QQ-C-525b
APRIL 11, 1962

SUPERSEDING
Int. Fed. Spec. QQ-C-00525a (NAVY-Ships)
August 5, 1960 and
Fed. Spec. QQ-C-525
June 29, 1955

FEDERAL SPECIFICATION

COPPER ALLOY INGOTS (LEADED AND NONLEADED TIN BRONZE, RED BRASS, AND SEMI-RED BRASS)

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 copper-alloy ingots for remelting except aluminum bronze, manganese bronze, manganese-aluminum bronze, and copper-silicon alloy. (See page 6.5 and 6.6.)

1.2 **Classification.**

1.2.1 *Compositions.* The ingots shall be of the following compositions, as specified (see 6.2):

Composition 1	Composition 8
Composition 2	Composition 9
Composition 3	Composition 10
Composition 5	Composition 11
Composition 6	Composition 12
Composition 6X	Composition 13
Composition 7	

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. 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 Specifications:

MIL-C-132—Crate, Wood, Open; Maximum Capacity 2,500 Pounds.

Military Standards:

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

MIL-STD-147—Palletized Unit Loads (40" x 48" 4-Way Partial and 4-Way Pallets).

FSC 9650

TABLE I. *Chemical composition*

Composition No.	Copper	Tin	Lead	Zinc	Nickel (maximum)	Iron (maximum)	Phosphorous (maximum)	Antimony (maximum)	Sulphur (maximum)	Silicon (maximum)	Aluminum	Total other elements (maximum)
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
1	86.0–89.0	5.8– 6.5	1.0– 1.8	3.5– 5.0	[1]0.8	0.20	0.03	0.20	0.05	0.005	([2])	....
[3]2	84.0–86.0	4.3– 6.0	4.0– 5.7	4.5– 6.0	.8	.25	.03	.25	.08	.005	([2])	....
3	78.0–82.0	4.3– 6.0	2.0– 2.8	12.0–16.0	.8	.35	.03	.25	.05	.005	([2])	....
5	86.0–89.0	7.8– 9.0	[4]0.25	3.5– 5.0	[1].8	.20	.03	.25	.05	.005	([2])	....
6 and 6X	85.0–89.0	7.8– 9.0	[4].90	3.0– 5.0	[1].8	.20	.03	.25	.05	.005	([2])	....
7	74.0–79.0	5.3– 7.0	15.3–19.0	[4]1.3	.8	.20	.03	.7	.03	.005	([2])	....
8	83.0–85.0	7.3– 8.7	7.3– 8.7	[4]0.8	1.0	.15	.03	.35	.08	.005	([2])	....
9	84.0–86.0	13.3–15.0	[4]0.15	[4]1.5	.8	.10	.03	.15	.05	.005	([2])	....
10	80.0–82.0	18.3–20.0	[4].40	[4].25	.8	.10	([5])	.15	.05	.005	([2])	....
[3]11	79.0–82.0	2.5– 3.5	6.3– 7.7	7.0–10.0	.8	.35	.02	.25	.08	.005	([2])	....
[3]12	82.0–84.0	6.5– 7.5	6.5– 7.7	2.5– 4.0	.8	.20	.03	.30	.08	.005	([2])	....
13	69.0–72.0	13.0–14.0	14.0–16.0	[4]0.50	([6])	.25	.05	.50	.08	...	([2])	0.35

[1] A nickel content up to 0.80 with a tolerance of plus or minus 0.20 shall be furnished (see 6.2).
[2] 0.005 percent maximum aluminum as determined on a 10-gram sample.
[3] In determining compliance with the minimum copper requirement for compositions 2, 11, and 12 ingots, copper may be computed as copper plus nickel.
[4] Maximum.
[5] 0.40 to 0.60 percent.
[6] 0.50 to 1.0 percent.

(Copies of Military Specifications and Standards 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 document forms a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids shall apply.

Uniform Freight Classification Rules.

(Application for copies should be addressed to the Official Classification Committee, 1 Park Avenue at 33rd Street, New York 16, N.Y.)

3. REQUIREMENTS

3.1 Chemical composition.

3.1.1 Ingots shall conform to the chemical composition shown in table I.

3.2 Mechanical properties. Ingots, when remelted and cast in sand, shall conform to the properties shown in table II.

TABLE II. *Mechanical properties*

Composition No.	Tensile strength (minimum)	Elongation in 2 inches (minimum)	Brinell hardness No. (minimum)
	P.s.i.	*Percent*	
1	36,000	30	...
2	32,000	22	...
[1]3	28,000	15	...
4	.....	..	...
5	40,000	20	...
6	36,000	18	...
[2]6X	30,000	12	...
7	.....	..	...
8	25,000	8	...
9	30,000	1	...
10	[3]45,000	..	160
11	29,000	18	...
12	30,000	12	...
13	.....	..	50

[1] Mechanical properties need not be determined unless otherwise specified in the contract or order.

[2] Mechanical properties shall be determined only when required.

[3] Not required, but may be obtained in sound cast test specimens.

3.3 Weights. Unless otherwise specified (see 6.2), ingots shall be furnished in commercial weights.

3.4 Marking for identification. The manufacturer's name or brand and the composition shall be cast or stamped on each ingot. Each ingot shall bear its proper heat or melt number either stamped on or cast in, so that its identity will be clear at the point of delivery.

3.5 Workmanship. Ingots shall be of uniform quality, clean and free from excessive dirt, dross, slag inclusions, surface exudations, burned or gassed metal and shall not exhibit a "puffed" condition.

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.

4.2 Sampling.

4.2.1 *Lot.* For purposes of sampling, a lot shall consist of not more than 100,000 pounds of ingots from a single melt or not more than 2,000 pounds of ingots poured from a continuous melting furnace (see 6.3).

4.2.2 *Sampling for examination.* For the purpose of examination specified in 4.3, representative sample ingots shall be selected from each lot as shown in table III.

4.2.3 *Sampling for tests.* At least four ingots shall be selected from each lot for tests.

4.2.3.1 *Chemical analysis.* Samples from two of the ingots selected in accordance with 4.2.3 shall be obtained in accordance with method 111 or 112 of Fed. Test Method Std. No. 151. Drillings shall include metal at both surfaces. Drillings shall not be mixed, except

TABLE III. *Sampling for examination*

Number of ingots in lot	Number of ingots in sample
Under 12	All
12 to 100	11
Over 100	12

that drillings taken from one ingot may be thoroughly mixed to make one sample. Each sample shall consist of not less than two ounces.

4.2.3.2 *Tension tests.*

4.2.3.2.1 After the samples for chemical analysis have been taken, at least two test coupons shall be cast in sand from the ingots selected in accordance with 4.2.3. Such action as necessary shall be taken to identify the castings and test bars with the heat or lot number assigned and each test bar shall be stamped for future identification with the proper heat or lot number and suitable identification stamp.

4.2.3.2.2 Unless otherwise specified in the contract or order, the chilling of test coupons shall be cause for rejection of the material represented.

4.2.3.2.3 The test coupon shall conform to the form and dimensions shown on figure 1 or the double horizontal full web test bar of method 211 of Fed. Test Method Std. No. 151. Other test bar designs may be used if approved by the bureau or activity concerned.

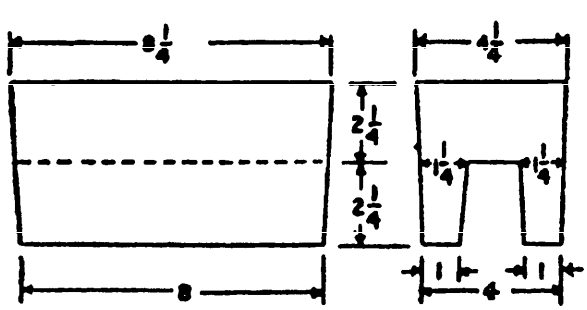

FIGURE 1. Test coupon.

The specimen machined therefrom shall conform to the form and dimensions shown in method 211 of Fed. Test Method Std. No. 151.

4.3 **Examination.** Each ingot selected in accordance with 4.2.2 shall be examined to determine conformance with this specification. If one or more sample ingots fail to conform to this specification, the entire lot shall be rejected.

4.4 **Test procedures.**

4.4.1 *Chemical analysis.* Unless otherwise specified in the contract or order, each of the samples obtained in accordance with 4.2.3.1 shall be analyzed in accordance with method 111 or 112 of Fed. Test Method Std. No. 151 to determine conformance with 3.1.1.

4.4.2 *Tension tests.* One of the test specimens obtained in accordance with 4.2.3.2 shall be pulled in tension in accordance with method 211 of Fed. Test Method Std. No. 151 to determine conformance with 3.2. If the specimen fails to conform to this specification, except as provided in 4.4.2.1 the lot shall be rejected.

4.4.2.1 If any test specimen contains flaws which result in the failure of the specimen, an additional specimen from the same melt may be selected to replace it at the discretion of the inspector. The nature of the flaw or defect in the discarded specimen, when deemed characteristic of the material under inspection shall be taken into consideration when determining the acceptability of the material.

4.4.3 *Retests.* If any specimen fails to conform to the requirements of this specification, the entire lot shall be rejected subject to the retest provisions of Fed. Test Method Std. No. 151.

5. PREPARATION FOR DELIVERY

5.1 **Packing.**

5.1.1 *Level A.* Ingots shall be packed in Wood-cleated plywood or nailed-wood boxes or unsheathed crates conforming to PPP-B-601 (overseas type), PPP-B-621 (class 2) or MIL-C-132, respectively. Shipping containers shall be closed and strapped in ac-

cordance with the appendix of the applicable specification. The gross weight of wood boxes shall not exceed 500 pounds and unsheathed crates shall not exceed 1000 pounds. Boxes exceeding 250 pounds shall be modified by the addition of skids in accordance with PPP-B-621.

5.1.2 *Level B.* Ingots shall be packed in wood-cleated plywood or nailed wood boxes or unsheathed crates conforming to Specification PPP-B-601 (domestic type), PPP-B-621 (class 1) or MIL-C-132, respectively. Shipping containers shall be closed and strapped in accordance with the appendix of the applicable specification. The gross weight of wood boxes shall not exceed 500 pounds and unsheathed crates shall not exceed 1000 pounds. Boxes exceeding 250 pounds shall be modified by the addition of skids in accordance with PPP-B-621. When specified (see 6.2), ingots shall be palletized in accordance with MIL-STD-147.

5.1.3 *Level C.* Ingots shall be packed in containers which will insure acceptance by common carrier and safe delivery at destination. Shipping containers shall comply with the Uniform Freight Classification Rules or other regulations as applicable to the mode of transportation.

5.2 Marking. In addition to any special marking required by the contract or order or herein, shipping containers shall be marked in accordance with MIL-STD-129.

6. NOTES

6.1 **Intended use.** Copper alloy ingots are used for remelting and recasting into specified shapes.

6.2 **Ordering data.** Procurement documents should specify the following:

(*a*) Title, number, and date of this specification.

(*b*) Composition required (see 1.2).

(*c*) When other than 0.80 percent maximum nickel for composition 1, 5, 6, or 6X is required (see table I).

(*d*) Weights of the ingots, if not to be furnished in commercial weights (see 3.3).

(*e*) Applicable level of packing required (see 5.1).

(*f*) Whether ingots shall be palletized (see 5.1.2).

6.3 **Quality control.** The requirements specified in 4.2.1 for a lot to consist of a single melt may be modified upon application by the contractor or prospective contractor to the procuring activity, giving detailed information that the contractor or prospective contractor has demonstrated his ability to produce ingots of uniform quality in accordance with this specification.

6.4 Federal Specifications do not include all types, classes, grades, and sizes, of the commodities indicated by the titles of the specifications, or which are commercially available, but are intended to cover the types, classes, grades, and sizes which are suitable for Federal Government requirements.

6.5 Ingots covered by this specification are equivalent to the following casting compositions and ASTM B-30 alloy numbers:

QQ-C-525	QQ-L-225		ASTM B-30 alloy No.
Composition 1	Composition 1	MIL-B-16541	2A
Composition 2	Composition 2	MIL-B-16444	4A
Composition 3	Composition 3	MIL-B-16542	
Composition 11	Composition 4		5A
Composition 5	Composition 5	MIL-B-16576	1B
Composition 6	Composition 6	MIL-B-16540 (grades A and B)	2B
Composition 7	Composition 7		
Composition 8	Composition 8	MIL-B-16261 (grade II)	

QQ-C-525	QQ-L-225		ASTM B-30 alloy No.
Composition 9	Composition 9	MIL-B-16261 (grade III)	
Composition 10	Composition 10		
Composition 11	Composition 11		
Composition 12	Composition 12	MIL-B-16261 (grade VI)	3B
Composition 13		MIL-B-16261 (grade VII)	

Note. Composition 4 (QQ-C-525) has been deleted. Composition 11 (QQ-C-525) may be substituted as the two compositions are practically identical.

6.6 Copper alloy ingots not covered by this specification are covered by the following specifications (see 1.1):

	Specification
Aluminum bronze	QQ-B-675
Manganese and Manganese-aluminum bronze	QQ-C-523
Copper-silicon alloy	MIL-C-20152

6.7 **Transportation description.** Transportation descriptions and minimum weights applicable to this commodity are:

Rail:

Ingots, brass, bronze or copper. Carload minimum weight 40,000 pounds.

Motor:

Ingots, brass, bronze or copper. Truckload minimum weight (W) 40.6 pounds, (W) subject to Rule 34, National Motor Freight Classification.

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.

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Copies of this specification may be purchased for 5 cents each.

SPECIFICATION ANALYSIS SHEET

Form Approved
Budget Bureau No. 119-R004

INSTRUCTIONS

This sheet is to be filled out by personnel either Government or contractor, involved in the use of the specification in procurement of products for ultimate use by the Department of Defense. This sheet is provided for obtaining information on the use of this specification which will insure that suitable products can be procured with a minimum amount of delay and at the least cost. Comments and the return of this form will be appreciated. Fold on lines on reverse side, staple in corner, and send to preparing activity *(as indicated on reverse hereof)*.

SPECIFICATION

ORGANIZATION *(Of submitter)* | CITY AND STATE

CONTRACT NO. | QUANTITY OF ITEMS PROCURED | DOLLAR AMOUNT $

MATERIAL PROCURED UNDER A

☐ DIRECT GOVERNMENT CONTRACT ☐ SUBCONTRACT

1. HAS ANY PART OF THE SPECIFICATION CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE?

A. GIVE PARAGRAPH NUMBER AND WORDING.

B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES.

2. COMMENTS ON ANY SPECIFICATION REQUIREMENT CONSIDERED TOO RIGID

3. IS THE SPECIFICATION RESTRICTIVE?

☐ YES ☐ NO IF "YES", IN WHAT WAY?

4. REMARKS *(Attach any pertinent data which may be of use in improving this specification. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity)*

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