

MIL-F-13088A(MR)  
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SUPERSEDING  
MIL-F-13088(ORD)  
23 October 1953

MILITARY SPECIFICATION  
FINISH, PROTECTIVE,  
TUNG (CHINA WOOD) OIL BASE  
(FOR WOODEN COMPONENTS OF SMALL ARMS)

\* 1. SCOPE

1.1 This specification covers one type of tung oil base fluid (protective finish) for use as a decorative as well as a protective coating on wooden components of small arms. The protective finish is intended primarily for application by dipping (see 6.1).

\* 2. APPLICABLE DOCUMENTS

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

SPECIFICATIONS

Federal

TT-P-143

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

TT-T-775

- Tung Oil, Raw (China Wood) (for Use in Organic  
Coating).

FSC 8010

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## STANDARDS

FederalFED. TEST METHOD  
STD. NO. 141- Paint, Varnish, Lacquer, and Related Materials;  
Methods of Inspection, Sampling, and Testing.

(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 Qualification. The protective finish furnished under this specification shall be a product which has been tested and passed the qualification tests specified herein (see 4.4 and 6.3) and has been listed on or approved for listing on the applicable qualified products list.

3.2 Composition. The protective finish shall consist of tung (China wood) oil processed with a volatile solvent and containing dyes as necessary to give the required color (see 3.4.2) and such other materials as are necessary to meet the requirements of this specification.

\* 3.2.1 Tung oil base. The raw tung oil shall conform to TT-T-775.

3.2.2 Volatile solvent. The flash point of the volatile solvent shall be not less than 125° Fahrenheit (F.).

3.3 Properties of protective finish.

3.3.1 The protective finish shall conform to the requirements specified in table I when subjected to the applicable tests specified in section 4.

Table I. Properties of protective finish

Property	Requirement	Test paragraph
Viscosity, Saybolt Universal at 100° F., seconds, maximum	54	4.5.3
Flash point, ° F., minimum	125	4.5.4
Nonvolatile matter (solids), percent	43-46	4.5.5
Drying time, set to touch, hours	4-7	4.5.6

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3.3.2 Skimming. The protective finish shall show no skin formation when tested as specified in 4.5.7.

\* 3.3.3 Stability. The protective finish shall show no insoluble materials, settling of dyes, or sediment when tested as specified in 4.4.1. The color of the protective finish at the completion of the test shall be no lighter than the color of the original sample submitted for qualification tests.

\* 3.3.4 Compatibility. The protective finish shall be compatible with all protective finishes previously qualified under this specification when tested as specified in 4.4.2. Each resulting mixture shall show no immiscibility and, being considered as a single protective finish, shall meet all the requirements of this specification.

### 3.4 Properties of wood treated with protective finish.

3.4.1 Drying quality. Wooden test specimens treated with the protective finish shall show no spots, runs, or tackiness when tested as specified in 4.5.8. Test specimens that have dried in contact shall not stick together and shall show no contact marks upon separation.

\* 3.4.2 Coloring. The heartwood areas of wooden test specimens treated with the protective finish shall have a color which is no lighter than color standard 11018988-W (see 6.5) when tested as specified in 4.5.9. The color shall be uniform within the limits of the color standard.

\* 3.4.3 Surface effect. Wooden test specimens treated with the protective finish shall show no glossy patches (flashing) and shall have a uniform surface (lack of raised grain or other build-up) similar to the color standard when tested as specified in 4.5.10.

3.4.4 Sweating and smoking. Wooden test specimens treated with the protective finish shall show no tackiness, sweating, or smoking when tested as specified in 4.5.11. Slight exudation from the end grain shall not be cause for rejection.

3.4.5 Water resistance. Wooden test specimens treated with the protective finish shall have a uniform surface (lack of raised grain or other build-up) similar to the color standard when tested as specified in 4.5.12. There shall be no leaching of the dye from the test specimen.

\* 3.5 Workmanship. The protective finish shall be homogeneous and free from water, dirt, sediment, and undissolved additives as determined by visual examination. It shall not have an offensive odor nor a toxic effect upon prolonged contact with the skin or through inhalation, either before or after drying.

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## 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, the supplier may utilize his own facilities or any commercial laboratory acceptable to 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 and inspection. Sampling and inspection shall be performed in accordance with method 1031 of Fed. Test Method Std. No. 141.

4.3 Classification of tests. Testing of the protective finish shall be classified as follows:

- (a) Qualification tests
- (b) Quality conformance tests

\* 4.4 Qualification tests. The qualification tests shall consist of all the quality conformance (acceptance) tests herein and the following tests.

\* 4.4.1 Stability. A quart-size clear-glass container shall be filled with a sample of the protective finish, the cover shall be replaced and tightened, and the container with contents shall be stored for 30 days. The container shall not be placed in direct sunlight but shall be placed in an open position susceptible to the normal changes in room conditions. The container shall not be disturbed until examined. At the end of 30 days, the contents shall be visually examined for evidence of insoluble materials, settling of dyes, or sedimentation (see 3.3.3). The color of the contents shall be visually compared with that of a sample of protective finish submitted for qualification tests which had been stored in a lightproof container prior to test. The comparison shall be made using two 4-ounce oil sample bottles or similar bottles of clear colorless glass.

4.4.2 Compatibility. Approximately 1 pint of protective finish shall be mixed in a quart size glass container with an equal amount of a previously qualified protective finish. The mixture shall be thoroughly shaken for not less than 1 minute. The cover shall be replaced by a ribbed cover watch glass, and the container with the mixed protective finishes shall be set aside in a place away from direct sunlight but susceptible to the changes of room conditions. The container shall not be disturbed until examined. At the end of 30 days, the contents shall be visually examined for evidence of immiscibility and may be subjected to such other inspection as is necessary to determine compliance with the requirements of this specification (see 3.3.4). When more than one qualified protective finish exists, the sample submitted for qualification may be tested in a like manner with as many as may be considered necessary.

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\* **4.5 Quality conformance tests.** Quality conformance tests for acceptance of individual lots shall consist of tests for all requirements specified in section 3 with the exception of stability and compatibility as specified in 3.3.3 and 3.3.4 respectively.

\* **4.5.1 Test conditions.** The routine and referee testing conditions shall be in accordance with section 7 of Fed. Test Method Std. No. 141 except as otherwise specified herein.

\* **4.5.2 Preparation of wood test specimens.** When wood specimens are required for test purposes (see 4.5.8, 4.5.9, 4.5.10, 4.5.11, and 4.5.12), untreated black walnut having a moisture content of 6 to 10 percent shall be used. Unless otherwise specified, the test specimens shall be approximately 2 by 2 by 6 inches. All surfaces of the specimens shall be planed and smoothed down with fine sandpaper so as to approximate the surface conditions of the color standard. Specimens to be used in the coloring test shall consist mainly of heartwood approximating the average color of black walnut heartwood.

\* **4.5.3 Viscosity.** The viscosity of the protective finish shall be determined in accordance with method 4285 of Fed. Test Method Std. No. 141 (see table I).

\* **4.5.4 Flash point.** The flash point of the protective finish shall be determined in accordance with method 4291 of Fed. Test Method Std. No. 141 (see table I).

**4.5.5 Nonvolatile matter.** The nonvolatile content shall be determined by placing a sample of approximately 5 to 10 grams of the protective finish in a tared evaporating dish. The dish with sample shall be weighed and the weight of the sample calculated. The dish with sample shall be placed in an oven maintained at  $400^{\circ} \pm 5^{\circ}$  F. for 1 hour. The oven shall be of a type provided with venting and forced circulation. At the end of 1 hour, the dish with sample shall be cooled to room temperature and weighed. From the weight of the residue and the weight of the sample, the percentage of nonvolatile matter (solids) shall be calculated (see table I).

\* **4.5.6 Drying time.** The protective finish shall be flowed onto a clean glass plate and allowed to drain and dry in a near vertical position in a place away from direct sunlight and forced drafts. The film shall be tested by lightly touching with the tip of the finger at points not less than one-half inch from the edges and approximately 1 1/2 inches below the upper edge of the flowed-on finish. The film shall be considered set-to-touch when it still shows a tacky condition but none of it adheres to the finger. Tests shall be made at approximately 5 minutes prior to 4 hours' drying time and within 10 minutes after 7 hours of drying to determine whether the drying time is within the specified requirements (see table I).

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4.5.7 Skimming. A sample of approximately 75 milliliters of the protective finish shall be placed in a 250 milliliter beaker or evaporating dish. The container shall be covered with a ribbed cover glass and set aside under normal room conditions in a place away from direct sunlight. The container and contents shall not be disturbed until examined. At the end of 5 days, the contents shall be visually examined for compliance with 3.3.2.

4.5.8 Drying quality. Not less than three wood test specimens (see 4.5.2) shall be immersed in the protective finish for 3 to 5 minutes and then set upright and allowed to drain and dry in contact. At the end of 5 hours, the test specimens shall be examined for sticking as a result of contact drying, contact marks, spots, runs, or tackiness (see 3.4.1).

\* 4.5.9 Coloring. Not less than three wood test specimens (see 4.5.2) shall be immersed in the protective finish for 3 to 5 minutes, allowed to drain and dry for 24 hours, and visually examined for compliance with 3.4.2. Only the heartwood areas of the test specimens shall be considered when comparing with the color standard for compliance with the coloring requirement. (NOTE. The tests for coloring and surface effect may be performed concurrently.)

\* 4.5.10 Surface effect. Not less than three wood test specimens (see 4.5.2) shall be immersed in the protective finish for 3 to 5 minutes, allowed to drain and dry for 24 hours, and visually examined and compared with the color standard for compliance with 3.4.3.

\* 4.5.11 Sweating and smoking. Not less than three wood test specimens (see 4.5.2) shall be immersed in the protective finish for 3 to 5 minutes and allowed to drain and air-dry for 24 hours followed by further drying in a forced draft oven maintained at  $110^{\circ} \pm 3^{\circ}$  F. for not more than 96 hours. At the end of the drying period, the test specimens shall be placed in a well ventilated oven maintained at  $405^{\circ} \pm 5^{\circ}$  F. for 30 minutes, removed, and visually examined for evidence of smoking. When cooled sufficiently to handle, the test specimens shall be examined for evidence of tackiness and sweating (see 3.4.4).

\* 4.5.12 Water resistance. Not less than three wood test specimens (see 4.5.2), approximately 1/2 by 2 by 6 inches, shall be immersed in the protective finish for 3 to 5 minutes and then dried using the same drying procedures described in 4.5.11. At the end of the drying period, the test specimens shall be placed upright to half their length in water maintained at room temperature (see 4.5.1). After 24 hours, the specimens shall be taken out of the water and lightly rubbed with paper toweling to remove surface moisture. The portion immersed in water shall be visually compared with the color standard for compliance with the uniform surface requirement (see 3.4.5). The paper toweling used for drying shall be examined for any evidence of stain from the finish.

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4.6 Rejection. Failure of any sample of protective finish or any wooden test specimen to conform to any applicable requirement of this specification shall be cause for rejection of the lot of protective finish represented.

## 5. PREPARATION FOR DELIVERY

\* 5.1 Packaging, packing, and marking. The protective finish shall be packaged, packed, and marked in accordance with TT-P-143, as specified for the applicable level (see 6.2). The finish shall be furnished in the size container specified (see 6.2).

## 6. NOTES

\* 6.1 Intended use. The protective finish is intended for use on but is not limited to the following species of wood:

- (a) Black walnut (*Juglans nigra*).
- (b) English walnut (*Juglans regia*).
- (c) Yellow birch (*Betula alleghaniensis*).
- (d) Sweet birch (*Betula lenta*).

6.2 Ordering data. Procurement documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Level of packaging and packing (see 5.1).
- (c) Size of container required (see 5.1).

6.3 Qualification. With respect to products requiring qualification, awards will be made only for such products as have, prior to the time set for opening of bids, been tested and approved for inclusion in the applicable Qualified Products List whether or not such products have actually been so listed by that date. The attention of suppliers 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 orders for the products covered by this specification. The activity responsible for the Qualified Products List is the Commanding Officer, Springfield Armory, ATTN: SWESP-PP, Springfield, Massachusetts 01101, and information pertaining to qualification of products may be obtained from that activity.

\* 6.4 Basis of purchase. The protective finish should be purchased by volume, the unit being one U. S. liquid gallon of 231 cubic inches at 15.6° centigrade (60° F.).

\* 6.5 Color standards may be obtained from Commanding Officer, Springfield Armory, ATTN: SWESP-QAE, Springfield, Massachusetts 01101 (see 3.4.2).

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6.6 The margins of this specification are marked with an asterisk to indicate where changes (additions, modifications, corrections, deletions) from the previous issue were made. 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 and relationship to the previous issue.

Custodian:

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