MIL-V-21064A (OS)
31 July 1974
SUPERSEDING
MIL-V-21064 (NOrd)
6 January 1958

MILITARY SPECIFICATION

VARNISH, FINISHING, BAKING, FOR ROLLER COAT APPLICATION

This specification is approved for use by all departments and agencies of the Department of Defense

1. SCOPE

1.1. **Scope.** This specification covers two classes of finishing varnish for roller coat application on sheet metal which has been sized and color coated. This specification meets Air Pollution Regulations (Rule 66).

1.2 **Classification.** The varnish shall be of the following classes, as specified (see 6.2).

Class 1	Gloss
Class 2	Semigloss

2. APPLICABLE DOCUMENTS

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

SPECIFICATIONS

Federal

TT-P-143	Paint, Varnish, Lacquer, and Related Materials; General Specification for Packaging, Packing and Marking

FSC 8010

Military

MIL-E-19603	Enamel, Baking, for Roller Coat Application

STANDARDS

Federal

FED-STD-141	Paint, Varnish, Lacquer and Related Materials; Methods of Inspection, Sampling and Testing

Military

MIL-STD-129	Marking for Shipment and Storage

(Copies of specifications and standards required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

3. REQUIREMENTS

3.1 **Color.** The varnish as packaged shall be no darker than seven (7) on the Hellige color scale.

3.2 **Composition.**

3.2.1 **Vehicle.** The varnish shall be an epoxy resin, a vinyl resin, or an alkyd resin solution. Small amounts of other resins or film formers may be used to impart desired film characteristics. Flatting agents may be present in the semigloss varnish. The varnish shall give a negative test for rosin and rosin derivatives (see 4.4.2).

3.2.2 **Volatile content.** The volatile content shall conform to the following requirements by volume when tested as in 4.4.3.

a. Solvents having an olefinic or cyclo-olefinic type of unsaturation: 5 percent maximum.

b. A combination of aromatic compounds with eight or more carbon atoms to the molecule except ethyl benzene: 8 percent maximum.

c. A combination of ethyl benzene, ketones having branched hydrocarbon structures, or toluene: 20 percent maximum.

d. Total of a + b + c: 20 percent maximum.

3.3 **Quantitative requirements.** The varnish shall conform to the quantitative requirements specified in table I.

Table I

QUANTITATIVE REQUIREMENTS

Characteristics	Minimum	Maximum
Total solids, percent by weight	18	–
Viscosity No. Ford Cup, (sec)	30	75
Specular gloss, 60°		
Class 1	65	–
Class 2	30	50

3.4 **Qualitative requirements.**

3.4.1 **Condition in container.** When tested as in 4.4.4 the varnish shall show little or no settling in the freshly opened container and shall mix readily to a smooth homogeneous state. It shall show no evidence of livering or curdling and shall be free from skins and lumps.

3.4.2 **Dilution stability.** When tested as in 4.4.6 there shall be no evidence of separation or precipitation.

3.4.3 **Application.** When tested as in 4.4.7 the varnish shall produce uniform films of 2 to 4 milligrams per square inch dry coating weight (see 6.5).

3.4.4 **Baking schedule.** The manufacturer shall provide the baking schedule, however, it shall not exceed 10 minutes at 400° F metal temperature. The varnish shall cure at the recommended baking schedule without objectionable darkening in color.

3.4.5 **Coating system.** Panels prepared as in 4.4.8 shall show no lifting of the coating system.

3.4.6 **Blocking.** When tested as in 4.4.9 none of the varnish shall separate from the coated surface and adhere to or be retained on the uncoated surface. A slight tendency of the specimens to stick together will be permissible.

3.4.7 **Flexibility.** When tested as in 4.4.10 the coating system shall not crack, flake, or show loss of adhesion at the bend. In addition it shall be capable of withstanding all forming operations normally employed in fabricating containers without showing evidence of film failure of any type.

3.4.8 **Knife test.** When tested as in 4.4.11 the coating system shall adhere tightly to the metal and shall show good adhesion between the varnish and the color coat and between the color coat and the size coat. The film shall not chip or flake from the metal.

3.4.9 **Accelerated weathering.** When tested as in 4.4.12 the coating system shall show no deterioration other than slight dulling and a color change equivalent to a lightness index difference not exceeding three units.

3.4.10 **Salt spray resistance.** When tested as in 4.4.13 the coating system shall show no rust creepage or undercutting beyond one-sixteenth inch from the score mark. At all other points there shall be no rusting or blistering. Upon removal of the coating system the metal substrate shall be free from rusting, pitting, or corrosion except on the area immediately adjacent to the score.

3.4.11 **Toxicity.** The varnish shall contain no benzene (benzol), methanol, chlorinated compounds, hydrolyzable chlorine derivatives, or other ingredients which are deemed toxicologically hazardous under normal conditions of usage.

4. QUALITY ASSURANCE PROVISIONS

4.1 **Responsibility for inspection.** Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order the supplier 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 the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.2 **Sampling, inspection and testing.** Unless otherwise specified, sampling, inspection and testing shall be in accordance with method 1031 of FED-STD-141.

4.3 **Classification of tests.** Testing under this specification shall be for the purpose of acceptance of individual lots.

4.4 **Test methods.**

4.4.1 **Test conditions.** The routine and referee testing conditions shall be in accordance with section 7, FED-STD-141 except as otherwise specified herein.

4.4.2 The following tests of table II shall be conducted in accordance with applicable methods of FED-STD-141 or as required in this specification. The right is reserved to make any additional tests deemed necessary to determine that the varnish meets the requirements of this specification.

4.4.3 **Analysis of volatile vehicle.** Determine solvents as in methods 7355 and 7356 of FED-STD-141 for compliance with 3.2.2.

4.4.4 **Condition in container.** Determine package condition in accordance with method 3011 of FED-STD-141 and observe for compliance with 3.4.1.

4.4.5 **Specular gloss, 60°.** Using a panel prepared as in 4.4.8 measure the gloss as specified in method 6101 of FED-STD-141 for compliance with table I.

Table II

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Test	Applicable method in FED-STD-141	Paragraph of this specification giving further references	Paragraph of this specification giving requirements
Color	4242	–	3.1
Rosin and rosin derivatives in isolated vehicle	5031	–	3.2.1
Volatile content	7355, 7356	4.4.3	3.2.2
Total solids	4041	–	Table I
Viscosity	4282	–	Table I
Condition in container	3011	4.4.4	3.4.1
Specular gloss	6106	4.4.5	Table I
Dilution stability	4203	4.4.6	3.4.2
Application	–	4.4.7	3.4.3
Baking schedule	–	–	3.4.4
Coating system (Preparation of test panels)	–	4.4.8	3.4.5
Blocking	6216	4.4.9	3.4.6
Flexibility	6221	4.4.10	3.4.7
Knife test	6304	4.4.11	3.4.8
Accelerated weathering	6152	4.4.12	3.4.9
Salt spray resistance	6061	4.4.13	3.4.10
Toxicity	–	4.4.14	3.4.11

4.4.6 **Dilution stability.** Reduce the varnish for application according to the manufacturer's recommendation and test as in method 4203 of FED-STD-141 for compliance with 3.4.2.

4.4.7 **Application.** Cut a 4- by 4-inch section from each of three panels prepared as in MIL-E-19603. Weigh the specimens and then remove the films either cathodically or by the use of a solvent. Reweigh and by difference calculate the average coating weight per square inch. Reduce the varnish in accordance with the manufacturer's recommendation and apply to three primed and enameled panels of known coating weight. Bake and determine the average varnish coating weight per square inch following the procedure as above. (Weight of the total system coated panel minus the weight of the stripped panel minus the weight of the prime coat and enamel coat equals the weight of the varnish). Check for compliance with 3.4.3.

4.4.8 **Preparation of test panels.** Using ten (10) 4- by 8-inch panels prepared as in MIL-E-19603 apply the varnish to a dry film weight of 2 to 4 milligrams per square inch (see 6.6). Bake according to the manufacturer's recommendation and use where applicable in the following tests.

4.4.9 **Blocking.** Cut six 2- by 2-inch specimens from panels prepared as in 4.4.8. Stack the specimens so that the coated surface of the one below is in contact with the uncoated surface of the one directly above. Place the stacked specimens in an oven for 24 hours at 120° ± 2° F with a weight sufficient to exert 10 lbs. per square inch resting on them. Cool to room temperature and pry apart using the pointed end of a needle. Observe for compliance with 3.4.6.

4.4.10 **Flexibility test.** Determine flexibility as in method 6621 of FED-STD-141 on 2- by 4-inch sections cut from each of two panels prepared as in 4.4.8. After baking the panels according to the manufacturer's recommendation, bake for an additional 48 hours at 220 ± 4° F. Condition at room temperature for one hour and bend over a 1/8-inch mandrel. Examine for compliance with 3.4.7.

4.4.11 **Knife test.** Perform the knife test as in method 6304 of FED-STD-141 on the flat portion of the panels from the flexibility test. Check for compliance with 3.4.8.

4.4.12 **Accelerated weathering.** Perform the test on 3- by 6-inch panels cut from two panels prepared as in 4.4.8. After baking as recommended air dry the panels for 24 hours. Expose for 168 hours to accelerated weathering as in method 6152 of FED-STD-141 using a twin arc apparatus. Examine the exposed panels for chalking by rubbing with a piece of velvet or cheesecloth wrapped around the finger. The rubbing shall be done under moderate pressure by drawing the cloth across the width of the panel in two different locations. Measure the directional reflectance (method 6121) on an unrubbed area of the exposed panel and determine the amount of color change, expressed as lightness index difference ($\triangle L$), using method 6122 of FED-STD-141. Check for compliance with 3.4.9.

4.4.13 **Salt spray resistance.** Prepare two panels as in 4.4.8. Make an X score across the center of the panels and bend through 180° on a conical mandrel. Expose the panels to salt spray for 168 hours as in method 6061 of FED-STD-141. Face the bend toward the source of the salt fog with the sharp end facing downward. Immediately upon removal wash the panels gently in running water until free from any visible salt deposits and examine for compliance with 3.4.10.

4.4.14 **Toxicity.** The manufacturer shall certify that the varnish contains no benzene (benzol), methanol, chlorinated compounds or hydrolyzable chlorine derivatives.

5. PREPARATION FOR DELIVERY

5.1 The varnish shall be furnished in 1-quart or 1-gallon multiple friction top containers, in 5-gallon lug cover steel pails or in 55-gallon steel drums as specified (see 6.2). The varnish shall be packaged level A or C; packed level A or C as specified (see 6.2) in accordance with TT-P-143.

5.2 **Marking.** In addition to any special marking interior packages and exterior containers shall be marked in accordance with MIL-STD-129.

6. NOTES

6.1 **Intended use.** The varnish covered by this specification is intended for use in combination with a primer size coat and an enamel coat with or without stenciling ink, as a coating system for clean tin and terne containers. The system is intended for roller application to stock metal prior to fabrication of the containers. This specification in conjunction with MIL-P-19602 and MIL-E-19603 is applicable to the coating manufacturer only.

6.2 **Ordering data.** Procurement documents should specify the following:

a. Title, number and date of this specification
b. Size of container
c. Level of packaging and level of packing
d. Class (see 1.2).

6.3 The varnish should be purchased by volume, the unit being one U.S. liquid gallon of 231 cubic inches at 68° F (20° C).

6.4 While the performance requirements of the specification are based on application on clean tin, a coating based on the composition specified will perform equally well over clean terne plate. Although vapor degreasing in this specification is for test purposes only, attention is called to the desirability of adequately cleaning all metal surfaces prior to production application of the coating.

6.5 During normal production line application, it will be permissible to use additional thinner to maintain proper working viscosity; however, the decrease in viscosity shall not be such that an unsatisfactory coating results.

6.6 Products tested under this specification have not been tested for their lifting tendencies with all primers conforming to MIL-P-19602 and enamels conforming to MIL-E-19603. This should be determined prior to use of mixed systems from different manufacturers.

6.7 Asterisks are not used in this revision to identify changes with respect to the previous issue, due to the extensiveness of the changes.

Custodian:

Navy - OS

Preparing activity:

Navy - OS
(Project No. 8010-N114)

SPECIFICATION ANALYSIS SHEET

Form Approved
Budget Bureau No. 22-R255

INSTRUCTIONS: This sheet is to be filled out by personnel, either Government or contractor, involved in the use of the specification in procurement of products for ultimate use by the Department of Defense. This sheet is provided for obtaining information on the use of this specification which will insure that suitable products can be procured with a minimum amount of delay and at the least cost. Comments and the return of this form will be appreciated. Fold on lines on reverse side, staple in corner, and send to preparing activity. Comments and suggestions submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or serve to amend contractual requirements.

SPECIFICATION MIL-V-21064A (OS), Varnish, Finishing, Baking for Roller Coat Application

ORGANIZATION

CITY AND STATE

CONTRACT NUMBER

MATERIAL PROCURED UNDER A

☐ DIRECT GOVERNMENT CONTRACT ☐ SUBCONTRACT

1. HAS ANY PART OF THE SPECIFICATION CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE?

A. GIVE PARAGRAPH NUMBER AND WORDING.

B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES

2. COMMENTS ON ANY SPECIFICATION REQUIREMENT CONSIDERED TOO RIGID

3. IS THE SPECIFICATION RESTRICTIVE?

☐ YES ☐ NO *(If "yes", in what way?)*

4. REMARKS *(Attach any pertinent data which may be of use in improving this specification. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity)*

SUBMITTED BY *(Printed or typed name and activity - Optional)*

DATE

DD FORM 1 JAN 66 1426

REPLACES EDITION OF 1 OCT 64 WHICH MAY BE USED.

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