

MIL-L-296B  
18 June 1973  
SUPERSEDING  
MIL-L-296A  
12 April 1965

## MILITARY SPECIFICATION

### LACQUER, PURPLE

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

#### 1. SCOPE

1.1 Scope. This specification covers one type and grade of purple lacquer for sealing the flash holes of primer extension tubes and as a waterproofing agent for artillery ammunition primers. It is suitable for use in areas covered by Air Pollution Regulations.

#### 2. APPLICABLE DOCUMENTS

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

#### SPECIFICATIONS

##### Federal

TT-P-143 - Paint, Varnish, Lacquer and Related Materials; Packaging, Packing and Marking of.

#### STANDARDS

##### Federal

Fed. Test Method Std. No. 141 - Paint, Varnish, Lacquer and Related Materials; Methods of Inspection, Sampling, and Testing.

FSC 8010

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

## 3. REQUIREMENTS

3.1 Composition. The lacquer shall be nitrocellulose, castor oil and dibutyl phthalate combined with methyl violet dye<sup>1/</sup> and necessary amounts of solvents to yield a product conforming to the requirements of this specification.

3.1.1 Volatile content. The volatile content shall also conform to the following requirements by volume when tested as in 4.4.4.

(a) Solvents having an olefinic or cycle-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**.

3.2 Quantitative requirements. The lacquer shall conform to the requirements of Table 1 when tested as in 4.4.

TABLE 1. Quantitative requirements

Requirements	Minimum	Maximum
Total solids, percent by weight of lacquer	53	57
Nitrocellulose, percent by weight of vehicle solids	50	54
Dibutyl phthalate, percent by weight of vehicle solids	5	13
Castor oil as fatty acids, percent by weight of vehicle solids	35	39
Castor oil	Positive	
Water, percent by weight of lacquer	--	1.0
Viscosity, reduced, No. 4 Ford cup, seconds	70	90
Drying time, minutes		
Dust free	3	7
Dry through	--	10

<sup>1/</sup> Methyl violet dye consisting of a mixture of hydrochlorides of highly methylated parrosanilines, containing principally the tetra-, penta-, and hexamethyl derivatives.

### 3.3 Qualitative requirements.

3.3.1 Condition in container. When tested as in 4.4.7 the lacquer 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.

3.3.2 Color. When tested as in 4.4.8 the color of the dry film shall be distinctly purple and shall approximate the color of the dry film of test lacquer.

3.3.3 Flexibility. When tested as in 4.4.9 a film of lacquer shall withstand bending without cracking or flaking.

3.3.4 Knife test. When tested as in 4.4.10 a film of lacquer shall adhere tightly and not flake, crack, or powder from the metal. The cut shall show beveled edges.

3.3.5 Film test. When tested as in 4.4.11 the dried film shall be uniform and show no breaks or voids across the holes.

## 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. Test Method Std. No. 141.

4.3 Testing. Testing under this specification shall be for acceptance of individual lots. The right is reserved to make any additional tests deemed necessary to determine that the lacquer meets the requirements of the specification.

4.3.1 Composition. Unless otherwise specified, the contractor may furnish certification of compliance with the requirements for nitrocellulose, dibutyl phthalate, castor oil, castor oil fatty acids, and solvents in lieu of performing the tests required in 4.4.3.3, 4.4.3.4, 4.4.3.5, 4.4.4, and Method 7501 of Fed. Test Method Std. No. 141. The certification shall be accompanied by batch production data in accordance with method 1031 of Fed. Test Method Std. No. 141.

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4.4 Test methods.

4.4.1 Test conditions. The routine and referee testing conditions shall be in accordance with section 7, Fed. Test Method Std. No. 141 except as otherwise specified herein.

4.4.2 The following tests shall be conducted in accordance with applicable methods of Fed. Test Method Std. No. 141 or as hereinafter specified.

TABLE 11. Index

Item	Test Method		Paragraph of this specification giving requirements
	Applicable method in Fed. Test Method Std. No. 141	Paragraph of this specification giving further references	
Total solids	4044	4.4.3.2	Table 1
Nitrocellulose	--	4.4.3.3	Table 1
Dibutyl phthalate	--	4.4.3.4	Table 1
Castor oil, fatty acids	--	4.4.3.5	Table 1
Castor oil	7501	--	Table 1
Solvents, quantitative	7360	4.4.4	3.1
Water	4082	--	Table 1
Viscosity	4282	4.4.5	Table 1
Drying time			
Dust free	4061	4.4.6	Table 1
Dry through	4061	4.4.6	Table 1
Condition in container	3011	4.4.7	3.3.1
Color	--	4.4.8	3.3.2
Flexibility	6221	4.4.9	3.3.3
Knife test	6304	4.4.10	3.3.4
Film test	--	4.4.11	3.3.5

4.4.3 Analysis of nonvolatile.

4.4.3.1 Preparation of sample. Quantitatively dilute about 50 grams of lacquer with approximately 20 percent by weight of lacquer thinner conforming to Table 111. Mix well and apply necessary correction to all samples withdrawn for analysis.

4.4.3.2 Nonvolatile. Determine nonvolatile content of lacquer reduced as in 4.4.3.1 in accordance with method 4044 of Fed. Test Method Std. No. 141.

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4.4.3.3 Nitrocellulose. Record the weight of a dry 250 ml. Erlenmeyer flask containing a boiling stone. Weigh 1.5 to 2.5 grams of the thinned lacquer into the tared flask and dissolve sample in 25 ml. of acetone. Add 140 ml. of benzene slowly while sample is being swirled. Place flask on a heater and attach a water cooled condenser in such a way as to allow the distillate to be collected in a graduated cylinder without evaporation taking place. Distill until 75 ml. of distillate are collected. Cool the flask to room temperature and filter through a Gooch crucible previously dried and weighed, containing a thick mat of asbestos. Transfer and wash the precipitate with benzene. Collect the filtrate in a clean dry suction flask and hold for the determination of dibutyl phthalate. Dry Gooch crucible and flask containing boiling stone at 110°C. (230°F.) for one hour. Combine the increase in weight of crucible and flask and calculate the percent of nitrocellulose.

$$\text{Percent nitrocellulose} = \frac{\text{weight of precipitate} \times 100}{\text{weight of nonvolatile sample}}$$

4.4.3.4 Dibutyl phthalate. Refilter the filtrate from the nitrocellulose determination through filter paper of fine porosity into a 500 ml. Erlenmeyer flask. Add 100 ml. of absolute ethanol and 50 ml. of freshly prepared and filtered 1.0 normal potassium hydroxide in absolute ethanol. Reflux for two hours and cool to room temperature. Filter the sample through a Gooch crucible, previously dried and weighed, containing a thin mat of asbestos. Transfer and wash precipitate with absolute ethanol. Collect the filtrate in a clean suction flask and hold for the determination of fatty acids. Dry the crucible at 110°C. (230°F.) for 1 hour, cool in desiccator and weigh. Calculate the dibutyl phthalate content using the following equation:

$$\text{Percent dibutyl phthalate} = \frac{\text{weight of precipitate} \times 1.15 \times 100}{\text{weight of nonvolatile sample}}$$

4.4.3.5 Castor oil fatty acids. Transfer the filtrate from the dibutyl phthalate analysis into a 600 ml. beaker with water and evaporate the solvents on a steam bath keeping the volume above 25 ml. by the addition of water. After the organic solvents have been evaporated, transfer the contents of the beaker to a 500 ml. separatory funnel and dilute to 200 ml. with water. Add 18 N sulfuric acid until the system is strongly acid to litmus paper. Extract by shaking vigorously with 75-, 50-, and 50-ml. consecutive volumes of ethyl ether. Combine ether extractions and wash with 25 ml. portions of water until acid-free. Filter the ethyl ether through rapid filter paper that is wet with ethyl ether into a tared 250 ml. beaker. After the ethyl ether has been evaporated, dry the fatty acids under vacuum at 80°C. (176°F.) until constant weight is obtained. Calculate the percent of fatty acids as follows:

$$\text{Percent fatty acids} = \frac{\text{weight of fatty acids} \times 100}{\text{weight of nonvolatile sample}}$$

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4.4.4 Solvent analysis. Determine solvent as in method 7360 of Fed. Test Method Std. No. 141. Samples that fail to meet the requirements of 3.1.1 shall be subject to further examination using a six foot silicone nitrile column (20% XF-1150 on 60 to 80 mesh Chromosorb W).

4.4.5 Viscosity (reduced). Reduce one part by weight of the packaged material with one part by weight of thinner conforming to Table 111. Check for compliance with Table 1.

TABLE 111. Thinner

Ingredient	Percent by weight	Approx. Percent by volume
Toluene	19	17
Normal butyl acetate	35	32
Normal butyl alcohol	15	15
Heptane	31	36

4.4.6 Drying time. Determine drying time in accordance with method 4061 of Fed. Test Method Std. No. 141 using referee conditions.

4.4.7 Condition in container. Determine package condition in accordance with method 3011 of Fed. Test Method Std. No. 141 and observe for compliance with 3.3.1.

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4.4.8 Color. Using a 0.0020 inch (0.0040 inch gap clearance) film applicator draw down a film of the lacquer under test and test lacquer in Table IV on a clear plate glass panel and air dry 24 hours. Examine for compliance with 3.3.2.

TABLE IV. Test lacquer

Ingredient	Percent by weight
1/2 second R.S. nitrocellulose (65 percent in ethanol)	44.0
Dibutyl phthalate	5.0
Castor oil, blown	21.5
Methyl isobutyl ketone	9.2
Methyl isobutyl carbinol	2.4
Isopropyl alcohol (99 percent)	3.3
Toluene	14.5
Methyl violet dye	0.1

Dissolve the nitrocellulose in the given solvents, then add the remainder of the ingredients.

4.4.9 Flexibility. Determine flexibility in accordance with method 6221 of Fed. Test Method Std. No. 141. Apply a 2-inch wide film of lacquer with a film applicator that will give a dry film thickness of 0.0009 to 0.0011 inch on a smooth finish steel panel prepared in accordance with method 2011 of Fed. Test Method Std. No. 141 using the aliphatic naphtha-ethylene glycol monoethyl ether mixture. The panel shall be prepared from new cold rolled carbon steel rust-free 0.010  $\pm$  0.001 inch thick with a Rockwell 15-T maximum hardness of 82 and finished with a surface roughness of 8 to 12 microinches. Air-dry the lacquer in a horizontal position for 1/2 hour and then bake for 6 hours at 105°  $\pm$  2°C. (221  $\pm$  4°F.). Condition the panel for 1/2 hour under referee conditions. Bend over a 1/8 inch mandrel. Examine the coating for cracks over the area of the bend in a strong light at a 7-diameter magnification for compliance with 3.3.3.

4.4.10 Knife test. Perform the knife test in accordance with method 6304 of Fed. Test Method Std. No. 141 using a flat portion of the baked panel from the flexibility test. Observe for compliance with 3.3.4

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4.4.11 Film test. Solvent clean three 4 by 6 inch steel panels in accordance with method 2011 of Fed. Test Method Std. No. 141 having a staggered grid of 10 or more holes 0.14 inch in diameter and 0.75 inch apart. Place the panels on a piece of white paper cut to the same size as the panels. Pour approximately 15 ml. of lacquer across each panel above the holes. Using a 0.0015 inch (0.0030 inch gap clearance) film applicator, draw down a 3 inch wide film of the lacquer so that the surface is just covered and the holes are filled. Place the panels and backing paper in a vertical position and allow to air dry for 2 hours. Examine for compliance with 3.3.5.

## 5. PREPARATION FOR DELIVERY

5.1 Packaging, packing and marking. The lacquer shall be packaged, packed and marked in accordance with TT-P-143. The level of packaging shall be A or C and the level of packing shall be A, B, or C as specified (see 6.2). The primer 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).

## 6. NOTES

6.1 Intended use. The lacquer covered by this specification is intended for use in sealing the flash holes of primer extension tubes and as a water-proofing agent for artillery ammunition primers.

6.2 Ordering data. Procurement documents should specify the following:

- (a) Title, number and date of this specification.
- (b) Size of containers (see section 5).
- (c) Level of packaging and level of packing (see section 5).

6.3 The lacquer covered by this specification should be purchased by volume, the unit being one United States liquid gallon of 231 cubic inches at 68°F. (20°C.).

Custodian:  
Army - AR

Preparing activity:  
Army - AR

(Project No. 8010-0440)