

**METRIC**

MIL-P-21035B(NAVY)

30 April 1991

SUPERSEDING

DOD-P-21035A(NAVY)

21 November 1977

(See 6.8)

**MILITARY SPECIFICATION**

**PAINT, HIGH ZINC DUST CONTENT, GALVANIZING REPAIR (METRIC)**

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

**1. SCOPE**

1.1 Scope. This specification covers a high zinc dust content paint for regalanizing welds in galvanized steels.

1.2 Classification. Paint covered by this specification is of the following types, as specified (see 6.2):

Type I - Paint for use in air pollution control districts where solvents must conform to the South Coast Air Quality Management District Rule 102.

Type II - Paint for use in air pollution control districts where solvent content is limited to a maximum of 295 grams of volatile organic content (VOC) per liter of paint.

**2. APPLICABLE DOCUMENTS**

**2.1 Government documents.**

2.1.1 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 listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Naval Sea Systems Command, SEA 5523, Department of the Navy, Washington, DC 20362-5101 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A

FSC 8010

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

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SPECIFICATIONS

FEDERAL

- RR-S-366 - Sieve, Test.
- PPP-F-320 - Fiberboard; Corrugated and Solid, Sheet Stock (Container Grade), and Cut Shapes.
- PPP-P-1892 - Paint, Varnish, Lacquer, and Related Materials; Packaging, Packing, and Marking of.

MILITARY

- MIL-L-19140 - Lumber and Plywood, Fire-Retardant Treated.
- MIL-S-22698 - Steel Plate and Shapes, Weldable Ordinary Strength and Higher Strength: Hull Structural.

STANDARDS

FEDERAL

- FED-STD-141 - Paint, Varnish, Lacquer and Related Materials: Methods of Inspection, Sampling and Testing.
- FED-STD-313 - Material Safety Data, Transportation Data and Disposal Data for Hazardous Materials Furnished to Government Activities.

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Standardization Documents Order Desk, BLDG. 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.1.2 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 issues are those cited in the solicitation.

PUBLICATION

CODE OF FEDERAL REGULATIONS (CFR)

CFR 29, 1910.1200 - Hazard Communication Standard.

(The Code of Federal Regulations (CFR) and the Federal Register (FR) are for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.)

2.2 Non-Government publications. The following document(s) form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation (see 6.2).

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- B 117 - Standard Method of Salt Spray (Fog) Testing.  
(DoD adopted)
- D 93 - Standard Test Methods for Flash Point by Pensky-Martens Closed Tester. (DoD adopted)

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ASTM (Continued)

- D 520 - Standard Specification for Zinc Dust Pigment.
- D 521 - Standard Methods for Chemical Analysis of Zinc Dust (Metallic Zinc Powder).
- D 562 - Standard Test Method for Consistency of Paints Using the Stormer Viscosimeter. (DoD adopted)
- D 1475 - Standard Test Method for Density of Paint, Varnish, Lacquer, and Related Products. (DoD adopted)
- D 2369 - Standard Test Method for Volatile Content of Coatings. (DoD adopted)

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

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Rules and Regulations - Rule 102 and Rule 107.

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

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents also may be available in or through libraries or other informational services.)

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein (except for related associated detail specifications, specification sheets, or MS standards), 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 Materials. The paint shall consist of zinc dust conforming to type I of ASTM D 520, either ready-mixed or in a two-compartment container, with oils and solvents properly processed to conform to all requirements as specified herein.

3.1.1 Toxic products. The material shall have no adverse effect on the health of personnel when used for its intended purpose. Questions pertinent to this effect shall be referred by the contracting activity to the appropriate departmental medical service who will act as an advisor to the contracting agency.

3.1.2 Polychlorinated biphenyls (PCB). Polychlorinated biphenyls (PCB) shall not be used in paint covered by this specification.

3.1.3 Material safety data sheet (MSDS). The contracting activity shall be provided a material safety data sheet at the same time of contract award. The MSDS shall be provided in accordance with the requirements of FED-STD-313. The MSDS shall be included with each shipment of the material covered by this specification (see 6.6).

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3.1.4 Recovered materials. Unless otherwise specified herein, all equipment, material, and articles incorporated in the products covered by this specification shall be new and may be fabricated using materials produced from recovered materials to the maximum extent practicable without jeopardizing the intended use. The term "recovered materials" means materials which have been collected or recovered from solid waste and reprocessed to become a source of raw materials, as opposed to virgin raw materials. None of the above shall be interpreted to mean that the use of used or rebuilt products is allowed under this specification unless otherwise specifically specified.

3.2 Quantitative requirements. Quantitative requirements shall be as shown in table I and as specified herein.

TABLE I. Quantitative requirements.

Characteristic	Minimum	Maximum
Pigment, percent of weight of nonvolatile content	94.0	---
Pigment, percent zinc by analysis	97.5	---
Pigment, kg (pounds) per gallon of paint	5.455(12.0)	---
Flash point, °C (°F)	38(100)	---
Drying time-set-to-touch, hours	0.5	2
dry hard, hours	---	8

3.2.1 Solvent (type I only). The solvent portion of the paint shall conform to the following requirements:

- (a) A combination of hydrocarbons, alcohols, aldehydes, ethers, esters, or ketones having an olefinic or cycloolefinic type of unsaturation, except perchloroethylene: 5 percent maximum.
- (b) A combination of aromatic compounds with eight or more carbon atoms to the molecule, except ethylbenzene, methyl benzoate, and phenylacetate: 8 percent maximum.
- (c) A combination of ethylbenzene, ketones having branched hydrocarbon structures, trichloroethylene, or toluene: 20 percent maximum.

3.2.2 Volatile organic content (VOC) (type II only). The VOC (excluding water) shall be a maximum of 295 grams of solvent per liter of paint (see 4.5.11).

3.3 Performance requirements. The paint shall comply with the performance requirements specified herein.

3.3.1 Condition in container. The mixed paint or the vehicle portion, if supplied as a two-compartment package, shall break up to a smooth, uniform consistency. It shall not increase more than 15 Krebs units in viscosity or increase more than 2 hours in drying time. It shall not liver, curdle, gel, or show any other objectionable properties for at least 1 year after date of manufacture (see 4.5.6).

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3.3.2 Application characteristics. The mixed paint shall brush out without excess drag on the brush. When dry, the brush-coated surface shall be free from sags, runs, wrinkles, excess brush marks, or other film defects. The film shall exhibit good adhesion and a smooth, uniform appearance (see 4.5.7).

3.3.3 Salt spray resistance. There shall be no blistering, loss of adhesion, or other film failure, except pinpoint rusting and white corrosion product (see 4.5.8).

3.3.4 Hardness. A film of the mixed coating shall be tough and hard and shall adhere tightly to the metal panel. It shall be difficult to furrow off with a knife and shall not flake, chip, or powder. The knife cut shall show bevelled edges (see 4.5.9).

3.3.5 Stability in partially full container. Vehicle reaction shall exhibit no evidence of skinning (see 4.5.10).

3.4 Workmanship. When the paint is supplied as a ready-mixed, single-package product, the component raw materials shall be mixed and ground as required to produce a product which is uniform, free from dirt and grit, entirely suitable for the purpose intended, and in conformance to the requirements of this specification.

#### 4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements (examinations and tests) as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in this specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items shall meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of the manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

4.2 Test conditions. Unless otherwise specified, all inspections shall be performed in accordance with the test conditions specified in 4.3 and 4.5.

4.3 Quality conformance inspection. Quality conformance sampling and inspection shall be performed in accordance with method 1031 of FED-STD-141 and as specified herein (see 6.3).

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4.4 Ingredient materials inspection. When required by the contracting activity (see 6.2), 1 pint of each ingredient used (see 3.2) shall be supplied by the contractor for test purposes.

4.5 Test procedures. Tests shall be conducted in accordance with table II.

TABLE II. Quality conformance test procedures. 1/

Test	Requirement	Procedure
Pigment content	3.2	4.5.1
Total zinc, percent of pigment	3.2	4.5.2
Nonvolatile content	3.2	4.5.3
Flash point	3.2	4.5.4
Drying time	3.2	4.5.5
Condition in container	3.3.1	4.5.6
Application characteristics	3.3.2	4.5.7
Salt spray resistance	3.3.3	4.5.8
Hardness	3.3.4	4.5.9
Stability in partially full container	3.3.5	4.5.10
Volatile organic content	3.2.2	4.5.11

1/ For two-compartment packaged paint, the nonvolatile content and flash point on the vehicle portion and total zinc on the pigment portion may be determined without mixing the components, provided the pigment portion consists solely of dry pigment. The mixing instruction may be used in calculating the requirements of table I.

4.5.1 Pigment content. Pigment shall be extracted from a weighed sample of the mixed paint as in method 4021.1 of FED-STD-141, using the appropriate extraction mixture. Extracted pigment shall be dried and weighed and the percent pigment in the paint calculated.

4.5.2 Total zinc. Total metallic zinc content in the extracted pigment or in the zinc dust pigment of the two-component product shall be determined in accordance with ASTM D 521.

4.5.3 Nonvolatile content. Nonvolatile content of the paint shall be determined in accordance with ASTM D 2369.

4.5.4 Flash point. Flash point of the paint shall be determined in accordance with ASTM D 93.

4.5.5 Drying time. Drying time shall be determined by method 4061.2 of FED-STD-141, except that the specified conditions of temperature and humidity shall apply only for referee tests in case of dispute. Other tests shall be conducted under prevailing laboratory conditions.

4.5.6 Condition in container. Paint condition in container shall be determined in accordance with method 3011.2 of FED-STD-141.



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4.5.7 Application characteristics. Application characteristics of the mixed paint shall be determined in accordance with method 2141.1 of FED-STD-141. The paint shall be applied to 30.48-centimeter (cm) (1-foot) squares of 0.64-cm (0.250-inch) galvanized steel plates conforming to MIL-S-22698. The film thickness of the dried paint shall be averaged from five measurements using a micrometer or other equivalent instrument. Paint shall conform to 3.3.2.

4.5.8 Salt spray resistance. Salt spray resistance shall be determined in accordance with ASTM B 117, except that three 10.6 by 15.24 by 0.32 cm (4 by 6 by 1/8 inches) mild steel panels in accordance with MIL-S-22698 shall be used for this test. Surfaces shall be blasted with a medium grit (pass through 0.071-cm (710-micrometer) and retain on 0.042-cm (420-micrometer)) sieve conforming to RR-S-366 prior to coating. A 1.27-cm (0.5-inch) wide strip shall be left uncoated along the longitudinal center of test face of each panel to observe degree of cathodic protection provided by the coating. Two coats of paint shall be brush-applied uniformly to all remaining surfaces of each panel to a minimum thickness of 0.0508 millimeter (2 mils). A drying time of 24 hours between coats and 48 hours for the second coat shall be observed. The panels shall be exposed in the salt spray apparatus for 288 hours, then evaluated for percent rust on the coated and uncoated areas. The uncoated area of the test panel shall not be completely rusted. The coated area shall show less than 5 percent rust. Rust streaking shall be disregarded in determining these percentages. The average of the three panels shall be determined for each area. Film failure of coated areas shall be noted and recorded.

4.5.9 Hardness. A steel panel of the type specified in method 2011.2 of FED-STD-141 shall be solvent cleaned, using the petroleum naphtha-propylene glycol monomethyl ether mixture. A 5.08-cm (2-inch) wide film of the mixed paint shall be drawn down with a film applicator that shall deposit a dry film thickness of 0.00229 to 0.00279 cm (0.0009 to 0.0011 inch). The paint film shall dry for 48 hours in a horizontal position at ambient laboratory conditions. The knife test shall be performed in accordance with method 6304.1 of FED-STD-141 and the paint shall conform to 3.3.4.

4.5.10 Stability in a partially filled container. Stability shall be checked by method 3021.1 of FED-STD-141 and shall conform to 3.3.5.

4.5.11 Volatile organic content. Volatile organic content shall be determined by the applicable method of Rule 107 of the South Coast Air Quality Management District.

4.6 Toxicological product formulations. The contractor shall have the toxicological product formulations and associated information available for review by the contracting activity to evaluate the safety of the material for the proposed use. The information shall include: the name, formula, and approximate percentage by weight and volume of each ingredient in the product; the results of any toxicological testing of the product; identification of its pyrolysis products; and any such other information which may be needed to permit an accurate appraisal of any toxicity problem associated with the handling, storage, application, use, or disposal of the material.

4.7 Inspection of packaging. Sample packages and packs, and the inspection of the preservation, packing and marking for shipment and storage shall be in accordance with the requirements of section 5 and the documents specified therein.

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## 5. PACKAGING

(The packaging requirements specified herein apply only for direct Government acquisition.)

5.1 Packaging requirements. The paint shall be preserved level A, B or C, packed level A, B, or C as specified (see 6.2) and marked in accordance with PPP-P-1892, and shall include bar codes and applicable packaging acquisition options therein as specified (see 6.2). The product shall be furnished in 1-gallon cans or 5-gallon pails of the mixed paint or in a two-compartment kit containing separate predetermined amounts of zinc dust and vehicle, as specified (see 6.2). In addition, for Navy acquisitions, the following applies:

(a) Navy fire-retardant requirements:

- (1) Treated lumber and plywood - When specified (see 6.2), all lumber and plywood (including laminated veneer materials used in shipping container construction members, blocking, bracing, and reinforcing) shall be fire-retardant treated material conforming to MIL-L-19140 as follows:

Levels A and B - Type II - weather resistant.  
Category 1 - general use.

Level C - Type I - non-weather resistant.  
Category 1 - general use.

- (2) Fiberboard - When specified (see 6.2), fiberboard used in the construction of class-domestic, non-weather resistant fiberboard and cleated fiberboard boxes (including interior packaging forms) shall meet the flamespread and the specific optic density requirements specified in PPP-F-320.

5.1.1 Special marking. In addition to any special marking required (see 6.2), each container, interior and exterior shall be marked with the following (see 6.5):

- Type I - "The volatile content of the material in this container is not photochemically reactive as defined by Rule 102 of the South Coast Air Quality Management District."
- Type II - "The volatile organic content (VOC) of the material in this container does not exceed 295 grams of solvent per liter of paint as defined by Rule 107 of the South Coast Air Quality Management District."

5.2 Material safety data sheet. A copy of the material safety data sheet shall be attached to the shipping document for each destination (see 3.1.3 and 6.6).

## 6. NOTES

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



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6.1 Intended use. This specification covers paint intended for use for regalvanizing welds in galvanized steels.

6.2 Acquisition requirements. Acquisition documents must specify the following:

- (a) Title, number, and date of this specification.
- (b) Type of product required (ready-mixed or two-component) (see 1.2).
- (c) Issue of DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1.1 and 2.2).
- (d) When 1 pint of each ingredient should be supplied by the contractor (see 4.4).
- (e) Level of preservation and packing required (see 5.1).
- (f) Bar codes and packaging acquisition options required (see 5.1).
- (g) Size of container required (see 5.1).
- (h) When fire-retardant materials are required (see 5.1).
- (i) Special marking required (see 5.1.1).

6.3 Consideration of data requirements. The following data requirements should be considered when this specification is applied on a contract. The applicable Data Item Descriptions (DID's) should be reviewed in conjunction with the specific acquisition to ensure that only essential data are requested/provided and that the DID's are tailored to reflect the requirements of the specific acquisition. To ensure correct contractual application of the data requirements, a Contract Data Requirements List (DD Form 1423) must be prepared to obtain the data, except where DoD FAR Supplement 27.475-1 exempts the requirement for a DD Form 1423.

<u>Reference Paragraph</u>	<u>DID Number</u>	<u>DID Title</u>	<u>Suggested Tailoring</u>
4.3	DI-T-2072	Reports, test	---

The above DID's were those cleared as of the date of this specification. The current issue of DoD 5010.12-L, Acquisition Management Systems and Data Requirements Control List (AMSDL), must be researched to ensure that only current, cleared DID's are cited on the DD Form 1423.

6.4 Unit of measure. Paint should be acquired under this specification by volume, the unit being 1 U.S. gallon (231 cubic inches) at 15.5 degrees Celsius (60 degrees Fahrenheit).

6.5 Volatile content. Although the container marking specifically refers to the South Coast Air Quality Management District, the paint may be used anywhere else a paint complying with 3.1 is allowed. This includes all other air pollution control districts or similar areas controlling the emission of solvents into the atmosphere.

6.6 Material safety data sheets. Contracting officers will identify those activities requiring copies of completed Material Safety Data Sheets prepared in accordance with FED-STD-313. The pertinent Government mailing addresses for submission of data are listed in FED-STD-313.

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6.7 Subject term (key word) listing.

Drying time  
Flash point  
Hydrocarbons  
Pigment  
Volatile organic content  
Welds

6.8 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Custodian:  
Navy - SH

Preparing activity:  
Navy - SH  
(Project 8010-N364)

User activities:  
Navy - EC, YD