shall be thorough.
- h. Give the collected precipitate a final wash with a small amount of water.
- i. Dry the crucible for 2 hours in a 221 °F (105 °C) oven.
- j. Cool crucible in a desiccator and determine the weight of the precipitate (it shall not exceed 3 g; if it does, repeat the determination with a smaller sample).

A.4.7.1.2.2.3 Calculations.

$$\text{Percent phosphate [PO}_4\text{]} = \frac{\text{Weight of precipitate} \times 5.029}{\text{Sample weight}}$$

$$\text{Percent zinc phosphate [Zn}_3\text{(PO}_4\text{)}_2 \cdot 2\text{H}_2\text{O)}] = \frac{\text{Weight of precipitate} \times 11.18}{\text{Sample weight}}$$

A.4.7.1.2.2.4 Failure criteria. Nonconformance to table A-I shall constitute failure of this test.

A.4.7.1.3 Hexavalent chromium. Determine the presence or absence of hexavalent chromium by either of the following chemical reagent screening techniques.

- (a) Weigh approximately 250 milligrams (mg) of pigment into a small glass test tube. Add 5 milliliters of 25 percent aqueous KOH and shake vigorously for 1 - 2 minutes. Decant a one milliliter aliquot into a plastic micro-centrifuge tube and centrifuge for five (5) minutes at 17,000 rotations per minute, balancing the centrifuge with a tube containing one ml of the KOH solution. The resulting supernatant liquid shall be nearly colorless. Use the tube containing the KOH solution as a reference. A distinct yellow color indicates the presence of hexavalent chromium and therefore shall constitute failure of the test requirement.
- (b) Weigh approximately 50 mg of pigment into a small glass test tube. Add 5 ml of 10 percent aqueous H₂SO₄ and shake vigorously for 1 - 2 minutes. Decant a one ml aliquot into a plastic micro-centrifuge tube and centrifuge for five (5) minutes at 17,000 rotations per minute, balancing the centrifuge with a second tube containing one ml of the H₂SO₄ solution. The solution in the second tube shall act as the test "blank". Immerse a chromate ion (CrO₄²⁻) test strip into the supernatant from each tube. Shake off the excess liquid and after approximately one minute compare the color change in the reaction zone of the strips to the color scale (concentration levels) provided by the manufacturer. The appearance of a purple/violet color from the "sample" strip is indicative of hexavalent chrome and therefore shall constitute failure of the test requirement. If a color change is apparent from the "blank" strip rerun the test using fresh, chromium-free reagents. The appearance of a pronounced color change is indicative of hexavalent chrome and therefore shall constitute failure of the test requirement.

MIL-DTL-53022F
w/AMENDMENT 1
APPENDIX A

A.4.7.2 Nonvolatile (total solids) content. Place a portion of the thoroughly mixed sample in a dropping bottle and weigh to the nearest one-tenth mg. Weigh one 60 millimeters (mm) aluminum dish to the nearest one-tenth mg. Transfer a small sample that does not exceed 0.3 g to the dish, determine its exact weight to the nearest one-tenth mg by loss in weight of the bottle. Dissolve the sample in 2 ml of American Chemical Society reagent grade ethanol and dry in a gravity convection oven at 221 °F (105 °C) for one (1) hour. Upon cooling, reweigh the dish to the nearest one-tenth mg. From the weight of the residue in the dish and the weight of the sample taken, calculate the percent nonvolatile (total solid) as required. Nonconformance to the requirements in table A-II shall constitute failure of this test.

A.4.7.3 Solvent analysis.

A.4.7.3.1 VOC determination. For types II and III, determine the VOC of component A and component B in accordance with ASTM D3960. The density is determined by using the weight/gallon cup described in ASTM D1475. The nonvolatile content is determined by using ASTM D7232. The notarized statement of composition shall be used in the determination process. Calculate the VOC for the coating as mixed with the equation:
$$4(\text{VOC of component A}) + (\text{VOC of component B}) = \text{VOC lbs/gal of mixed coating}$$

Determine compliance with A.3.3.2.3.1 for type II and A.3.3.2.3.2 for type III.

A.4.7.3.2 Solvent VOHAP determination. Hazardous solvent content of each individual coating shall be determined in accordance with ASTM D3960 or EPA Method 311, as applicable. When using ASTM D3960, determine the VOC of component A and component B in accordance with ASTM D3960. The density is determined by using the weight/gallon cup described in ASTM D1475. The nonvolatile content is determined by using ASTM D7232. The notarized statement of composition shall be used in the determination process. Calculate the VOC for the coating as mixed with the equation: $(4(\text{VOC of component A}) + (\text{VOC of component B}))/5 = \text{VOC lbs/gal of mixed coating}$. Check for compliance with A.3.3.2.3.3.

A.4.7.4 Analysis of vehicle.

A.4.7.4.1 Epoxy resin - component A. Determine the epoxy resin content on the extracted vehicle in accordance with ASTM D1652 for compliance with table A-II. Nonconformance to table A-II constitutes failure of this test.

A.4.7.4.2 Epoxy resin - component B. Place 4 drops of component B in a test tube. Add about 10 drops of toluene and 10 drops of ethyl alcohol, mix and dry completely in an oven at 221 °F (105 °C). After cooling, add 1 ml concentrated sulfuric acid and warm to about 140 °F (60 °C) in a water bath for 10 minutes. Cool and add 2 drops of 40 percent formaldehyde solution. Allow the sample to stand a few minutes. Dilute with 10 ml of water added all at one time. A blue or green color shall form almost immediately if epoxy resins of the bisphenol type are present.

A.4.7.4.3 Weight/gallon - component B. Determine the weight/gallon of component B in accordance with ASTM D1475.

MIL-DTL-53022F
w/AMENDMENT 1
APPENDIX A

A.4.7.5 Lead content. Determine the presence or absence of lead by weighing 50 mg of pigment into a small glass test tube. Add 5 ml of dilute HNO₃ and shake vigorously for 1 - 2 minutes. Decant a one ml aliquot into a plastic micro-centrifuge tube and centrifuge for five (5) minutes at 17,000 rotations per minute - balancing the centrifuge with a tube containing one ml of the dilute HNO₃ solution. This tube shall also act as the test “blank”. Immerse a lead test strip into the supernatant from each tube. Shake off the excess liquid and after approximately one minute compare the color change in the reaction zone of the strips to the color scale (concentration levels) provided by the manufacturer. If any color change is apparent from the “blank” strip rerun the test using fresh, lead-free reagents. For the “Sample” strip, the appearance of a bright red color is indicative of lead at a concentration level above the specification limit, while no color change or a faint pink color change is indicative of lead concentrations below the specification limit. Confirmation of the exact lead concentration in the coating’s solids shall be determined using any authoritative quantitative method, such as ASTM D3335.

A.4.8 Specular gloss (60 degree). Prepare a film of the primer on steel as specified in A.4.13 and allow to dry 48 hours. Determine the 60 degree specular gloss in accordance with ASTM D523. Nonconformance to table A-III shall constitute failure of this test.

A.4.9 Drying time. Spray the mixed coating on a test panel as specified in A.4.13 to a dry film thickness of 1.5 ± 0.2 mils (37.5 ± 5 microns). Determine the drying time under ambient conditions in accordance with ASTM D5895. Check for compliance with table A-III.

A.4.10 Condition in container.

A.4.10.1 Component A. Upon opening a full previously unopened container, the condition of the contents shall be examined for compliance with A.3.5.1.1. Reseal, then agitate the container for three (3) minutes on a paint shaker and examine for compliance with A.3.5.1.1. On reexamination of the contents, the disclosure of any gel bodies or undispersed pigment indicates unsatisfactory settling properties.

A.4.10.2 Component B. Upon opening a full previously unopened container, the condition of the contents shall be examined for compliance with A.3.5.1.2.

A.4.11 Storage stability.

A.4.11.1 Component A. Allow a full quart can of component A to stand undisturbed for one (1) year in accordance with ASTM D1849 and then examine the contents. Evaluate the pigment settling as specified in A.4.10.1, except agitate the can for five (5) minutes on a paint shaker prior to reexamination. Determine viscosity and other applicable tests for compliance with A.3.5.2.1.

A.4.11.2 Component B. Allow a full 8 ounce can of component B to stand for one (1) year under standard laboratory conditions. At the end of this period, examine the contents for compliance to A.3.5.2.2.

A.4.12 Mixing properties. Thoroughly mix four (4) parts by volume of component A with one part by volume of component B and examine for compliance with A.3.5.3. Place 5 ounces of the

MIL-DTL-53022F
w/AMENDMENT 1
APPENDIX A

material in an eight ounce glass jar and do not agitate or disturb for 4 hours. At the end of this period examine for compliance with A.3.5.3.

A.4.13 Spraying properties. If necessary for application of type II primer, use the solvent MIL-T-81772, type I or II if necessary or follow the manufacturer's recommendations not to exceed the VOC level (see A.1.2). For type III and IV primer, follow the manufacturer's recommendations not to exceed the VOC level (see A.1.2). To maintain a HAP-free primer, MIL-T-81772 shall not be used with the type III material. Spray primer on a steel panel to a dry film thickness of 1.5 ± 0.2 mils (37.5 ± 5 microns). The coating properties of the dry sprayed surface shall be observed for compliance with A.3.5.4.

A.4.14 Adhesion. Spray the primer as in A.4.13 on a steel and aluminum panel pretreated as in A.4.6.2. Air dry types II and III specimens for seven (7) days. Perform adhesion testing as specified in ASTM D3359, method B and examine for compliance with A.3.5.5.

A.4.15 Flexibility. Determine flexibility in accordance with ASTM D522, method B. Spray the coating on a steel panel, tinplated 0.010 inches (0.254 mm) thick to a dry film thickness of 1.5 ± 0.2 mils (37.5 ± 5 microns). Air dry for 168 hours. Bend the coated panels over a 1/4 inch mandrel at room testing temperature (see A.4.4). Examine the coating for cracks over the area of the bend for compliance with A.3.5.6.

A.4.16 Water resistance. Prepare sprayed films of primer as in A.4.13 on test panels pretreated as in 4.6.2. Allow the panels to air dry seven (7) days. Coat all exposed, uncoated metal surfaces with wax or other suitable coating. Immerse the panels for 168 hours in distilled water at 73 ± 2 °F (23 ± 1 °C) as specified in ASTM D1308. On removal, observe panels for compliance with A.3.5.7. Nonconformance to A.3.5.7 constitutes failure of this test.

A.4.17 Hydrocarbon fluid resistance. Prepare films of primer as in A.4.13 on test panels pretreated as in A.4.6.2 and air dry seven (7) days. Do not wax or coat the exposed metal surfaces. Immerse the panels for 168 hours in a hydrocarbon fluid conforming to JP8 at 70 ± 5 °F (21 ± 3 °C). Panels shall be immersed at a minimum depth of 50 %. At the end of the test period, remove and examine for compliance with 3.5.8. Nonconformance to A.3.5.8 shall constitute failure of this test.

A.4.18 Corrosion resistance. For types II and III, prepare three (3) 4 by 12 inch test panels each as in A.4.14 and air dry for seven (7) days. Coat the edges and uncoated metal surfaces of the witness panels with a suitable CARC coating prior to testing. Tape, wax, and chromated coatings are unacceptable for edge and back coatings.

A.4.18.1 Salt spray resistance. Expose the panels prepared in 4.18 to 5 percent salt spray for 336 hours for types II and III in accordance with ASTM B117. Upon removal, wash the panel's gently in warm running water until free from any visible salt deposits and examine immediately for compliance with A.3.5.9.1. Nonconformance to A.3.5.9.1 shall constitute failure of this test.

A.4.19 Topcoating. Prepare two (2) test panels for each topcoat as in A.4.16. Allow primer to air dry 1 hour and 24 hours respectively and spray a coat of Green 383, color 34094 conforming to MIL-DTL-64159 and MIL-DTL-53039 over the specimens. If necessary, the topcoats shall be

MIL-DTL-53022F
w/AMENDMENT 1
APPENDIX A

thinned according to the specification, with thinner conforming to the specification or manufacturer, and sprayed to a dry film thickness of 2 ± 0.2 mils (50 ± 5 microns). Visually examine the panels for evidence of lifting after the topcoat has air dried 2 hours. Allow the specimens to air dry 168 hours after topcoat application. Perform adhesion testing as specified in ASTM D3359, method B and examine its ability to resist peeling. The resultant rating shall be classified as scale 4B or better. Nonconformance to A.3.5.10 constitutes failure of this test.

A.4.20 Weather resistance. Prepare four (4) 4 by 12 inch panels (2 of each substrate) of the primer as in A.4.13 and pretreated as in A.4.6.2. Allow the primer to air dry for 24 hours and then apply a coat of Green 383, color 34094 as specified in MIL-DTL-64159 type II to a dry film thickness of 2 ± 0.2 mils (50 ± 5 microns). Allow to air dry for a minimum of seven (7) days and record color and 60° gloss readings for each panel. Panels shall be placed outdoors, for the equivalent of 560 megajoule per square meter of total UV irradiance, in an accelerated outdoor exposure according to ASTM G90. At 70 megajoule per square meter intervals examine the panels for compliance with A.3.5.11. Determine chalking according to ASTM D4214. Rinse the panels with a warm soap solution using a soft sponge or cloth, rinse, dry and examine for color change at each interval. The exposure racks shall be weathered at latitude 33° 23' north and 112° 35' west. Nonconformance to A.3.5.11 shall constitute failure of this test.

A.4.21 Super tropical bleach (STB) resistance. Prepare a steel panel as specified in A.4.15. Scribe a one (1) inch diameter wax ring using a china marker on the painted surface of the panel. Place approximately one (1) milliliter of STB agent on the panel surface. Do not cover. Allow to stand 30 minutes then thoroughly wash with water. A STB slurry mix of 40 parts STB and 60 parts water by weight shall be used. Examine for compliance with A.3.5.12.

A.4.22 Toxic ingredients. Other than PCBTF, the manufacturer shall certify that the primer contains no benzene (benzol), chlorinated solvents or ethylene based glycol ethers and their acetates. Nonconformance to A.3.5.13 constitutes failure of this requirement.

A.5. PACKAGING

A.5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see A.6.2). When packaging of materiel is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or within the military service's system command. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

A.6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

MIL-DTL-53022F
w/AMENDMENT 1
APPENDIX A

A.6.1 Intended use. The primer described in this appendix, which is lead and hexavalent chromium free, is intended for use on clean, chemically pretreated surfaces in camouflage missile systems. Type II formulations will meet a 3.5 lbs/gal (420 g/l) maximum VOC content requirement. Type III formulations will meet a 2.8 lbs/gal (340 g/l) maximum VOC content requirement and be HAP-free. These legacy primers are retained solely for fielded missile bodies and should not be used on any other system of their associated components.

A.6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number and date of this specification.
- b. Type of coating required (see A.1.2).
- c. Part or identifying number (PIN) (see A.1.3).
- d. Color required (see A.3.2).
- e. Size of primary container required for component A and size of primary container required for component B (see A.3.3).
- f. Whether a SDS is required with each shipment (see A.3.7 and A.4.5).
- g. If a toxicity clearance is required (see A.3.8).
- h. If conformance samples are required and where to send them (see A.4.3).
- i. Lot and batch formation (see A.4.3.1).
- j. Packaging requirements (see A.5.1).

A.6.3 Basis of purchase. The primers covered by this specification should be purchased by volume, the unit being a kit comprised of 1 quart of 57.75 cubic inches or 1 gallon of 231 cubic inches. The kit components need not be the same size.

A.6.4 Recertification.

A.6.4.1 Retention of certification. In order to retain certification of types II and III products approved for listing in the QPD, the manufacturer will verify by certification to the qualifying activity that the manufacturer's product complies with the requirements of this specification. Unless otherwise specified, the time of periodic verification by certification will be in two year intervals from the date of the prior certification, and will be initiated by the qualifying activity. No change will be made in formulation, raw materials or supplier(s) of raw materials, methods of manufacture, equipment, or geographic location without prior written Government approval. The Government reserves the right to re-examine the certified product whenever deemed necessary to determine that the product continues to meet any or all of the specification requirements.

A.6.4.2 Conformity to qualified sample. All lots of coatings supplied under this specification must be manufactured using the same formulation, raw materials and supplier(s) of raw materials, methods of manufacture, equipment, and geographic location as the prior certification sample, unless changes have been approved by the qualifying activity.

A.6.4.3 SDS. Contracting officers will identify those activities requiring copies of a completed SDS prepared in accordance with FED-STD-313. The pertinent Government mailing addresses for submission of data are listed in FED-STD-313.

MIL-DTL-53022F
w/AMENDMENT 1
APPENDIX A

A.6.5 Conformance rejection and retest. Failure in any conformance inspection will result in the rejection of the batch from which it was obtained and constitutes justification for removal from the qualified products list. Rejected material cannot be resubmitted for acceptance without written approval from the qualification activity (see A.4.3). The application for resubmission will contain all details concerning previous rejections and measures taken to correct these deficiencies.

A.6.6 Toxicity request. Department of the Army Regulation (AR) 40-5, Preventive Medicine, (AR) 70-1, Acquisition Policy, and Department of the Army Pamphlet 70-3, Acquisition Procedures, require a toxicity clearance. Army toxicity questions and/or a toxicity clearance request should be addressed to: Commander, US Army Center for Health Promotion and Preventive Medicine, ATTN: MCHB-TS-TTE, 5158 Blackhawk Road, Aberdeen Proving Ground, MD 21010-5403.

A.6.7 Detail specification. MIL-DTL-53072, Chemical Agent Resistant Coating (CARC) System Application Procedures and Quality Control Inspection, is available for application procedures and quality control inspection of this coating.

A.6.8 Subject term (key word) listing.

Aluminum
Camouflage system
HAP
Metal
Missiles
Panels
Steel
VOC

A.6.9 Appendix notations. The margins of this appendix that was based upon selected content from the previous revisions to accommodate types II and 3 formulations were not marked with vertical lines to indicate modifications due to the extent of the changes.

CONCLUDING MATERIAL

Custodian:

Army - MR
Navy - AS
Air Force – 20

Preparing activity:

Army - MR

Project: 8010-2021-004

Review activities:

Army - MD1, MI
DLA - CQ
Navy - CG, SH, MC

Civil agency:

GSA/FAS

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the accuracy of the information above using the ASSIST Online database at <https://assist.dla.mil/>.