

INCH-POUND

MIL-DTL-12276E(MR)
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SUPERSEDING
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DETAILED SPECIFICATION

VARNISH, PHENOLIC, BAKING

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

1. SCOPE

1.1 Scope. This specification covers three types of heat hardening phenolic varnishes suitable for use as a coating for cartridge cases and as a lining for munitions and other containers. This document also provides for an additional composition suitable for use under Air Pollution regulations.

1.2 Classification. The varnish covered by this specification should be of the following compositions, types, and classes, as specified (see 6.2 and 6.4).

1.2.1 Compositions.

1.2.1.1 Composition G. Composition G varnish is for general use.

1.2.1.2 Composition L. Composition L varnish is for limited use and should be specified for use in areas where regulations controlling the emission of solvents into the atmosphere are enforced.

1.2.2 Types. (see 6.1).

1.2.2.1 Type I. Type I varnishes should be used on cartridge cases.

Comments, suggestions, or questions on this document should be addressed to: Director, U.S. Army Research Laboratory, Weapons and Materials Research Directorate, Materials Applications Branch, Specifications and Standards Office, Attn: AMSRD-ARL-WM-MC, Aberdeen Proving Ground, MD 21005-5069 or emailed to rsquilla@arl.army.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at <http://assist.daps.dla.mil/>.

MIL-DTL-12276E(MR)

1.2.2.1.1 Class A. Class A should be used for spray applications.

1.2.2.1.2 Class B. Class B should be used for dip applications.

1.2.2.2 Type II. Type II varnishes should be used in the lining of munitions and chemical containers.

1.2.2.3 Type III. Type III varnishes should be used on cartridge cases under special conditions.

1.2.2.3.1 Class A. Class A should be used for spray applications.

1.2.2.3.2 Class B. Class B should be used for dip applications.

1.2.2.3.3 Class C. Class C should be used for roller, curtain or similar coating applications.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, 4, or 5 of this specification. 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, or 5 of this specification, whether or not they are listed.

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 issues of these documents are those cited in the solicitation or contract.

FEDERAL STANDARDS

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

COMMERCIAL ITEM DESCRIPTIONS

A-A-113	-	Tape, Pressure Sensitive Adhesive
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(Copies of these documents are available online at <http://assist.daps.dla.mil/quicksearch/> or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

MIL-DTL-12276E(MR)

2.3 Non-Government publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal should apply.

ASTM INTERNATIONAL

ASTM B117	-	Standard Practice for Operating Salt Spray (Fog) Apparatus, (DoD Adopted)
ASTM D968	-	Standard Test Method for Abrasion Resistance of Organic Coatings by Falling Abrasive (DoD Adopted)
ASTM D4060	-	Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser (DoD Adopted)

(Copies of these documents are available from www.astm.org or ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959.)

2.4 Order of precedence. 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 Materials.

3.1.1 Type I. Type I varnish shall be a straight thermosetting phenol-formaldehyde varnish free from rosin or rosin derivatives, but may include the use of other materials to improve the leveling, flexibility and adhesion of the coating.

3.1.2 Type II. Type II varnish shall be a straight thermosetting phenol-formaldehyde varnish free from added plasticizers, rosin or rosin derivatives.

3.1.3 Type III. Type III varnish shall be a mixture of bisphenol epoxide and phenol-formaldehyde resins. It may include other materials to improve the leveling of coating.

3.2 Solvents.

3.2.1 Thinner. A thinner shall be supplied with the varnish so that the varnish can be reduced to the proper usable viscosity prior to application. The varnish and thinner delivered as a lot shall be furnished in quantities proportional to the ratio recommended by the manufacturer to produce the specified film thickness after baking.

3.2.1.1 Solids content. Type I and II varnish, when diluted with the supplied thinner shall have a viscosity of 30 centipoises at $70^{\circ} \pm 2^{\circ}$ F, and a minimum solids content of 29 percent. Type III varnish, when diluted with the supplied thinner shall have a viscosity of 30 centipoises at $70^{\circ} \pm 2^{\circ}$ F, and a minimum solids content of 24 percent.

MIL-DTL-12276E(MR)

3.2.2 Compositions G and L. The solvent, used with the resin and the solvent supplied as the thinner, shall be of such a nature that they shall not constitute an undue hazard to personnel in the application of the varnish. Evidence to this effect shall be subject to review by departmental medical authority.

3.2.3 Composition L. The solvent used with the resin and the solvent supplied as the thinner shall meet the requirements listed below, when tested as described in 4.3.6.

- a. Aromatic compounds of eight or more carbon atoms exclusive of ethyl benzene shall amount to a maximum of 8%. These plus ethyl benzene, toluene and ketones shall amount to a maximum of 20% of the solvent with the provision that all of these items must be present in the solvent.
- b. Solvents with an olefinic or cyclo-olefinic type of unsaturation shall test at less than 1%.

3.3 Color.

3.3.1 Type I and III. Type I and III materials shall be clear or the natural color of the varnish. There shall be no pigment added and the use of soluble organic dyes is not permissible.

3.3.2 Type II. No color requirements are applicable. Materials shall be clear or pigmented. The use of soluble organic dye is permissible.

3.4 Solids contents. The minimum solids content for types I and III varnish, as received, and then tested in accordance with 4.3.5, shall be 35 percent.

3.5 Absence of film defects. The varnish shall produce a smooth, continuous film with no visible pinholes, craters, or blisters when tested as specified in 4.3.3.

3.6 Film adhesion and flexibility. The dried film on metal shall be tough, elastic and shall not chip, flake, scale, or show poor adhesion to SAE 1010 steel panels when tested as specified in 4.3.4.

3.7 Resistance to chemicals and solvents. The varnish when applied to steel panels as specified in 4.3.2 and baked as prescribed in each of the three schedules listed in 4.3.1 shall not be softened or otherwise deteriorated when immersed in toluene, glacial acetic acid, ammonium hydroxide, ethyl alcohol or ether and tested as specified in 4.3.6. In addition, type II varnish shall not be softened, blistered, or otherwise deteriorated by boiling in bis-(beta chloroethyl) ether when tested as specified in 4.3.7.

3.8 Corrosion resistance. There shall be no rusting of the panels, nor peeling or undercutting of the coating when subjected to salt spray test for 264 hours (11 days) as specified in 4.3.8.

3.9 Abrasion resistance.

MIL-DTL-12276E(MR)

3.9.1 Type I and III materials. When tested as specified in 4.3.9, the maximum weight of coating removed by 500 cycles shall not exceed 8 milligrams and the coating shall not be abraded through to the metal.

3.9.2 Type II materials. The diameter at the area abraded through to the steel when tested as specified in 4.3.9 shall not exceed 4 millimeters.

3.10 Impact resistance. Panels coated with type III varnish shall not flake, crack or lift when tested as specified in 4.3.10. This requirement does not apply to types I and II.

3.11 Thermoplasticity. The finish shall not soften or stick when tested at $600^{\circ} \pm 5^{\circ}$ C as specified in 4.3.11.

3.12 Viscosity. Types I and III varnishes shall have a minimum viscosity of 40 centipoises at $70^{\circ} \pm 2^{\circ}$ F as received. The viscosity shall be determined as specified in 4.3.12.

3.13 Shelf life. When tested as specified in 4.3.13, there shall be no more than a 15 percent change in viscosity after 90 hours at $140^{\circ} \pm 5^{\circ}$ F nor separation of any component.

3.14 Workmanship. The ingredients of the varnish shall be thoroughly mixed to form a homogeneous product free of visual dirt, grit, water, or other foreign materials. The unpigmented varnish shall have no sediment or solid particles.

3.14.1 Caution to users. Users are reminded that the testing procedures that follow utilize many chemical reagents, some are organic solvents, and others are corrosive enough to harm human tissues. It is appropriate at this point to remind the potential user to employ the correct personal protective equipment in order to avoid personal injury.

4. VERIFICATION

4.1 Classification of inspection. The inspection requirements specified herein are classified as conformance inspection (see 4.2)

4.2 Conformance inspection.

4.2.1 Conformance tests. Conformance testing shall be for the purpose of acceptance of individual lots and shall consist of tests for all requirements specified herein.

4.2.2 Sampling, inspection and testing. For the purpose of conformance inspection, unless otherwise specified in the contract or order (see 6.2), sampling, inspection and testing shall be in accordance with method 1031 of Federal Test Method Standard No. 141.

4.2.3 Testing facility. Unless otherwise specified in the contract or order (see 6.2), the contractor may use his own or other facilities suitable for the performance of the inspection requirements specified herein. The Government reserves the right to perform any of the

MIL-DTL-12276E(MR)

inspections set forth in the specification where such inspections are deemed necessary to assure that supplies and services conform to prescribed requirements.

4.3 Test procedure.

4.3.1 Preparation of test panels. The phosphate coated test panels shall be purchased from a commercial supplier (see 6.6). Prepare 7 sets of six panels divided into three groups of two panels each of SAE 1010, 3 x 6 x 0.026 inch panels. Also prepare two sets of six panels divided into three groups of two panels each of SAE 1010, 1 x 2.5 x 0.026 inch panels. Additionally, prepare one set of six panels divided into three groups of two panels each of SAE 1010, 3 x 6 x 0.020 inch panels. All of these panels are to be prepared in accordance with the following schedule:

- (a) For the length of time and the temperature normally recommended by the finish manufacturer. (All tests).
- (b) For the same length of time but at a temperature of 25 degrees Fahrenheit lower than (a) above. (All tests).
- (c) For the same length of time but at a temperature 25 degrees Fahrenheit higher than (a) above. (All tests).

4.3.2 Film thickness. The types I and III coatings shall be applied by spray in such a manner that the film thickness after baking shall be 0.0005 ± 0.0001 inch. Type II coatings shall be applied by spray in such a manner that the film thickness after baking shall be 0.0005 ± 0.0001 inch for clear coatings and 0.00125 ± 0.00025 inch for pigmented films. The panels shall be coated in an atmosphere as free as possible from dirt, dust or laboratory fumes.

4.3.3 Absence of film defects. Two test panels, 3 x 6 x 0.026 inches in size, prepared as specified in 4.3.1, shall be spray coated to a dry film thickness of 0.0005 ± 0.0001 inch for types I and types III materials. The thickness of type II coatings shall be in accordance with 4.3.2. The panels shall be prebaked at $212^{\circ} \pm 5^{\circ}$ F for 20 minutes and then baked according to the manufacturer's recommended baking schedule. The panels shall be examined visually for defects specified in 3.5

4.3.4 Film adhesion and flexibility. Test panels, 3 x 6 x 0.020 inches in size, shall be prepared and coated as specified in 4.3.1 and 4.3.2. A minimum of two coated panels for each of the three schedules specified in 4.3.1 shall be tested for film adhesion and flexibility by rapidly bending each coated panel around a mandrel 0.5 ± 0.01 inch in diameter for type I material, 1.00 ± 0.01 inch in diameter for type II material and 0.125 ± 0.005 inch in diameter for type III material. The film shall be examined for compliance with 3.6. A strip of transparent, pressure-sensitive, adhesive cellophane tape conforming to A-A-113 shall then be pressed down on the bend in the coated panel and stripped off. None of the phenolic coating shall be lifted off by the adhesive tape.

4.3.5 Solid content. Weigh to the nearest milligram a small disposable aluminum dish approximately 2 inches in diameter. Weigh into the dish a very small sample of the varnish

MIL-DTL-12276E(MR)

that does not exceed 0.3 gram in weight. Dissolve in 2 ml. of reagent grade toluene and dry the dish for 30 minutes in a gravity convection oven at $105^{\circ} \pm 2^{\circ}$ C. Determinations shall be run in duplicate. Upon cooling, reweigh to the nearest 0.1 milligrams and calculate the percent total solids:

$$\text{Percent Solids} = \frac{\text{Weight of Residue}}{\text{Weight of Sample}} \times 100$$

4.3.6 Solvent analysis for composition L.

4.3.6.1 Separation of volatile portion. Pour about 15 grams of the varnish into a 50 ml. distilling flask. Add 10 ml. of tricresyl phosphate and several anti-bumping stones or Berl Saddles. Fit a release valve into the mouth of the flask and attach a delivery tube to the side arm, extending into a receiver. The receiver consists of a test tube (20 x 150mm) with side arm for attaching to a vacuum pump. The glass delivery tube should reach 1 ½ inches from the bottom of the tube. Immerse the receiver in a dry ice-acetone bath. Preheat a silicone oil bath to 160° C. Raise the oil bath until the oil reaches the sample level. Reduce the pressure slowly to 10mm of mercury. After all the solvent has distilled, carefully release the vacuum using the valve that is connected to the distilling flask. Reserve the collected distillate for the aromatic solvent determination and the test for ketone, olefinic and cyclo-olefinic compounds.

4.3.6.2 Determination of aromatic hydrocarbons.

4.3.6.2.1 Qualitative test for aromatic hydrocarbons. Place 5 ml. of the distillate in a 10 ml. glass stopped graduate. Add 5 ml. of 86 percent sulfuric acid slowly while the graduate is being cooled with tap water. After the acid has been added, shake vigorously for 2 minutes, then allow the layers to separate. If there is no separation of layers, it can be assumed that no aromatic hydrocarbons are present. If there is an upper layer, determine the aromatic hydrocarbons quantitatively as described in 4.3.6.2.2.

4.3.6.2.2 Qualitative determination of aromatic hydrocarbons.

APPARATUS: A gas chromatograph equipped with a thermal conductivity detector.

COLUMN PREPARATION: Two lengths of ¼ inch copper tubing, 6-ft. and 18-ft. long. Packed with 35 percent N, N-Bis (2-cyanoethyl) formamide on 60- to 80-mesh Chromosorb P.

OPERATING CONDITIONS:

	6-FT.	18-FT.
Detector cell temperature, °C	300	300
Detector cell current, mA	150	150
Injection port temperature, °C	300	300
Helium flow at exit, cc/minute	175	110
Column temperature, °C	125	70

MIL-DTL-12276E(MR)

4.3.6.2.2.1 Aromatic and oxygenated solvents – procedure A. Install the 6-ft. column and follow the operating conditions described above. Inject about 3 micro-liters of the isolated distillate and scan the chromatogram. The aliphatic solvents shall emerge within 1 minute and the complete chromatogram should develop in about 5 minutes. From the position of the peaks observed on the chromatogram, select an internal standard that shall be free of interference, such as cyclopentanol or cyclohexanol. Add 0.6 ml. of internal standard to 3 ml. of the distillate, analyze according to the above procedure. Peaks emerging after 1 minute may be present. Calculate the percent of aromatic and oxygenated solvents as follows:

$$\text{Percent aromatic and oxygenated solvents, v/v} = \frac{20 * \times A}{1.02 ** \times B}$$

where; A = area of aromatic and oxygenated solvents.

B = area of internal standard.

* = is percent of internal standard added.

** = is correction factor if cyclopentanol is used. If another internal standard is used, calibrate to determine the correction factor.

NOTE: If the above determination exceeds 8 percent, continue with the following procedure.

4.3.6.2.2.2 Total aromatic content – procedure B. Proceed as in the qualitative test for aromatic hydrocarbons (see 4.3.6.2.1). Remove as much of the top layer as possible and wash it with distilled water. Carefully pipet 3 ml. of the washed solvent into a small flask followed by 0.6 ml. of the internal standard. Mix and analyze according to procedure A. Calculate the percent of aromatics after acid treatment in the same manner as in procedure A and the percent of total aromatic solvents as follows:

$$\text{Percent total aromatic solvents, v/v} = \frac{B \times (100 - A)}{100 - B}$$

where; A = percent of aromatic and oxygenated solvents from procedure A.

B = percent of aromatic solvents after acid treatment.

NOTE: If the total aromatic content of the solvent is between 8 percent and 20 percent, continue with the following procedure.

4.3.6.2.2.3 Toluene and ethyl benzene – procedure C. Install the 18-ft. column and follow the operating conditions described for that column. Add 0.3 ml. of high purity benzene to the 3 ml. sample used in procedure A. If the results of procedures A and B indicated the presence of oxygenated solvents, treat this sample with 85 percent sulfuric acid (use 3 ml. acid) as described in procedure B. Inject about 3 micro-liters of sample and allow the chromatograph to develop until all xylene isomers appear. Purge the column by raising the column temperature to 120° C. After the high boiling materials emerge, reset the column temperature to 70° C. Calculate the percent of toluene and ethylbenzene as follows:

MIL-DTL-12276E(MR)

$$\text{Percent toluene, v/v} = \frac{(\text{area of toluene peak}) \times (1.017) * \times (10) **}{(\text{area of benzene peak})}$$

$$\text{Percent ethylbenzene, v/v} = \frac{(\text{area of ethylbenzene peak}) \times (1.054) * \times (10) **}{(\text{area of benzene peak})}$$

where; * = the correction factor for the detector response.

** = the percentage of internal standard added.

NOTE: Sensitivity of the instrument should be adjusted to keep peaks from running off the scale. Appropriate corrections must be made for changes in sensitivity when computing the peak areas.

4.3.6.3 Test for olefinic or cycle-olefinic compounds. Take 2 test tubes and place 2 drops of the distillate in each. Dissolve the first sample in 1ml. of chloroform and add 1 drop of 1 percent bromine in chloroform. Shake and allow to set for 5 minutes. A positive test is indicated by the complete absence of yellow color when observed against a white background. Dissolve the second sample in 1 ml. of acetone and add 1 drop of 1 percent permanganate solution (1 gram of potassium permanganate crystals in 95 mls. of acetone and 5 mls. of water). Shake and allow to set for 2 minutes. A positive test is indicated by the decoloration of the purple solution. The solvent is considered to fail the test for olefinic and cyclo-olefinic compounds if either of the above tests is positive (see 3.2.3 and 6.5).

4.3.6.4 Tests for ketones.

4.4.6.4.1 Reagent. Two grams of 2,4-dinitrophenylhydrazine plus 4 mls. of concentrated sulfuric acid plus 30 mls. methanol (add slowly plus 10 mls. water).

4.3.6.4.2 Procedures. Pipette 1 ml. of reagent into 20 by 170 mm test tube. Add 10 drops of distillate (see 4.3.6.1) and shake for 30 seconds. A yellow precipitate or cloud in the reagent layer indicates the presence of ketones. Run a blank using one milliliter of reagent and 10 drops of mineral spirits.

4.3.7 Resistance to chemicals and solvents. A minimum of 18 panels shall be required. Test panels, 1 x 2 ½ x 0.026 inches in size, shall be prepared and coated as specified in 4.3.1. A minimum of one coated panel for each of the three schedules specified in 4.3.1 shall be tested separately for resistance to the following chemicals and solvents by immersion. A separate panel shall be used for each individual test.

MIL-DTL-12276E(MR)

CHEMICAL and SOLVENTS	IMMERSION TIME
Boiling toluene	1 hour
Glacial acetic acid	1 hour at room temperature
Ammonium hydroxide (10 percent by weight)	1 hour at room temperature
Ethyl alcohol	1 hour at room temperature
Ethyl ether	1 hour at room temperature
Boiling bis-(beta chloroethyl) ether	2 hours (type II varnish only)

Coated panels which are to be immersed in acetic acid and ammonium hydroxide shall have their edges protected by dipping in molten paraffin prior to immersion. The paraffin shall not extend more than 1/8 inch onto the coated area of the panels.

At the end of the specified test period, the film of the varnish shall not have soften, blistered or otherwise deteriorated. (During the immersion in boiling bis-(beta chloroethyl) ether, moderate discoloration shall not be considered as deterioration.)

4.3.8 Corrosion resistance. Test panels, 3 x 6 x 0.026 inches in sizes, shall be prepared and coated as specified in 4.3.1. A minimum of two coated panels for each of the three baking schedules specified in 4.3.1 shall be tested for corrosion resistance by scribing each panel along the two diagonals for a distance of 5 inches using a razor blade. The scribe marks shall completely penetrate the varnish film. Expose the panels for 264 hours (11 days) to 5 percent salt spray in accordance with ASTM B117. At the end of the test period, examine the panels visually for evidence of peeling or undercutting of the coating at the scribe marks or signs of rusting at points other than within 1/8 inch distance from the scribe marks or edges of the panels.

4.3.9 Abrasion resistance.

4.3.9.1 Types I and III. A minimum of two panels for each of the three baking schedules specified in 4.3.1 shall be used. The shape and size of the panels shall be either a disk of 4 inch diameter x 0.026 inch thick, or a square panel 4 x 4 x 0.026 inches. The panels shall be prepared and coated as specified in 4.3.1. The test shall be conducted in accordance with ASTM D4060.

4.3.9.2 Type II. A minimum of two panels for each of the three baking schedules specified in 4.3.1 shall be used. The shape and size of the panels shall be either a disk of 4 inch diameter x 0.026 inch thick, or a square panel 4 x 4 x 0.026 inches. The panels shall be prepared and coated as specified in 4.3.1. The test shall be conducted in accordance with ASTM D968 and 2 kg of sand shall be used.

4.3.10 Impact resistance (For Type III only). Two test panels, 3 x 6 x 0.026 inches in size, shall be prepared, coated, and baked as specified in and in accordance with 4.3.1. The coated panels shall be tested for impact resistance with an impact tester device utilizing a falling weight and die technology which is capable of exerting 30 inch-pounds of impact on the panel. The coated panel shall be placed (in the device) with the test surface facing downward or away from the impacting tool. A 30 inch-pound impact shall be made on the

MIL-DTL-12276E(MR)

panel. The film shall be examined on the convex surface for compliance with 3.10. A strip of transparent, pressure-sensitive adhesive cellophane tape conforming to A-A-113 shall be pressed down on the convex area of the impacted surface and then stripped off. None of the coating shall be lifted by the adhesive tape.

4.3.11 Thermoplasticity. Two test panels, free from defects, 3 x 6 x 0.026 inches in size, and two panels 1 x 2.5 x 0.026 inches in size for each baking schedule specified in 4.3.1 shall be used. Panels shall be prepared and coated as specified in 4.3.1. The edges of the 1 x 2.5 x 0.026 inch coated panels shall be broken down to the bare metal so that all burrs and varnish beads are completely removed. The test panels shall be placed film to film in an oven at $600^{\circ} \pm 5^{\circ}$ F. These panels, with the smaller panel uppermost in each case, shall rest on a smooth flat steel plate previously brought to oven temperature. The steel plate shall be a minimum of 4 x 6 x 1/4 inches in size. To assure that the weights and steel plates have been brought to oven temperature, they shall be placed in the oven maintained at $600^{\circ} \pm 5^{\circ}$ F for one hour prior to use. As soon as the test panels and plates have been placed in the oven, a 2-kilogram weight, previously brought to oven temperature, shall be placed on each of the smaller panels. Keep the panels in oven maintained at $600^{\circ} \pm 5^{\circ}$ F for 15 minutes. Remove the weights from the panels and immediately reverse the position of the panels so that the larger panels are uppermost. The smaller panels shall immediately fall away from the larger panels.

4.3.12 Viscosity. The viscosity shall be determined by using a suitable Viscosimeter with an appropriate spindle at a temperature of $70^{\circ} \pm 2^{\circ}$ F.

4.3.13 Shelf life. A tall, wide mouth 8 oz. container shall be filled with the varnish to within 1/8 inch of the top. Record the viscosity, then place the covered container in the oven at $140^{\circ} \pm 5^{\circ}$ F for 90 hours. Remove the container, allow to cool and again determine the viscosity.

$$\text{Percent change in viscosity} = \frac{(V_2 - V_1) \times 100}{V_1}$$

Where; V_1 = original viscosity

V_2 = viscosity after 90 hours at $140^{\circ} \pm 5^{\circ}$ F.

4.3.13.1 Extended shelf life test. A one quart container of the subject material shall be stirred/shaken as required by the manufacturer. The viscosity shall then be measured at $70^{\circ} \pm 2^{\circ}$ F and recorded. This container shall then be sealed and stored on a shelf in a cabinet out of direct light and heat sources at room temperature for a period of one year. At the end of that period of time, the container shall then be stirred/shaken as recommended by the manufacturer and then its viscosity measured at $70^{\circ} \pm 2^{\circ}$ F and its viscosity compared to the first measurement one year earlier. The newest viscosity reading shall not be more than 15% greater than the first reading.

4.4 Rejection.

MIL-DTL-12276E(MR)

4.4.1 Test failures. A lot shall be rejected for failure to meet any of the test requirements when tested in accordance with 4.3

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements 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 commands. 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.

6. NOTES

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

6.1 Intended use. Types I and III varnishes covered by this specification are intended for use as finishes on steel cartridge cases to protect them from atmospheric corrosion. Classes A and B of type I and Classes A, B, and C of type III may be used depending upon the type of equipment used to produce the finish on the cartridge cases. Type I is intended for use where the metal is not deformed or fabricated after coating. Type III is intended for use where the metal is deformed or fabricated after it is coated. Type II varnish covered by this specification is intended for use as a protective finish for lining munitions, chemical and other containers requiring special protection.

6.2 Ordering data. Procurement documents should specify the following:

- a. Title, number, and date of this specification.
- b. Specify classification, composition, type, and class (see 1.2).
- c. If sampling, inspection or testing is different then as specified (see 4.2.2).
- d. If contractor's facility is not allowed for performing inspection (see 4.2.3).
- e. Packaging requirements (see 5.1).

6.3 Marking. Suggested wording to be included in the contract or purchase order "Marking for shipment and storage should be in accordance with MIL-STD-129". The requirements for packaging and for packing and marking for shipment (see 5.1) specified herein apply to direct shipment to Government activities and apply also, where specified, to contracts or orders between the manufacturer and the Government prime contractor.

6.4 Composition L. Composition L varnish should be specified for use in areas with regulations controlling the emission of solvents into the atmosphere.

MIL-DTL-12276E(MR)

6.5 Test Limitations. The test for olefinic and cyclo-olefinic compounds should not be considered positive for solvents containing less than 1 percent of these compounds.

6.6 Phosphate coated panels. Phosphate coated panels of the appropriate size are readily available from a number of commercial suppliers at a great savings in overall cost and efficiency.

6.7 Subject term (key word) listing.

Aromatic compounds	Munitions	Varnish
Bisphenol epoxide	Phenolic varnishes	
Cartridge cases	Plasticizers	
Chemical containers	Rosin	
Coatings	Spray applications	
Dip applications	Thermosetting	

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 extent of the changes.

CONCLUDING MATERIAL

Custodians:
Army – MR

Preparing activity:
Army – MR
(Project 8010-2006-015)

Review activities:
Army – MI

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 currency of the information above using the ASSIST Online database at <http://assist.daps.dla.mil/>.