

FEDERAL SPECIFICATION

BRASS, LEADED AND NONLEADED: ROD, SHAPES,  
FORGINGS, AND FLAT PRODUCTS WITH  
FINISHED EDGES (BAR AND STRIP)

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

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers alloys (composition) of brass rod, shapes, forgings, and flat products with finished edges (bar and strip) used for general fabricating purposes (see 6.1) but does not include strip or bar furnished with slit, sheared, sawed, or machined edges (see 6.6).

1.2 Classification

1.2.1 Alloys (composition), forms, and tempers. The material covered by this specification shall be furnished in the following alloys (composition) forms, and tempers, as specified (see 6.2):

Alloys (composition):

Copper alloy numbers

230

240

260

268

342

353

360

377

Composition 11

FSC 9530, 9535, 9540, FORG

QQ-B-626D

Forms:

Rod  
Shapes  
Forgings  
Flat products with finished edges (bar and strip)

Temper:

Bar and rod:  
As-extruded  
Soft  
Half-hard  
Hard (copper alloy numbers 260, 268, and 360 only)

Strip:  
Annealed  
Quarter-hard  
Half-hard  
Hard  
Extra-hard  
Spring  
Extra-spring

Forgings:  
As-forged

Shapes:  
As-extruded  
Soft  
Drawn

Alloy number 260 may be furnished in lieu of alloy number 268 at the option of the supplier. When temper is not specified, rod and flat products shall be furnished in the half-hard temper.

2. APPLICABLE DOCUMENTS

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

Federal Standards:

Fed. Std. No. 123 - Marking for Domestic Shipment (Civil Agencies).  
Fed. Std. No. 146 - Tolerances for Copper and Copper-Base Alloy Mill Products.  
Fed. Test Method Std. No. 151 - Metals; Test Methods.  
Fed. Std. No. 185 - Identification Marking of Copper and Copper Base Alloy Mill Products.

(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 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, DC 20402.

(Single copies of this specification and other Federal Specifications required by activities outside the Federal Government for bidding purposes are available without charge from Business Service Centers at the General Services Administration Regional Offices in Boston, New York, Washington, DC, Atlanta, Chicago, Kansas City, MO, Fort Worth, Denver, San Francisco, Los Angeles, and Seattle, WA.

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

Military Specification:

MIL-C-3993 - Copper and Copper Base Alloy Mill Products, Packaging of.

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 and Standards required by suppliers 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 a specific issue is identified, the issue in effect on date of invitation for bids or request for proposal shall apply.

American Society for Testing and Materials (ASTM) Standards:

B 154 - Mercurous Nitrate Test for Copper and Copper Alloys.

E 8 - Tension Testing of Metallic Materials.

E 18 - Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials.

E 112 - Estimating the Average Grain Size of Metals.

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.)

(Technical society and technical association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

3. REQUIREMENTS

3.1 Manufacture. Material covered by this specification shall be manufactured by such hot or cold working followed by such annealing as may be required to meet the requirements of this specification. When specified (see 6.2), soft material shall be finish annealed.

3.2 Unless otherwise specified (see 6.2), material shall be furnished in straight lengths.

3.3 Chemical composition. The material shall conform to the chemical requirements specified in table I.

TABLE I. Chemical composition, percent<sup>1/</sup>

Copper alloy No. or composition	Copper	Lead	Iron	Total other elements	Zinc
230	84.0 to 86.0	0.05	0.05	0.15	Rem.
240	78.5 to 81.5	.05	.05	.15	Rem.
260	68.5 to 71.5 <sup>2/</sup>	.07	.05	.15	Rem.
268	64.0 to 68.5	.15	.05	.15	Rem.
342	62.5 to 66.5	1.5 to 2.5	.10	.50	Rem.
353	59.0 to 64.5	1.3 to 2.3	.10	.50	Rem.
360	60.0 to 63.0	2.5 to 3.7	.35	.50	Rem.
377	58.0 to 62.0	1.5 to 2.5	.30	.50	Rem.
11 <sup>3/</sup> 4 <sup>4/</sup>	58.5 to 71.5	3.7 <sup>2/</sup>	.50	.50	Rem.

<sup>1/</sup>Maximum, unless shown as a range.

<sup>2/</sup>If the presence of bismuth is suspected during analysis, further analysis shall be made and if bismuth is found in excess of 0.006 percent, the lot shall be rejected.

<sup>3/</sup>The following copper alloy numbers are applicable: 260, 262, 268, 270, 272, 274, 280, 330, 331, 332, 335, 340, 342, 344, 345, 347, 348, 350, 353, 356, 360, 370, 462, 464, 465, 466, 467, 482, 485.

<sup>4/</sup>Nickel - 1.0 percent maximum; tin - 1.5 percent maximum.

<sup>2/</sup>When specified (see 6.2), lead - 0.50 percent minimum.

3.3.1 Analysis shall be made regularly only for the elements specifically mentioned in table I. If, however, the presence of other elements is suspected or indicated in the course of routine analysis, further analysis shall be made to determine that the total of other elements is not in excess of the limits specified.

3.4 Mechanical properties.

3.4.1 Tensile properties.

3.4.1.1 Shapes and forgings. Shapes and forgings shall meet the tensile properties as specified (see 6.2).

3.4.1.2 Rod and finished edge bar. Rod and finished edge bar of copper alloy numbers 260, 268, and 360 shall conform to the tensile properties specified in tables II and III. Unless otherwise specified (see 6.2), there shall be no tensile requirements for copper alloy number 377 and composition 11.

TABLE II. Tensile properties, rod, copper, alloy numbers 260, 268, and 360

Copper Alloy Number	Temper	Specified diameter, thickness, or distance between parallel faces, inches	Tensile strength, minimum, k.s.i.	Yield strength, minimum, k.s.i.	Elongation in 4 x diam. or thickness, minimum, percent
260, 268	Soft	All sizes	42	---	30
	Half-hard	Up to 1/2, incl.	57	---	15
		Over 1/2 to 1, incl.	55	---	20
		Over 1 to 2, incl.	50	---	25
		Over 2	45	---	30
260	Hard	Up to 1/4, incl.	80	---	8
		Over 1/4 to 1/2, incl.	70	---	10
268	Hard	Up to 1/4, incl.	80	---	10
		Over 1/4 to 1/2, incl.	70	---	12
360	Soft & as-extruded	Up to 1, incl.	48	20	15
		Over 1 to 2, incl.	44	18	20
		Over 2	40	15	25
	Half-hard	Up to 1/2, incl.	57	25	7 <sup>3/</sup>
		Over 1/2 to 1, incl.	55 <sup>4/</sup>	25	10
		Over 1 to 2, incl.	50	20	15
		Over 2 to 4, incl.	45	15	20
	Hard	Over 4	40	15	20
		1/8 to 3/16, incl.	80	45	---
		Over 3/16 to 1/2, incl.	70	35	4
		Over 1/2 to 3/4, incl.	65	30	6

<sup>1/</sup> Determined at 0.5 percent extension under load.

<sup>2/</sup> In any case, a minimum gage length of 1 inch shall be used.

<sup>3/</sup> For material furnished in coils, the elongation shall be 4 percent, min.

<sup>4/</sup> If specified for thread rolling applications, the minimum tensile strength shall be 52 k.s.i.

TABLE III. Tensile properties, finished edge bar, copper alloy numbers 260, 268, and 360

Temper	Specified thickness or distance between parallel faces, inches	Specified width, inches	Tensile strength, min., k.s.i.	Yield strength, min., k.s.i.	Elongation in 4 x thickness, min., <sup>2/</sup> percent
Soft & as-extruded	Up to 1, incl. Over 1	Up to 6, incl.	44	18	20
		Up to 6, incl.	40	15	25
Half-hard	Up to 1/2, incl.	Up to 1, incl.	50	25	10
		Over 1 to 6, incl.	45	17	15
	Over 1/2 to 2, incl.	Up to 2, incl.	45	17	20 <sup>3/</sup>
		Over 2 to 6, incl.	40	15	20
Over 2	Over 2 to 4, incl.	40	15	20	

<sup>1/</sup> Determined at 0.5 percent extension under load.

<sup>2/</sup> In any case, a minimum gage length of 1 inch shall be used.

<sup>3/</sup> For copper alloy number 360, 15 percent minimum elongation.

3.4.1.3 Finished edge strip. Finished edge strip of copper alloy numbers 230, 240, 260, 268, 342, and 353 shall conform to the tensile properties specified in table IV. Unless otherwise specified (see 6.2), there shall be no tensile requirements for composition 11.

TABLE IV. Tensile properties, finished edge strip

Copper alloy No.	Temper	Tensile strength, k.s.i.
230	Quarter-hard	44 to 54
	Half-hard	51 to 61
	Hard	63 to 72
240	Quarter-hard	48 to 58
	Half-hard	55 to 65
	Hard	68 to 77
260	Quarter-hard	49 to 59
	Half-hard	57 to 67
	Hard	71 to 81
	Extra-hard	83 to 92
	Spring	91 to 100
	Extra-spring	95 to 104
268	Quarter-hard	49 to 59
	Half-hard	55 to 65
	Hard	68 to 78
	Extra-hard	79 to 89
	Spring	86 to 95
	Extra-spring	90 to 99
342, 353	Quarter-hard	49 to 59
	Half-hard	55 to 65
	Hard	68 to 78
	Extra-hard	79 to 89

3.4.2 Hardness requirements.

3.4.2.1 Copper alloy numbers 260 and 268, annealed tempers. Finished edge strip of copper alloy numbers 260 and 268 over 0.020 inch in thickness in the annealed tempers indicated shall meet the hardness requirements specified in table V.

TABLE V. Hardness requirements for copper alloy numbers 260 and 268 finished edge strip.

Annealed temper, nominal grain size, mm.	Rockwell hardness	
	F	Superficial 30-T
0.120	50 to 62	21 max.
.070	52 to 67	3 to 27
.050	61 to 73	20 to 35
.035	65 to 76	25 to 38
.025	67 to 79	27 to 42
.015	72 to 85	33 to 50

3.4.2.2 Copper alloy number 360, rolled tempers. Copper alloy number 360 rod and finished edge bar shall meet the hardness requirements specified in tables VI and VII. The Rockwell hardness tests, as far as they are prescribed, shall be the basis for acceptance, unless agreement cannot be reached. In such cases, final acceptance or rejection shall be decided by the tensile requirements.

TABLE VI. Hardness requirements for copper alloy number 360 rod.<sup>1/</sup>

Temper	Diameter or distance between parallel surfaces, inches	Rockwell B hardness <sup>2/</sup>	
		Rounds	Hexagons and octagons
Soft	1/2 and over	10-45	10-45
Half-hard	1/2 to 1, incl. <sup>3/</sup>	60-80	55-80
	Over 1 to 2, incl.	55-75	45-70
	Over 2 to 3, incl.	45-70	40-65
	Over 3 to 4, incl.	40-65	35-60
	Over 4	25 min.	25 min.

<sup>1/</sup> Values have not been established for diameters or widths less than 1/2 inch.

<sup>2/</sup> As determined on the cross-section midway between surface and center.

<sup>3/</sup> If specified for thread rolling applications, the Rockwell B hardness shall be 55-75.

TABLE VII. Hardness requirements for copper alloy number 360 finished edge bar.<sup>1/</sup>

Temper	Thickness, inches	Width, inches	Rockwell B hardness <sup>2/</sup>
Soft	1/2 and over	1/2 and over	10 - 35
Half-hard	1/2 and under	Over 1/2 to 1, incl.	45 - 75
	1/2 and under	Over 1 to 6, incl.	35 - 70
	Over 1/2 to 2, incl.	1/2 to 2, incl.	40 - 70
	Over 1/2 to 2, incl.	Over 2 to 6, incl.	35 - 70
	Over 2	Over 2 to 4, incl.	35 - 70

<sup>1/</sup> Values have not been established for widths less than 1/2 inch.

<sup>2/</sup> As determined on the cross-section midway between surface and center.

3.4.2.3 Composition 11. Rod 1/4 inch and over and flat products with finished edges (bar and strip) over 0.030 inch in thickness shall meet the hardness requirements specified in table VIII.

TABLE VIII. Hardness requirements for composition 11

Form, temper, and size	Rockwell hardness
Rod round:	
All sizes, half-hard-----	B60 - B90
Finished edge bar and rod, hexagonal, rectangular, square, octagonal, etc., half-hard:	
Up to 1 inch, inclusive-----	B50 - B80
Over 1 inch-----	B40 - B70
Forgings-----	B40 - B80
Finished edge strip:	
Annealed-----	F50 - F87
Quarter-hard-----	B40 - B65
Half-hard-----	B57 - B77
Hard-----	B76 - B86
Extra-hard-----	B83 - B91
Spring-----	B87 - B93

3.5 Grain size requirements.

3.5.1 Soft temper. When specified (see 6.2), rod and finished edge bar of copper alloy numbers 260 and 268 in the soft temper shall conform to the grain-size requirements specified in table IX.

TABLE IX. Permissible variations in grain size for copper alloy numbers 260 and 268, soft temper

Ordered grain size, mm.	Permissible variation in average grain size, mm.	
	Minimum	Maximum
0.070 .025	0.035 ✓	0.150 .050

✓ Although no minimum grain size is required, this material shall be fully recrystallized.

3.5.2 Annealed temper. When specified (see 6.2), finished edge strip of copper alloy numbers 230, 240, 260, 268, 342, and 353 in the annealed temper shall conform to the requirements specified in table X.

TABLE X. Permissible variations in grain size for annealed brass

Copper alloy number	Ordered grain size, mm.	Permissible variation in average grain size, mm.	
		Minimum	Maximum
230	0.070	0.050	0.100
	.050	.035	.070
	.035	.025	.050
	.025	.015	.035
	.015	1/	.025
240	0.070	0.050	0.120
	.050	.035	.070
	.035	.025	.050
	.025	.015	.035
	.015	1/	.025
260, 268	0.120	0.070	0.150
	.070	.050	.120
	.050	.035	.070
	.035	.025	.050
	.025	.015	.035
342, 353	0.070	0.050	0.100
	.050	.035	.070
	.035	.025	.050
	.025	.015	.035

1/ Although no minimum grain size is required, this material must be fully recrystallized.

3.6 Internal stresses. When specified (see 6.2), the products in tempers other than soft, annealed, as-extruded, or as-forged shall withstand without cracking the mercurous-nitrate test (see 4.6.5).

3.7 Dimensional tolerances.

3.7.1 Forgings. All forgings shall conform to the size and shape, as specified (see 6.2). When dimensional tolerances are not included in the contract or order, open die forgings shall not vary from the specified dimensions by more than plus and minus 3/32 inch on smooth forgings, or plus and minus 1/32 inch on rough machined forgings.

3.7.2 Other forms. The following references of Fed. Std. No. 146 shall apply:

Form and dimension	Reference
1. Flat products with finished edges (bar, and strip):	
Thickness	2a(1)
Width	2a(2)
Length	2a(3)
Schedule of lengths	2a(4)
Straightness	2a(5)
Standard edge contours	2a(6)
2. Bar and rod, as-extruded:	
Diameter or thickness	5a(1)
Straightness and length	5a(2)
3. Rod, cold drawn:	
Diameter	11a(1) ✓
Length	11a(2)
Straightness	11a(4)
4. Rod, hot rolled:	
Diameter	13a(1)
Length and straightness	13a(2)
5. Shapes, drawn	15a
6. Shapes, soft and as-extruded	16

✓ When hexagons are ordered for the manufacture of nuts and bolts, tolerances shall be all minus double the specified values.

3.8 Identification marking. When specified (see 6.2), product identification marking shall be in accordance with Fed. Std. No. 185 (see 6.3).

3.9 Workmanship. Material shall be uniform in quality and temper, clean, sound, smooth, and free from foreign material, pipes, slivers, laps, cracks, seams, scale, burrs, buckles, damaged ends or edges, and other defects which, due to their nature, degree, or extent detrimentally affect the serviceability for the intended parts. Material shall be commercially straight or flat unless coils or rolls are specifically specified (see 6.2).

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 in the contract or order, the supplier may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by 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 that supplies and services conform to prescribed requirements.

4.2 Lot. Unless otherwise specified (see 6.2), a lot shall consist of material of the same alloy, form, temper, and size submitted for inspection at one time consisting of:

- a. 10,000 pounds or fraction thereof or
- b. the mixture of two or more furnace charges or crucible melts weighing not more than 70,000 pounds into a single ladle or holding furnace used to pour one or more ingots at the same time.

4.3 Sampling. Samples for the purpose of tests prescribed in this specification shall be selected in a manner as to correctly represent the material furnished and avoid needless destruction of finished material when samples representative of the material are available from other sources.

4.3.1 For chemical analysis. The number of samples specified in table XI shall be selected from different pieces in each lot. The selected pieces shall be used to prepare samples for analysis in accordance with method 111 or 112 of Fed. Test Method Std. No. 151.

TABLE XI. Samples for chemical analysis.

Pounds of material in lot	Number of samples <sup>1/</sup>
Up to 2500, incl.	1
2501 to 5000, incl.	2
5001 to 7500, incl.	3
7501 to 10,000, incl.	4
10,001 to 70,000 incl.	12 <sup>2/</sup>

<sup>1/</sup>If the number of original bars, billets, or cakes from which the material is processed is less than the number of samples, not more than one sample need be taken from each piece.

<sup>2/</sup>See 4.2b.

4.3.2 For tension test. Unless otherwise specified (see 6.2), two tension-test specimens shall be taken from each lot and each shall be selected from a different piece unless the lot consists of one piece in which case one test specimen shall be sufficient. If the lot is 2500 pounds or less, only one tension test specimen is required.

4.3.3 For hardness and grain size. Unless otherwise specified (see 6.2), at least four sample pieces shall be selected from each lot for the test specified in 4.5.3.3 and 4.5.3.4 unless the lot is represented by less than four pieces. Not more than one sample shall be taken from the same piece.

4.3.4 For mercurous-nitrate test. When mercurous-nitrate test is specified in the contract or order, one test specimen shall be selected from each lot.

4.3.5 For visual and dimensional examination.

4.3.5.1 Pieces weighing over 150 pounds. Each piece shall be examined.

4.3.5.2 Pieces weighing 150 pounds or less. From each lot of material with pieces weighing 150 pounds or less, a representative sample shall be selected in accordance with MIL-STD-105, inspection level II with an acceptable quality level (AQL) of 1.5 percent defective. The samples selected for dimensional examination may be the same as those selected for visual examination, but shall be evaluated separately.

4.3.5.3 When material is furnished in rolls or on reels or bucks, the sample for examination shall be taken from within 10 feet of the outer end. If the sample selected is rejected due to handling marks, an additional 20 feet shall be used for re-examination.

4.3.5.4 When material is, as straightened, from coils, rolls, reels or bucks the sample for examination shall be taken from within 10 feet of the starting end of each coil, roll, reel or buck. If the sample selected is rejected due to handling marks an additional 20 feet of each coil, roll, reel or buck shall be used for re-examination.

4.4 Examination.

4.4.1 Visual and dimensional. Pieces selected in accordance with 4.3.5 shall be visually examined to determine compliance with the requirements for identification marking (see 3.8) and workmanship (see 3.9) and shall be measured for compliance with the dimensional requirements (see 3.7).

4.4.1.1 Straightness. Straightness shall be determined by placing the piece or sample unit on a level surface so that the arc or departure from straightness is horizontal. The maximum depth of arc shall be measured to the nearest 1/32 inch by means of a straight edge and a steel scale.

4.4.2 Preparation for shipment. Examination of the packing and marking for shipment shall be made for conformance to the requirements of section 5.

#### 4.5 Test specimens.

##### 4.5.1 Tension tests.

4.5.1.1 Tension test specimens for rod and flat products shall be tested in full size when practicable, and the elongation measured in a gage length of four times the diameter of round specimens and of four times the minimum distance across flats of specimens other than round except the gage length shall be not less than 1 inch. When a machined specimen becomes necessary, enough metal may be removed from the gage section to meet the limitations of the testing machine, or the specimens may be machined to the form and dimensions in accordance with the standard round tension test specimen of ASTM E 8. When this specimen is used, the elongation shall be measured in a gage length of 2 inches.

4.5.1.1.1 For bar and rod 1-1/2 inches or less in diameter or minimum thickness, the axis of the test specimen shall coincide with the central axis of the piece. For bar and rod over 1-1/2 inches in diameter or minimum thickness, when a machined specimen is used, the axis shall be located midway between the center and the surface of the piece. The longitudinal axis of the tension specimen shall be parallel to the direction of rolling or drawing.

4.5.1.2 For finished edge strip, the test specimen may be machined to the form and dimensions of the standard rectangular tension test specimen of ASTM E 8. The longitudinal axis of the specimen shall be parallel to the direction of rolling, drawing, or extruding.

4.5.1.3 Tension test specimens for forgings and shapes shall be as specified (see 6.2).

4.5.2 Mercurous-nitrate test. Where practical, the test specimen shall be the full cross-section of the material and at least 6 inches in length. For large material, a specimen the full thickness of the material and at least 1 inch wide may be used. Sawed edges may be machined or filed, but no annealing, bending, springing, polishing, or other preparation of the test specimen shall be permitted.

##### 4.6 Test procedures.

4.6.1 Chemical analysis. The samples selected in accordance with 4.3.1 shall be analyzed by the wet chemical method in accordance with method 111 of Fed. Test Method Std. No. 151 or the spectrochemical method in accordance with method 112 of Fed. Test Method Std. No. 151 to determine conformance with 3.3. A single analysis of a composite sample may be made. In case of dispute, analysis by the wet method (method 111) shall be the basis for acceptance.

4.6.2 Tension tests. Specimens from samples selected in accordance with 4.3.2 shall be tested in accordance with ASTM E 8. The yield strength shall be determined by the extension under load method in accordance with ASTM E 8. The limiting extension shall be 0.005 inch per inch for all specified yield strength values.

4.6.3 Hardness tests. The hardness of specimens selected in accordance with 4.3.3 shall be determined in accordance with ASTM E 18. Readings shall be taken on an outside surface (not cross-section).

4.6.4 Grain size requirements. Grain size of specimens selected in accordance with 4.3.3 shall be determined in accordance with ASTM E 112.

4.6.5 Mercurous-nitrate tests. When required (see 3.6), specimens selected in accordance with 4.3.4 shall be tested in accordance with ASTM B 154.

#### 4.7 Rejection.

4.7.1 Examination defects. Any sample unit having one or more defects shall be rejected. If the number of nonconforming sample units in the sample exceeds the acceptance number specified in 4.3.5.2 for that sample size, the entire lot shall be rejected subject to the provisions of the section on "Acceptance and Rejection" of MIL-STD-105.

4.7.2 Test failures. A lot shall be rejected for failure to meet any of the test requirements when tested in accordance with 4.6, subject to the provisions of the section on "Rejection and Retests" of Fed. Test Method Std. No. 151.

### 5. PREPARATION FOR DELIVERY

#### 5.1 Packing (see 6.2).

5.1.1 Levels A and B. The material shall be packed in accordance with MIL-C-3993.

5.1.2 Level C. The products shall be separated by size, alloy, form, and temper and packed in accordance with the manufacturer's standard practice into containers of a type and size commonly used for the purpose, in such a manner as to insure acceptance by carrier for transportation at the lowest rate applicable and to afford maximum protection from normal hazards of transportation.

#### 5.2 Marking (see 6.2 and 6.3).

5.2.1 Civil agencies. In addition to markings required by the contract or order, shipping containers shall be marked in accordance with Fed. Std. No. 123.

5.2.2 Military agencies. In addition to markings required by the contract or order, shipping containers shall be marked in accordance with MIL-STD-129.

## 6. NOTES

### 6.1 Intended use.

6.1.1 Copper alloy number 230 (red brass, 85 percent) is easily cold-worked, and is used in manufacturing processes which require drawing, forming, and bending.

6.1.2 Copper alloy number 240 (low brass, 80 percent) is suitable for various drawing and forming operations. It is used in making flexible metal hose and bellows.

6.1.3 Copper alloy number 260 (cartridge brass, 70 percent) is easily cold-worked, and is used in the manufacture of items which require progressive machine operations, and in deep drawing and spinning applications. Copper alloy number 260 in its overall characteristics for general application is equal to or even superior to copper alloy number 268.

6.1.4 Copper alloy number 268 (yellow brass) is a common high brass. It is malleable and suitable for a number of drawing, forming, stamping, and bending operations.

6.1.5 Copper alloy numbers 342 and 353 (high leaded brass) are used for gears and wheels, and in manufactured articles which require machining. They are not generally suitable for cold drawing.

6.1.6 Copper alloy number 360 (free-cutting brass) is intended for use in automatic screw machines. It has excellent machineability and moderate strength, but has low ductility and resistance to stress corrosion cracking. It can be bent moderately but is not intended for cold upsetting or spinning applications.

6.1.7 Copper alloy number 377 (forging brass) is intended for hot forging and subsequent machining. As forged, it has moderate strength and ductility. It has fair corrosion resistance.

6.1.8 Composition 11 covers a group of alloys including both leaded and non-leaded material. It is intended for use in structural applications not exposed to weather or corrosive influences and in nameplates and trimmings.

6.2 Ordering data. Purchasers should select the preferred options permitted herein and include the following information in procurement documents:

- a. Title, number, and date of this specification.
- b. Alloy (or composition), form, and temper required (see 1.2).
- c. Size of material.
- d. When material is required in rolls or on reels or on bucks (see 3.2).
- e. When special lead limits are required (for comp. 11) (see table I).
- f. Tensile properties when shapes or forgings are ordered (see 3.4.1.1).
- g. When tensile requirements are required for copper alloy number 377 and composition 11, and the nature of the requirements (see 3.4.1.2 and 3.4.1.3).
- h. When grain-size requirements are required for finished edge bar and rod, soft temper, copper alloy numbers 260 and 268 (see 3.5.1).
- i. When grain-size requirements are required for finished edge strip, annealed temper, copper alloy numbers 230, 240, 268, 342, and 353 (see 3.5.2).
- j. When the mercurous-nitrate test is required (see 3.6).
- k. Size and shape of forgings (see 3.7.1).
- l. The nature of the application of material such as bending, forming, or shaping.
- m. Dimensions and tolerances for forgings and shapes (see 3.7.1).
- n. Lengths, whether specific or stock lengths with or without ends (see 3.7.2).
- o. Corners or edges required (see 3.7.2).
- p. When tolerances are required all plus or all minus (see 3.7.2).
- q. When item identification marking is required (see 3.8).
- r. When a lot size other than as specified in 4.2 is required.
- s. When other than two tension-test specimens for lots over 2500 pounds are required (see 4.3.2).
- t. The number of hardness and grain size specimens, when other than as specified herein (see 4.3.3).
- u. For forgings and shapes, the type (or size and configuration) and location of tensile test specimens (see 4.5.1.4).
- v. Whether material is to be packed by level A, B, or C (see 5.1).
- w. Special marking, if required (see 5.2).
- x. Maximum gross weight of containers.

6.3 The requirements for product identification marking (see 3.8) and for packing and marking for shipment (see 5.1 and 5.2) specified herein apply to direct shipment for Government activities and apply also, where specified, to contracts or orders between the manufacturer and the Government prime contractor.

#### 6.4 Definitions.

6.4.1 Finished edge bar. A solid rectangular section, or one with two plane parallel surfaces and round or other simple regularly shaped edges, up to and including 12 inches in width and over 0.188 inch in thickness.

6.4.2 Rod. A round, hexagonal, or octagonal solid section furnished in straight lengths.

6.4.3 Shape. A solid section other than rectangular, square, or standard rod and wire sections, furnished in straight lengths. Shapes include such forms as angles, channels, bar, and material in bar form with other than square corners, rounded corners, rounded edges, or full-rounded edges.

6.4.4 Strip. As covered by this specification, a flat product, other than flat wire, up to and including 0.188 inch in thickness and generally furnished with finished drawn or rolled edges in widths over 1-1/4 to 12 inches, inclusive.

6.5 General information.

6.5.1 The thickness of all flat products should be stated in decimals of an inch.

6.5.2 Strip should be ordered in as narrow widths as can be used.

6.6 Related specifications. This specification covers flat products with finished edges (bar and strip) having drawn, extruded, or rolled (not previously slit) edges. QQ-B-613 covers plate, bar, sheet, and strip with slit and edge rolled, sheared, sawed, or machined edges. QQ-W-321 covers wire and flat wire.

6.7 The alloys covered by this specification are similar to alloys of the following ASTM designations as indicated:

QQ-B-626 D Copper alloy No.	ASTM
230	B 36, Alloy No. 230
240	B 36, Alloy No. 240
260	B 36, Alloy No. 260
268	B 36, Alloy No. 268
342	B 121, Alloy No. 342
353	B 121, Alloy No. 353
360	B 16
377	B 124, Alloy No. 377
(Comp.) 11	None

6.8 The term "k.s.i." is defined as "thousand pounds per square inch". The term "p.s.i." is obsolete.

6.9 Metric equivalents. To obtain tensile and yield strength values in mega-Pascals (MPa), multiply the values in tables II, III, and IV by 6.89.

MILITARY CUSTODIANS:

Army - MR  
Navy - SH  
Air Force - 84

Review activities:

Army - MR, MU, MI, ME  
Navy - SH, AS, OS  
Air Force - None  
DSA - IS

User activities:

Army - GL, EL  
Navy - MC  
Air Force - None

Preparing activity:

Army - MR

Civil Agency Coordinating Activities:

COMMERCE-NBS  
HUD- HHE, TCS

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Orders for this publication are to be placed with the General Services Administration, acting as an agent for the Superintendent of Documents. See section 2 of this specification to obtain extra copies and other documents referenced herein. Price 20 cents each.

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# 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.

**SPECIFICATION** QQ-B-626D, Brass, Leaded and Nonleaded: Rod, Shapes, Forgings, and Flat Products with Finished Edges (Bar and Strip)

**ORGANIZATION**

**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)**

**SUBMITTED BY (Printed or typed name and activity)**

**DATE**

**DD FORM 1426**  
1 APR 63

REPLACES NAVSHIPS FORM 4863, WHICH IS OBSOLETE