

**TT-T-775**

**MAY 28, 1957**

**SUPERSEDING**

**Int. Fed. Spec. TT-O-00395a (Agr-ARS)**

**June 15, 1956 and**

**Fed. Spec. TT-O-395**

**February 3, 1948**

**FEDERAL SPECIFICATION**

**TUNG OIL, RAW (CHINA WOOD)  
(FOR USE IN ORGANIC COATING)**

*This specification was approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.*

**1. SCOPE AND CLASSIFICATION**

**1.1 Scope.**—This specification covers raw tung oil suitable for use in paints, varnishes, enamels, and similar products.

**1.2 Classification.**—Raw tung oil shall be of one type and one grade.

**2. APPLICABLE SPECIFICATIONS, STANDARDS, AND OTHER PUBLICATIONS**

**2.1 Specifications and standards.**—The following specifications and standards, of the issues in effect on date of invitation for bids, form a part of this specification:

*Federal Specifications:*

TT-P-141 — Paint, Varnish, Lacquer, and Related Materials; Methods of Inspection, Sampling, and Testing.

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

PPP-P-31 — Preservation, Packaging, Packing, and Marking of Material; and Shipping Instructions (Domestic Shipping and Storage).

PPP-P-32 — Preservation, Packaging, Packing, and Marking of Material; and

Shipping Instructions (Domestic Shipments for Immediate Use).

*Federal Standards:*

Fed. Std. No. 102—Preservation, Packaging, and Packing Levels.

(Activities outside the Federal Government may obtain copies of Federal Specifications and Standards as outlined under General Information in the Index of Federal Specifications and Standards and at the prices indicated in the Index. The Index, which includes cumulative monthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

(Single copies of this specification and other product specifications required by activities outside the Federal Government for bidding purposes are available without charge at the General Services Administration Regional Offices in Boston, New York, Atlanta, Chicago, Kansas City, Mo., Dallas, Denver, San Francisco, Los Angeles, Seattle, and Washington, D. C.

(Federal Government activities may obtain copies of Federal Specifications and Standards and the Index of Federal Specifications and Standards from established distribution points in their agencies.)

*Military Standards:*

MIL-STD-105 — Sampling Procedures and Tables for Inspection by Attributes.

MIL-STD-129—Marking for Shipment and Storage.

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

**2.2 Other publications.**—The following publications, of the issues in effect on date of invitation for bids, form a part of this specification:

**Consolidated Freight Classification Rules and Container Specifications.**

(Application for copies should be addressed to the Consolidated Classification Committee, 202 Chicago Union Station, Chicago 6, Ill.)

**National Motor Freight Classification Rules and Container Specifications (No. 11 and No. A-1).**

(Application for copies should be addressed to the American Trucking Association, Inc., 1424 16th Street NW., Washington 6, D. C.)

### 3. REQUIREMENTS

**3.1 Quantitative requirements.**—The tung oil shall meet the requirements specified in table I.

TABLE I.—Quantitative requirements

Characteristics	Requirements	
	Minimum	Maximum
Specific gravity, 25°/25° C.	0.935	0.938
Acid number (alcohol benzol) -----	-----	8.0
Saponification number -----	189	195
Unsaponifiable matter (percent by weight) -----	-----	0.75
Refractive index at 25° C. ....	1.5165	1.5200
Iodine number (Wijs) -----	163	-----
Heating test (gel) (minutes) -----	-----	12
Foots (percent by volume) -----	-----	1.0
Loss on heating at 105° C. (percent by weight) -----	-----	0.3

### 3.2 Qualitative requirements.

**3.2.1 Appearance.**—The tung oil shall be clear and free from sediment and suspended matter at 65° C. (149° F.) when examined by transmitted light. (See 4.3.1.)

**3.2.2 Color.**—The oil shall be no darker than a solution of 1.041 grams of ACS reagent-grade potassium dichromate in 100 milliliters of sulfuric acid (sp. gr. 1.84). The No. 15 tube of the Gardner Color Scale (1953) or the No. 7 Standard of the Hellige Color Comparator may be used as secondary standards. (See 4.3.1.)

**3.2.3 Quality.**—When prepared and examined as specified in 4.3.1 the oil gel shall be dry (firm), shall not adhere to the spatula when cut, and the cut portions shall crumble under pressure of the spatula.

## 4. SAMPLING, INSPECTION, AND TEST PROCEDURES

**4.1 Sampling.**—Sampling shall be performed in accordance with method 102.1 of Federal Specification TT-P-141.

**4.2 Inspection.**—Inspection shall be performed in accordance with method 101.1 of Federal Specification TT-P-141.

**4.3 Test procedures.**—Tests shall be made in accordance with the applicable methods of Federal Specification TT-P-141 and as specified hereinafter.

**4.3.1** The following tests shall be conducted in accordance with Federal Specification TT-P-141:

Test	Method No.
Acid number (oils) -----	507.1
Saponification number -----	508.1
Unsaponifiable matter -----	701.1
Refractive index -----	437.1
Iodine number of oils and fatty acids -----	506.1
Appearance -----	426.1 <sup>1</sup>
Color of transparent liquids (potassium dichromate scale) -----	424.1 <sup>2</sup>
Heating test (gel) -----	444.1
Foots test -----	518.1
Loss on heating (fatty oils) -----	446.1
Quality test -----	444.2

<sup>1</sup> The oil shall be warmed to 65° C. (149° F.) before examination is made.

<sup>2</sup> As secondary standards for color, the Hellige Color Comparator may be used as well as the Gardner Color Scale (see 3.2.2).

**4.3.2 Specific gravity.**—Determine the specific gravity of the sample at 25°/25° C. by any convenient method that is accurate to the third decimal place.

**4.3.3 Visual and laboratory tests.**—Unless otherwise specified (see 4.3.2) in addition to the requirements specified in 4.1 and 4.2, the following requirements shall apply:

**4.3.3.1 Lot.**—For purposes of sampling a lot shall consist of tung oil from one batch offered for delivery at one time.

**4.3.3.2 Sampling for inspection of filled containers at the contractor's plant.**—A random sample of filled containers shall be taken by the inspector in accordance with Military Standard MIL-STD-105 at inspection level I and acceptable quality level equals 2.5 percent defective to verify compliance with this specification in regard to fill, closure, marking and other requirements not involving tests.

**4.3.3.3 Sampling for tests at a Government designated laboratory.**

**4.3.3.3.1** From each inspection lot (see 4.3.3.1), the inspector shall take two containers at random. From each of the two containers, 1-quart specimens shall be taken and placed in separate clean, dry, metal or glass containers, and then sealed, marked, and forwarded to the test laboratory designated by the activity concerned.

**4.3.3.3.2** When requested by the contractor, the inspector shall select sample specimens in accordance with 4.3.3.3.1 with the following exception: Three-quart specimens shall be taken instead of 1-quart specimens. Each 3-quart specimen shall be divided into three equal parts, one part to be delivered to the contractor, one part to the testing laboratory, and one part to be held by the inspector in case of dispute.

**4.3.3.3.3 Testing activity.**—Unless otherwise specified in the contract or order, the

samples taken by the inspector as required for test purposes shall be forwarded to the laboratory designated by the procuring agency.

**4.3.3.4 Inspection of filled containers at the contractor's plant.**—Each sample filled container selected as specified in 4.3.3.2 shall be examined for defects of construction of the container and the closure, for evidence of leakage, and for unsatisfactory markings. Each filled container shall also be weighed to determine the amount of contents. Any container in the sample having one or more defects, or under required fill, shall be rejected, and if the number of defective containers in any sample exceeds the acceptance number for the appropriate sampling plan of Military Standard MIL-STD-105, the lot represented by the sample shall be rejected. Rejected lots may be resubmitted for acceptance tests provided the contractor has removed or reworked all nonconforming products.

**4.3.3.5 Lot acceptance tests.**—The samples selected in accordance with 4.3.3.3 shall be subjected to the tests specified in 4.4 except that the laboratory may perform complete tests on only one sample from each lot provided sufficient tests are made on the second sample to verify that both are alike. Lots shall be accepted or rejected by the inspector on the basis of the laboratory test report on the transmitted samples. Rejected lots may be resubmitted for acceptance tests provided the contractor has removed or reworked all nonconforming products.

**4.3.4 Alternative inspection.**—When specified (see 6.2), inspection shall be made in accordance with section 1000 of Federal Specification TT-P-141.

## 5. PREPARATION FOR DELIVERY

The definitions and applications of the various levels of packaging and packing protection shall be in accordance with Federal Standard No. 102.

**TT-T-775****5.1 Packaging.**

5.1.1 *Level A.*—The tung oil shall be packaged in conformance with Federal Specification TT-P-143 as specified for overseas or domestic shipment. Packaged quantities shall be specified (see 6.2).

5.1.2 *Level C.*—The tung oil shall be packaged in commercial containers in accordance with the manufacturer's standard practice. Packaged quantities shall be as specified (see 6.2).

**5.2 Packing.**

5.2.1 *Level A.*—The tung oil, packaged in accordance with Level A or C, as specified, shall be packed in conformance with Federal Specification TT-P-143 as specified for overseas shipment.

5.2.2 *Level B.*—The tung oil, packaged in accordance with Level A or C, as specified, shall be packed in conformance with Federal Specification TT-P-143 as specified for domestic shipment.

5.2.3 *Level C.*—The tung oil, packaged in accordance with Level A or C, as specified, shall be packed to insure carrier acceptance and safe delivery to destination in containers conforming to Consolidated Freight Classification Rules and Container Specifications or to National Motor Freight Classification Rules and Container Specifications (either No. 11 or No. A-1) or to other carrier regulations applicable to the mode of transportation.

**5.3 Marking.**

5.3.1 *Military.*—In addition to any special marking required by the contract or order, shipments shall be marked in accordance with Military Standard MIL-STD-129.

5.3.2 *Nonmilitary.* — Unless otherwise specified, shipments shall be marked in ac-

cordance with Federal Specification PPP-P-31 or PPP-P-32.

**6. NOTES**

6.1 *Intended use.*—Tung oil, commonly known as china wood oil or simply as "wood oil", is obtained by expressing the oil from the seed of a tree of the aleurites species. The tung oil covered by this specification is intended for use in the manufacture of paints, varnishes, enamels and other similar types of organic coatings.

6.2 Purchasers should exercise any desired options offered herein, and procurement documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) When inspection shall be in accordance with section 1000 of Federal Specification TT-P-141.
- (c) Level of packaging and packing required (see 5.1 and 5.2).
- (d) Quantity to be packaged (see 5.1.1 and 5.1.2).

6.3 In section 3 the requirements of major importance are the specific gravity, refractive index, iodine number, heating test and quality tests; no deviations should be permitted from these requirements. The other requirements, while considered necessary, are not quite so important and slight deviations might be permitted. Experience has shown that it is extremely important in making the quality test (4.3.1) that the directions given be closely followed in every detail. It is advisable to apply the same test to tung oil of known purity at the same time that the sample under examination is run.

6.4 Raw tung oil of good quality can generally be stored in full containers in the dark for several years without deterioration. However, when the oil is exposed to the light in the absence of air, the alpha-elaestearin of

the oil gradually changes to beta-elaeostearin, which separates as a white precipitate.

6.5 Tung oil should be purchased on a weight basis, the unit being one pound avoirdupois.

**Notice.** — When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility, nor any obligation whatsoever; and the fact that the Govern-

ment may have formulated, furnished, or in any way, supplied the said drawings, specifications, or other data, is not to be regarded by implication or otherwise, as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

**MILITARY INTERESTS:**

Army—E M O Sig

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