

**MIL-I-17563A**

12 MARCH 1957

SUPERSEDING  
MIL-I-17563 (SHIPS)  
30 MARCH 1953**MILITARY SPECIFICATION****IMPREGNATING COMPOUND,  
COPPER ALLOY CASTING**

*This specification has been approved by the Department of Defense and is mandatory for use by the Departments of the Army, the Navy, and the Air Force.*

**1. SCOPE**

1.1 Scope. This specification covers impregnants for use in sealing porosity (including microporosity) in copper alloy castings which "weep" or "sweat" under hydrostatic or aerostatic pressure.

1.2 Classification. Impregnants shall be of the following classes:

Class 1 — For use at temperatures up to 800°F.

Class 2 — For use at temperatures up to 500°F.

**2. APPLICABLE DOCUMENTS**

2.1 The following specifications and standards, of the issue in effect on date of invitation for bids, form a part of this specification:

**SPECIFICATIONS****MILITARY**

MIL-C-124 — Containers (Cans, Pails and Drums), Metal (for Other Than Subsistence Items).

**STANDARDS****MILITARY**

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

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

MIL-STD-276 — Impregnation of Porous Nonferrous Metal Castings.

(Copies of specifications, standards, drawings and publications 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 documents form a part of this specification. Unless otherwise indicated the issue in effect on date of invitation for bids shall apply.

**INTERSTATE COMMERCE COMMISSION  
REGULATIONS**

Regulations for Transportation of Explosives and Other Dangerous Articles, etc.

(The Interstate Commerce Commission Regulations form a part of the Code of Federal Regulations, available from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.)

FSC 6850

**MIL-I-17563A****CONSOLIDATED CLASSIFICATION COMMITTEE****Consolidated Freight Classification Rules.**

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

**AMERICAN TRUCKING ASSOCIATION, INC.****Motor Freight Classification Rules.**

(Application for copies should be addressed to the Issuing Officer, American Trucking Association, Inc., 1424 16th St. N. W., Washington 6, D. C.)

**3. REQUIREMENTS**

**3.1 Qualification.** The impregnants furnished under this specification shall be a product which has been tested and has passed the qualification tests specified in section 4. (See 6.3.)

**3.2 Materials.** All materials used in the impregnants shall be suitable for purpose intended.

**3.3 Process.** The impregnation process shall be performed in accordance with Standard MIL-STD-276.

**3.4 Curing characteristics.** The impregnant shall show normal curing characteristics in contact with porous bronze disks as specified in 3.5.1.

**3.5 Leakage.** Porous bronze disks impregnated a maximum of two times in accordance with Standard MIL-STD-276 shall not show leakage at rates faster than shown in table I when subjected to a hydrostatic (water) pressure of 50 p.s.i. (see 6.4).

TABLE I. Allowable leakage.

Grade of disks	Diameter of pores	Allowable leakage
		MI/min.
2	Inch 0.001 - 0.002	25
3	.0005 - .001	4
4	.0001 - .0005	2

**3.5.1 Disks.** The porous bronze disks shall be composed of spherical particles compacted and sintered together by a standard powder metallurgy technique (see 6.5).

**3.6 Permanency.**

**3.6.1 Water, oil, and gasoline.** Impregnated grade 3 disks shall not leak at a rate faster than 16 ml/min. when tested as specified in 4.5.3.1.

**3.6.2 High temperature.** Impregnated grade 8 disks, shall not leak at a rate faster than 16 ml/min. when tested as specified in 4.5.3.2.

**3.7 Storage life.** When procurement of the impregnant for Naval General Stores is involved, the impregnant shall have uniform consistency and shall not liver, thicken, curdle, gel, nor show any other objectionable properties after long periods of storage.

**3.8 Workmanship.** All details of workmanship shall be in accordance with high-grade manufacturing practice.

**4. QUALITY ASSURANCE PROVISIONS**

**4.1 Qualification tests at a Government laboratory.** Qualification tests shall be conducted at a laboratory designated by the Bureau of Ships. These tests shall consist of the tests specified in 4.5.

**4.2 Sampling for lot acceptance.**

**4.2.1 Inspection lot.** For purposes of sampling, a lot shall consist of all impregnant of the same class, manufactured as one batch, and offered for delivery at one time.

**4.2.2 Sampling for inspection of filled containers.** A random sample of filled containers shall be selected from each lot by the Government inspector in accordance with Standard MIL-STD-105 at inspection level I, and acceptable quality level (A.Q.L.) = 2.5 percent defective to verify compliance with all stipulations of this specification regarding

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fill, closure, marking, and other requirements not involving tests.

**4.2.3 Sampling for tests.** From each inspection lot, the Government inspector shall select two containers at random. From each of the two containers, one quart specimens shall be taken and placed in separate clean, dry metal or glass containers, sealed, marked, and forwarded to the testing laboratory designated by the bureau or agency concerned.

### 4.3 Inspection and tests.

**4.3.1 Inspection of filled containers.** Each sample filled container selected in accordance with 4.2.2 shall be examined by the Government inspector for defects of the container and the closure, for evidence of leakage, and for unsatisfactory markings; each sample filled container shall also be weighed to determine the amount of the 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 Standard MIL-STD-105, the lot represented by the sample shall be rejected. Rejected lots may be resubmitted for acceptance tests provided that the contractor has removed or repaired all nonconforming containers.

**4.3.2 Lot acceptance tests.** The test sample of the impregnants selected in accordance with 4.2.3 shall be inspected and tested by the Government inspector to determine that the impregnants are identical to that previously subjected to the qualification tests. The Government inspector shall require a requalification test if a lot of material does not appear identical with previous lots as judged by color, consistency, or any other noticeable characteristic.

**4.4 Rejection.** If specimens fail one or more of the tests specified in 4.3.2 the lot shall be rejected. Rejected lots may be resubmitted for acceptance tests provided the contractor

has removed or reworked all of the nonconforming product.

### 4.5 Test procedure.

**4.5.1 Test specimens.** Test specimens shall consist of disks  $1\frac{1}{2}$  inches in diameter and  $\frac{3}{16}$ -inch thick of the material specified in 3.5.1. The number of disks required shall be as shown in table II.

TABLE II. Number of disks required.

Grade of disk	Number of disks	Test to be performed
2	1	Leakage
3	5	Leakage Water permanency Oil permanency Gasoline permanency Temperature stability
4	1	Leakage

**4.5.2 Disks shall be impregnated in accordance with Standard MIL-STD-276.** The external surfaces of the impregnated disks shall be machined clean of excess impregnating compound before testing.

**4.5.2.1 Disks shall be pressure tested after the first impregnation, and, if they withstand the test shall be given the permanency test; disks which fail this test shall be re-impregnated and again pressure tested.**

**4.5.3 Permanency test.** Each permanency test shall be performed on a separate impregnated grade 3 disk; the actual test diameter of the disks shall be  $\frac{1}{2}$  inch mounted and tested as shown on figure 1 (see 6.6).

**4.5.3.1 The disks shall be tested for leakage after conditioning in boiling water, SAE 10 oil at 210°F., and 40 percent aromatic gasoline for a period of 14 days.**

**4.5.3.2 The disks shall be tested after exposure to air at 300°F. for class 1 or at 500°F. for class 2 for a period of 10 days.**

**MIL-I-17563A****5. PREPARATION FOR DELIVERY**

**5.1 Application.** With the exception of 5.2, which is applicable to all procurement under this specification, the packaging, packing, and marking requirements specified in this section apply only to direct purchases by or direct shipments to the Government.

**5.2 Packaging, packing, and marking requirements for impregnants containing explosives, inflammable, or other dangerous materials.** Impregnants containing components which are explosive, inflammable, or otherwise dangerous shall be packaged, packed, and marked in accordance with Interstate Commerce Commission Regulations governing the respective type of material.

**5.3 Packaging, packing, and marking requirements for impregnants containing no explosive, inflammable, or other dangerous materials.** Impregnants containing components which are not explosive, inflammable, or otherwise dangerous shall be packaged, packed, and marked as follows:

**5.3.1 Packaging.** Unless otherwise specified in the contract or order, the impregnant shall be packaged in rectangular screw top or multiple friction top cans, steel pails, or metal drums, whether furnished in a liquid, jelly, or powdered form. When components of the impregnant are packaged separately, the containers for equivalent amounts of the components shall be included in the same shipment, the quantities of the components so packaged, when mixed according to the manufacturer's instructions, shall produce the specified quantity of impregnant. The capacity and style of the containers shall be as specified by the procuring agency. The containers shall be in accordance with the following requirements, as applicable:

**5.3.1.1 Liquid materials.** Liquid materials shall be packaged in rectangular cans with a screw cap closure not exceeding 1 gallon capacity conforming to type I of Specification MIL-C-124; closed top style 5-gallon

steel drum conforming to type V of Specification MIL-C-124, with screw cap closure; or in 6- to 55-gallon metal drums, with closed top style and double seamed-in head conforming to Specification 17E of the Interstate Commerce Commission Regulations.

**5.3.1.2 Powdered and jelly-type materials.** Powdered or jelly-type materials shall be packaged in round containers with a multiple friction top closure not exceeding 1 gallon capacity conforming to type IV of Specification MIL-C-124; 5-gallon round open top style containers with 16 lug closures, conforming to type VI, of Specification MIL-C-124, or in 6- to 55-gallon open top style metal drums with bolted ring seal closures and with side seams welded, conforming to Specification 87D, of the Interstate Commerce Commission Regulations.

**5.4 Packing.**

**5.4.1 Levels A and B.** The cans shall be packed in accordance with the appendix of Specification MIL-C-124. Drums will require no overpacking.

**5.4.2 Level C.** The subject material shall be packed to insure acceptance by common or other carrier for safe transportation, at the lowest rate, to the point of delivery. The shipping container shall conform to the Consolidated Freight Classification Rules or Motor Freight Classification Rules which ever may be applicable. The use of corrugated or solid fiberboard having a minimum Mullen test of less than 275 pounds is prohibited.

**5.5 Marking.** In addition to any special marking required by the contract or order, unit containers and exterior shipping containers shall be marked in accordance with Standard MIL-STD-129, and in addition, shall include the date of manufacture, thinning instructions for use, and special storage instructions as necessary.

**6. NOTES**

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6.1 Intended use. The impregnating material covered by this specification is intended for use on copper alloy castings designed to withstand pressure, but which, because of faulty casting techniques or other reasons, are found to be porous. Impregnating materials are not to be used to effect acceptance of an unacceptable casting.

6.1.1 Limitations on usage of impregnants and the procedure for impregnating copper alloy castings should be as specified in Standard MIL-STD-276.

6.2 Ordering data. Procurement documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Quantity of impregnants required.
- (c) The capacity of the container and level of packing required (see section 5).

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 Qualified Products List QPL 17563, whether or not such products have actually been so listed by that date.

6.3.1 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. Information pertaining to qualification of products covered by this specification may be obtained from the Chief of the Bureau of Ships, Department of the Navy, Washington 25, D. C.

6.4 The hydrostatic test leakage rate can be measured by collecting the water in a graduated cylinder.

6.5 The disks are manufactured by a method which eliminates the unpredictable pore shapes and sizes associated with many powder metal products. This method is as follows: (1) forming round copper particles by atomization, (2) grading in various sizes as a means of controlling pore size in the finished product, (3) coating the copper particles with tin, and (4) binding the particles by sintering above the melting point of the tin. The last step also results in an alloying of the tin and copper by diffusion, so that the final product is a bronze.

6.6 The allowable leakage rates shown in table I are higher than those normally expected to be found in actual castings. This is because the disks are so porous that good impregnating compounds must be used to obtain even the tabulated values of leakage. Compounds which pass the leakage rate tests should provide complete sealing of actual castings.

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 Government 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.

Custodians:

Army—Ordnance Corps  
Navy—Bureau of Ships

Other interest:

Army—E  
Navy—A

Preparing activity:

Navy—Bureau of Ships

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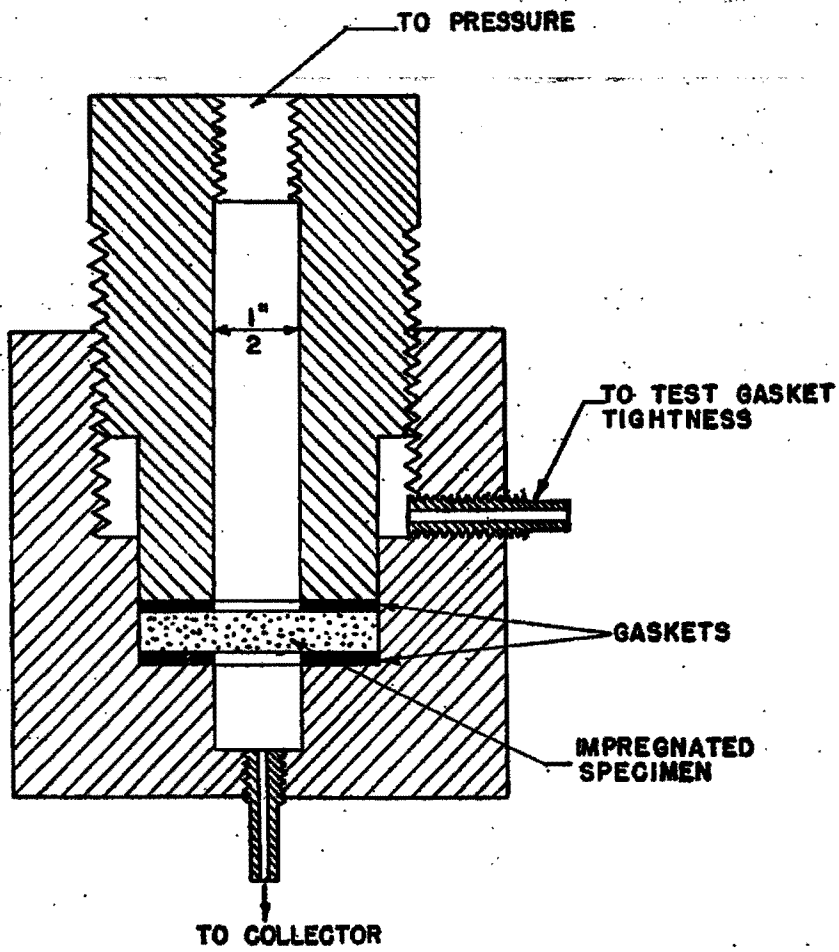


FIGURE 1. Pressure testing apparatus, full size.