

QQ-C-521d

August 2, 1962

SUPERSEDING

Int. Fed. Spec. QQ-C-00521c (Navy-Ships)

February 17, 1961 and

Fed. Spec. QQ-C-521b

August 2, 1945

FEDERAL SPECIFICATION

COPPER INGOT

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

1. SCOPE

1.1 This specification covers copper ingots for remelting.

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 to the extent specified herein:

Federal Specifications:

PPP-B-601 — Boxes, Wood, Cleated-Plywood.

PPP-B-621 — Boxes, Wood, Nailed and Lock-Corner.

Federal Standards:

Fed. Std. 102 — Preservation, Packaging and Packing Levels.

Fed. Std. 123 — Marking for Domestic Shipment (Civilian agencies).

Fed. Test Method Std. No. 151 — Metals; Test Methods.

(Activities outside the Federal Government may obtain copies of Federal Specifications, Standards, and Handbooks as outlined under General Information in the Index of Federal Specifications, Standards, and Handbooks 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, Washington D. C., Atlanta, Chicago, Kansas City, Mo., Dallas, Denver, San Francisco, and Auburn, Wash.

(Federal Government activities may obtain copies of Federal Specifications, Standards, and Handbooks and the Index of Federal Specifications, Standards, and handbooks 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.

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

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issues in effect on date of invitation for bids shall apply.

FSC 9650

QQ-C-521d**Uniform Freight Classification Rules:**

(Application for copies should be addressed to the Official Classification Committee, 1 Park Avenue at 88rd Street, New York 16, New York.)

3. REQUIREMENTS

3.1 Material. The raw materials used shall be such as to produce ingots meeting the requirements of this specification.

3.2 Length. Unless otherwise specified (see 6.2), ingot copper shall be furnished in standard commercial-shaped ingots, between 9 and 12 inches in length.

3.3 Ingot copper shall be highest grade copper, the quality of which may be determined by one of the following three methods, as specified (See 6.2).

3.3.1 Electrolytic method. Ingot copper shall have a purity of at least 99.90 percent as determined by the electrolytic method, silver being counted as copper.

3.3.2 Electrical resistivity. Electrical resistivity shall not exceed 0.15694 international ohms per meter-gram at 20° Centigrade (C.) as determined in the annealed condition after the material has been hot-rolled and cold-drawn into wire.

3.3.3 Chemical analysis. Ingot copper shall conform to the chemical requirements shown in table I and acceptance shall be based upon complete chemical analysis.

3.4 Marking. Each ingot shall be either legibly and indelibly marked or stamped with the manufacturer's name or trademark.

4. SAMPLING, INSPECTION, AND TEST PROCEDURES

4.1 The supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own or any other inspection facilities and services acceptable to the Government. Inspection records of the examination and tests shall be kept complete and available to the Government as specified in the contract or order. 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 the prescribed requirements.

4.2 Lot. A lot shall consist of each 8,000 pounds or fraction thereof of ingots from the same heat or melt when taken from stock; or may consist of over 8,000 pounds of ingots from the same heat or melt when taken directly after pouring of the heat.

4.3 Sampling for acceptance inspection.

4.3.1 Sampling for chemical analysis. When specified (see 6.2), has following samples shall be selected for the chemical analysis specified in 4.4.2. For lots of 8,000 pounds or fraction thereof, one representative ingot shall be taken from each lot. For lots of over 8,000 pounds, samples for chemical analysis shall be selected from the beginning, the middle and the end of the heat. One representative sample shall be obtained at the beginning of the heat, one at approximately the halfway mark, and one at the end of the heat.

TABLE I. — Chemical composition¹

Copper,² minimum	Bismuth, maximum	Antimony, maximum	Arsenic, maximum	Sulphur, maximum	Iron, maximum	Lead, maximum
<i>Percent</i> 99.90	<i>Percent</i> 0.001	<i>Percent</i> 0.0025	<i>Percent</i> 0.0025	<i>Percent</i> 0.0035	<i>Percent</i> 0.004	<i>Percent</i> 0.005

¹The limits on impurities shall apply.

²Silver to be computed as copper.

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4.3.2 Sampling for electrical resistivity. When specified (see 6.2), representative ingots shall be taken from each lot for the test specified in 4.4.3.

4.3.3 Sampling for electrolytic analysis. When specified (see 6.2), a sample shall be selected from each lot for the electrolytic analysis specified in 4.4.4.

4.4 Acceptance inspection.

4.4.1 Examination. Each ingot shall be examined for dimensions and marking to determine conformance with this specification. Any ingot which fails to conform to this specification shall be rejected.

4.4.2 Chemical test. For the sample ingots selected in accordance with 4.3.1, two ½ inch holes shall be drilled from the top of ingot as cast to ¼ inch from the bottom of each ingot selected for test. No lubricant shall be used and drilling shall not be forced sufficiently to cause oxidation of the chips. The drilling from the first ½ inch shall be discarded, and not less than 5 ounces of the remaining drilling from each sample ingot shall be placed in separate packages for analysis. Drillings from all samples of approximately equal weight for each full lot and not less than 5 ounces from an order shall be thoroughly mixed and a portion taken therefrom for analysis unless a question of homogeneity of the metal arises, in which case separate analysis shall be made as may be deemed expedient.

4.4.3 Electrical resistivity. A portion of the ingot shall be rolled hot and drawn cold into wire of 0.080-inch diameter, approximately, which shall be annealed at approximately 500°C.

4.4.4 Electrolytic. Purity of copper ingots shall be determined by the electrolytic method in accordance with 3.3.1.

4.5 Rejection. If any specimen fails to conform to this specification, the entire lot shall be rejected, subject to the retest provisions

in accordance with Fed. Test Method Std. No. 151.

4.6 Examination of preparation for delivery. Preservation, packaging, packing and marking shall be examined to determine conformance with the requirements of Section 5 of this specification. Except as required by referenced specifications, inspection lots and sampling shall be in accordance with MIL-STD-105, inspection level L-5, and an Acceptable Quality Level (AQL) of 4.0 percent defective.

5. PREPARATION FOR DELIVERY

(For civil agencies use only, the definitions and applications of the levels of packing shall be in accordance with Fed. Std. No. 102.)

5.1 Preservation and packaging. Not required

5.2 Packing.

5.2.1 Level A. Unless otherwise specified (see 6.2) ingots shall be packed in containers conforming to overseas type of PPP-B-601 or class 2 of PPP-B-621 at the option of the contractor. Boxes shall be closed and strapped in accordance with the appendix to the applicable box specification. Boxes exceeding 250 pounds gross weight shall be modified by the addition of wood skids in accordance with PPP-B-621.

5.2.2 Level B. Ingots shall be furnished loose, or packed in containers as specified (see 6.2). Containers, when specified, shall conform to domestic type of PPP-B-601 or class 1 of PPP-B-621 at the option of the contractor. Box closure shall be as specified in the appendix to the applicable box specification. Boxes exceeding 250 pounds gross weight shall be modified by the addition of wood skids in accordance with PPP-B-621.

5.2.3 Level C. Ingots shall be packed in a manner which will insure acceptance by common carrier and safe delivery at the

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first receiving activity for immediate use. Shipping containers shall conform to the Uniform Freight Classification Rules and Regulations or other carrier regulations as applicable to the mode of transportation.

5.3 Marking.

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

5.3.2 Civil agencies. Shipment markings shall be in accordance with Fed. Std. No. 123.

6. NOTES

6.1 Intended use. These ingots are intended for use in making copper base alloy castings, rolling slab brass for cold working or electrical equipment, or for special cases.

6.2 Ordering data. Procurement documents should specify the following:

- (a) Title, number and date of this specification.
- (b) Length of ingot required, if other than specified (see 3.2).
- (c) Quality of copper ingot determined

by electrolytic method, electrical resistivity or chemical analysis (see 3.3, 4.3.3.1, 4.3.2, and 4.3.3).

(d) Level of packing (see 5.2).

6.3 The physical property requirements described in this specification are similar to that described in ASTM B5-43.

6.4 Transportation description. Transportation description and weight applicable to this commodity are:

Rail:

Ingots, copper.

Carload minimum weight 40,000 pounds

Motor:

Ingots, copper.

Truckload minimum weight 40,000 pounds, subject to Rule 84, National Motor Freight Classification.

MILITARY CUSTODIANS:

Army—E

Navy—Sh

Air Force