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 SUPERSEDING
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FEDERAL SPECIFICATION

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

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 alloys of leaded and nonleaded naval brass rod, wire, shapes, forgings, and flat products with finished edges (flat wire, strip, and bar), but does not include strip or bar finished with slit, sheared, sawed, or machined edges (see 6.7).

1.2 Classification.

1.2.1 Alloys. The naval brass covered by this specification shall be furnished in the following alloys: 462, 464, 482, and 485. When the alloy is not specified, copper alloy number 464 shall be furnished.

1.2.2 Forms and tempers. The naval brass covered by this specification shall be furnished in the following forms and tempers, as specified (see 6.2):

Form	Temper
Bar and rod	As extruded Soft Cold-heading Half-hard or light annealed Hard
Wire	Soft Cold-heading Half-hard or light annealed Hard
Strip and flat wire	Soft Half-hard Hard
Shapes	As extruded Soft Drawn
Forgings	As forged

When temper is not specified, rod, wire, and flat products (flat wire, strip, and bar) shall be furnished in the half-hard temper. Round rod over 1/2 inch in diameter may be furnished as standard shafting; round rod over 1 inch in diameter may be furnished for special shafting (see 6.2). Shafting is available with or without piston finish (see 3.7).

2. APPLICABLE DOCUMENTS

2.1 The following specifications and standards, of the issues in effect on 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 (Civilian Agencies).
- Fed. Std. No. 146 - Tolerances for Copper and Copper Base Alloy Mill Products.

FSC 9525, 9530, 9535, 9540, FORG

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, D. C. 20402.

(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, Los Angeles, and Seattle, Wash.

(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 contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

3. REQUIREMENTS

3.1 Manufacture. The material shall be manufactured by such hot or cold working followed by such annealing and straightening as may be required to produce material meeting the requirements of this specification.

3.2 The material shall be furnished in straight lengths unless material in rolls, in coils, on reels, or on bucks is specified (see 6.2).

3.3 Chemical composition.

3.3.1 The material shall conform to the chemical requirements specified in table I.

Table I. Chemical composition, percent maximum unless a range is indicated

Copper alloy No.	Copper	Tin	Lead	Iron	Other elements total	Zinc
462	62.0 to 65.0	0.5 to 1.0	0.20	0.10	0.10	Rem.
464	59.0 to 62.0	.5 to 1.0	.20	.10	.10	Rem.
482	59.0 to 62.0	.5 to 1.0	0.4 to 1.0	.10	.10	Rem.
485	59.0 to 62.0	.5 to 1.0	1.3 to 2.2	.10	.10	Rem.

3.3.2 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. The material shall conform to the mechanical properties shown in tables II, III, and IV for the respective conditions.

Table II. Mechanical properties of copper alloy number 462

Form and temper	Size (diameter or distance between parallel faces), inches	Tensile strength, min. k.s.i.	Yield strength, min. k.s.i.	Elongation in four times thickness or diameter ^{1/} , min. percent
Bar, rod, and shapes, as extruded	All sizes	50	20	30
Bar, rod, and wire, soft	All sizes	48	16	30
Rod and wire, for cold-heading and cold-forming	All sizes	48	18	22
Bar, rod, and wire, half-hard or light annealed	0.500 and under	58	27	22
	Over 0.500 to 1.000, incl.	56	27	25
	Over 1.000 to 2.000, incl.	54	26	25
	Over 2.000 to 3.000, incl.	52	25	27
	Over 3.000 to 4.000, incl.	50	22	30
	Over 4.000	50	20	30
Bar, rod, and wire, hard	0.500 and under	64	40	13
	Over 0.500 to 1.000, incl.	62	38	13
	Over 1.000 to 2.000, incl.	58	34	18

^{1/} In any case, a minimum gage length of 1 inch shall be used.

Table III. Mechanical properties of copper alloy number 464

Form and temper	Size (diameter or distance between parallel faces), inches	Tensile strength, min. k.s.i.	Yield strength, min. k.s.i.	Elongation in four times diameter or thickness ^{1/} , min. percent
Bar, rod, and shapes, as extruded	All sizes	52	20	30
Bar, rod, and wire, soft	1.000 and under	54	20	30
	Over 1.000 to 2.000, incl.	52	20	30
	Over 2.000	50	20	30
Bar, rod, and wire, half-hard or light annealed	0.500 and under	60	27	22
	Over 0.500 to 1.000, incl.	60	27	25
	Over 1.000 to 2.000, incl.	58	26	25
	Over 2.000 to 3.000, incl.	54	25	25
	Over 3.000 to 4.000, incl.	54	22	27
	Over 4.000	54	22	30
Bar, rod, and wire	1.000 and under	67	45	13
	Over 1.000 to 2.000, incl.	62	37	18
	Over 2.000 to 3.000, incl.	54	25	27
	Over 3.000	54	22	30

Table III. Mechanical properties of copper alloy number 464 (continued)

Form and temper	Size (diameter or distance between parallel faces), inches	Tensile strength, min. k.s.i.	Yield strength, min. k.s.i.	Elongation in four times diameter or thickness ^{1/} , min. percent	
Flat wire and strip, soft	All sizes	52	20	30	
Flat wire and strip, half-hard	All sizes	60	35	15	
Flat wire and strip, hard	All sizes	65	50	10	
Forgings	4 pounds and less	52	22	30	
	Over 4 pounds	50	20	30	
Shapes, soft	All sizes	52	20	30	
Shapes, extruded and drawn ^{2/}	All sizes	58	25	20	

^{1/}In any case, a minimum gage length of 1 inch shall be used.

^{2/}Shapes, extruded and drawn, do not apply to hollow shapes or those of continuous periphery.

Table IV. Mechanical properties of copper alloy numbers 482 and 485

Form and temper	Size (diameter or distance between parallel faces), inches	Tensile strength, min. k.s.i.	Yield strength, min. k.s.i.	Elongation in four times diameter or thickness ^{1/} , min. percent	
				482	485
Bar, rod, and shapes, as extruded	All sizes	52	20	25	20
Bar, rod, and wire, soft	1.000 and under	54	20	25	20
	Over 1.000 to 2.000, incl.	52	20	25	20
	Over 2.000	50	20	25	20
Bar, rod, and wire, half-hard or light annealed	1.000 and under	60	27	18	12
	Over 1.000 to 2.000, incl.	58	26	20	20
	Over 2.000 to 3.000, incl.	54	25	20	20
	Over 3.000 to 4.000, incl.	54	22	20	20
	Over 4.000	54	22	25	20
Bar, rod, and wire, hard	1.000 and under	67	45	11	10
	Over 1.000 to 2.000, incl.	62	37	15	13
Shapes, soft	All sizes	52	20	25	20
Shapes, extruded and drawn ^{2/}	All sizes	58	25	15	15
Forgings	4 pounds and less	52	22	25	20

^{1/}In any case, a minimum gage length of 1 inch shall be used.

^{2/}Shapes, extruded and drawn, do not apply to hollow shapes or those of continuous periphery.

3.4.1 Forgings shall conform to the mechanical properties shown in tables III and IV unless other mechanical properties are required in which case the required properties shall be as specified (see 6.2).

3.4.2 Where material is required in special forms and tempers other than those specified in tables III and IV, the material shall be defined and specified (see 6.2).

3.5 Internal stresses. Unless otherwise specified (see 6.2), naval brass product in tempers other than soft, as extruded, or cold-heading, shall withstand without cracking the mercurous-nitrate test (see 4.5.3.3).

3.6 Heat treatment. Heat treatment, if any, shall be such as to obtain mechanical properties, structure, and temper required by this specification. When specified (see 6.2), soft material shall be finish annealed.

3.7 Piston finish. When specified (see 6.2), shafting shall be furnished with piston finish, a special surface produced by grinding.

3.8 Dimensional tolerances.

3.8.1 Forgings. 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 or minus 3/32 inch on smooth forgings, or plus or minus 1/32 inch on rough machined forgings.

3.8.2 Special shafting (straightness). When checked at the mill, the permissible variations in straightness of rod for special shafting, as determined by the departure from straightness (throw in one revolution); shall be shown in table V. All rod for special shafting shall be checked for straightness when supported on rollers at quarter points, and also on rollers at the ends of the rod in lengths as shown in table V.

Table V. Permissible variations in straightness of rod for special shafting

Span, feet	Rod supported at ends, inch			Rod supported at quarter points, inch		
	At 1st quarter point	At center	At 3rd quarter point	At 1st end	At center	At 2nd end
6	0.004	0.008	0.004	-	-	-
8	.006	.010	.006	0.006	0.004	0.006
10	.012	.016	.012	.012	.006	.012
12	.018	.024	.018	.018	.006	.018
14	.024	.032	.024	.024	.008	.024
16	.030	.042	.030	.030	.012	.030
18	.040	.054	.040	.040	.014	.040
20	.048	.066	.048	.048	.016	.048
22	-	-	-	.060	.020	.060
24	-	-	-	.072	.024	.072
26	-	-	-	.084	.028	.084
28	-	-	-	.096	.032	.096
30	-	-	-	.112	.038	.112

3.8.2.1 Length of span. The maximum permissible length of span to be used to determine conformance with table V shall be as shown in table VI.

Table VI. Maximum permissible length of span for the determination of conformance with table V

Diameter of rod, inches	Allowable length of rod when supported at the ends ¹ , feet
1	9
1-1/8	10
1-1/4	10
1-3/8	11
1-1/2	11
1-5/8	12
1-3/4	12

Table VI. Maximum permissible length of span for the determination of conformance with table V (continued)

Diameter of rod, inches	Allowable length of rod when supported at the ends ^{1/} , feet
2	13
2-1/4	14
2-3/8	14
2-1/2	15
2-3/4	15
3	16
3-1/2	17
4	19
4-1/2	20
5	21

^{1/}With the rod supported at the first and third quarter points, the allowable length shall be twice the value given.

3.8.3 Other forms. Except where otherwise indicated, the following references of Fed. Std. No. 148 shall apply:

Forms and dimensions	Reference
1. Flat products with finished edges (bar, flat wire, 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) ^{a/}
Length	11a(2), 11a(3)
Straightness	11a(4)
4. Rod, hot rolled:	
Diameter	13a(1)
Length and straightness	13a(2)
5. Rod, piston finish:	
Diameter	14a(1)
Length	14a(2)
Straightness	14a(3)
6. Rod, shafting, standard:	
Diameter	14b(1)
Length	14b(2)
Straightness	14b(3)
7. Rod, shafting, special:	
Diameter	14b(1)
Length	14b(2)
Straightness	Tables V and VI ^{b/}

Forms and dimensions	Reference
8. Shapes, cold drawn:	
Dimensional tolerances other than length	15a(1)
Length	15a(2)
Straightness	15a(3)
9. Shapes, as extruded	16
10. Wire:	
Diameter	24a(1)

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

b/This specification,

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

3.10 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). When some characteristic of workmanship is especially important to the serviceability of the intended parts, this information shall be included along with the character of the application of material in the ordering data (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, the supplier may utilize his own facilities or any commercial laboratory acceptable to 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 10,000 pounds or fraction thereof, of material of the same alloy, form, temper, and size submitted for inspection at one time.

4.3 Sampling. Samples for the purposes 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. From each lot, the number of pieces specified in table VII shall be sampled. 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 VII. Sampling for chemical analysis

Pounds of material in lot	Number of pieces to be sampled ^{1/}
Up to 5,000 incl.	2
5,001 to 10,000	4

^{1/}If the number of original bars, billets, or cakes from which the material is processed is less than the number of pieces specified for sampling, only one sample need be taken from each piece.

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.

4.3.3 For mercurous-nitrate test. Unless otherwise specified (see 6.2), one mercurous-nitrate test specimen shall be taken from each lot (see 3.5).

4.3.4 For visual and dimensional examination.

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

4.3.4.2 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.

4.3.4.3 When material is furnished in rolls or on reels or bucks, the sample 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.

4.4 Examination.

4.4.1 Visual and dimensional. Pieces selected in accordance with 4.3.4 shall be visually examined to determine compliance with the requirements for identification marking (see 3.9) and workmanship (see 3.10) and shall be measured for compliance with the dimensional requirements (see 3.8).

4.4.2 Straightness.

4.4.2.1 Strip, bar, shapes, and rod except for standard or special shafting. Straightness shall be determined by placing the piece 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.

4.4.2.2 Rod for standard shafting. The departure from straightness of rod for standard shafting shall be determined in accordance with reference 14b (3) of Fed. Std. No. 146.

4.4.2.3 Rod for special shafting. Straightness of rod for special shafting shall be determined as specified in 4.4.2.2, except that (1) rod shall be supported as indicated in 3.8.2, and (2) the deviation from straightness (throw in one revolution) shall be defined as the difference between the maximum and minimum reading of the dial indicator in one complete revolution of the rod.

4.4.3 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 methods.

4.5.1 Tension test specimens.

4.5.1.1 Tension test specimens for bar, rod, wire, and flat wire, 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 that 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 specimen may be machined to the form and dimensions in accordance with type R1 of method 211 of Fed. Test Method Std. No. 151. When a type R1 specimen is used, the elongation shall be measured in a gage length of 2 inches.

4.5.1.2 For bar and rod up to 1-1/2 inches in diameter or minimum thickness the axis of the test specimen shall coincide with the central axis of the piece. For bar and rod 1-1/2 inches and over 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.

4.5.1.3 For finished edge strip, the test specimen may be machined to the form and dimensions of type F2 of method 211 of Fed. Test Method Std. No. 151. The longitudinal axis of the specimen shall be parallel to the direction of rolling, drawing, or extruding.

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

4.5.2 Mercurous-nitrate test specimens. 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, or polishing of the test specimen shall be permitted.

4.5.3 Test procedures.

4.5.3.1 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.

4.5.3.2 Tension tests. Specimens from samples selected in accordance with 4.3.2 shall be tested in accordance with method 211 of Fed. Test Method Std. No. 151. The yield strength shall be determined by the extension under load method in accordance with method 211 of Fed. Test Method Std. No. 151. The limiting extension shall be 0.005 inch per inch for all specified yield strength values.

4.5.3.3 Mercurous-nitrate tests. Samples selected in accordance with 4.3.3 shall be tested in accordance with method 831 of Fed. Test Method Std. No. 151.

4.6 Rejection.

4.6.1 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 4.3.4.2 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.

4.6.2 Test failures. A lot shall be rejected for failure to meet any of the test requirements when tested in accordance with 4.5, 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, composition, 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 462 is cold workable and has the best resistance to corrosion by salt water of any of the alloys covered by this specification. It consists principally of alpha grains; has limited hot workability. It is intended for use when cold working, bending, forming, or sh-ping is required and may be used for the following:

Bar, rod and wire - small sizes less than approximately 2.5 inches in diameter or minimum thickness.

Bolts, cold headed or rolled thread.

Nuts made by the cold upset method.

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6.1.2 Copper alloy number 464 possesses excellent hot working properties with fair machinability. It consists of both alpha and beta grains; is hot workable, but hardens rapidly on cold working, and is intended for the following uses:

Forgings.
Shafting - pump rods, propeller shafting.
Condenser bolts.

6.1.3 Copper alloy number 482 possesses good hot working properties and good machinability. It consists of both alpha and beta grains; is moderately hot workable but hardens rapidly on cold working. The material is intended for use when free machining is required and may be used for the following: Forgings, bolts, studs, nuts (machined), and turnbuckles. Copper alloy number 482 is more machinable than copper alloy number 464.

6.1.4 Copper alloy number 485 possesses good hot working properties, and the machinability is better than copper alloy numbers 464 or 482. It consists of both alpha and beta grains; is moderately hot workable but hardens rapidly on cold working. The material is intended for use when free machining is required and may be used for the following:

Forgings.
Bolts, studs, nuts (machined).
Turnbuckles.
Marine hardware.
Applications where a corrosion resisting material is needed.

6.1.5 Standard shafting as covered by this specification is suitable for most shafting applications and for applications other than shafting. Special shafting should be used only in limited propulsion shafting applications.

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, form, and temper required (see 1.2).
- (c) Size of material.
- (d) When material is required in rolls or on reels or bucks (see 3.2).
- (e) Special mechanical properties for forgings (see 3.4.1).
- (f) Special forms and tempers required (see 3.4.2).
- (g) When the mercurous-nitrate test is required, and number of specimens when more than one is required (see 3.5 and 4.3.3).
- (h) Whether finish annealing of soft material is required (see 3.6).
- (i) When standard or special shafting is required.
- (j) When shafting should be furnished with piston finish (see 3.7).
- (k) Dimensions and tolerances for forgings (see 3.8.1).
- (l) Lengths, whether specific or stock lengths with or without ends (see 3.8.3).
- (m) Corners required, of other than square or rounded are desired (see 3.8.3).
- (n) When tolerances are required all plus or all minus (see 3.8.3).
- (o) When product identification marking is required (see 3.9).
- (p) When some characteristic of workmanship is important, the characteristic and the application of the material (see 3.10).
- (q) When a lot size of other than 10,000 pounds is required (see 4.2).
- (r) The number of tension test specimens, when other than as specified herein (see 4.3.2).
- (s) For forgings and shapes, the type (or size and configuration) and location of tensile test specimens (see 4.5.1.4).
- (t) When saddles are required for packing shafting.
- (u) Whether material is to be packed by level A, B, or C (see 5.1).
- (v) Special marking, if required (see 5.2)
- (w) Maximum gross weight of containers.
- (x) When desired, requirements for surface finish.

6.3 The requirements for product identification marking (see 3.9) 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 Bar. A bar is a solid rectangular section, or one with 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 rod is a round, hexagonal, or octagonal solid section furnished in straight lengths.

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

6.4.4 Flat wire. Flat wire is a flat product up to and including 0.188 inch in thickness and up to and including 1-1/4 inch width with all surfaces rolled or drawn without previous slitting, shearing, or sawing. It may be furnished in straight lengths, or on spools, reels, or bucks.

6.4.5 Strip. A strip (as covered by this specification) is 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 inch, inclusive.

6.4.6 Wire. A solid section, other than strip, furnished in coils, or on spools, reels, or bucks.

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.

6.5.3 For purposes of weight calculations, the weight per cubic inch may be taken as 0.304 pound.

6.5.4 Flat products in rolls are generally more economical than material of the same cross-section in straight or flat lengths.

6.6 Flat wire and strip may also be furnished in longer commercial lengths as follows, when specified.

Flat wire - on spools, reels, or bucks.
Strip - on bucks or in rolls.

6.7 Related specification. This specification covers naval brass rod, bar, wire, shapes, forgings, and flat products with finished edges. QQ-B-639 covers flat products with slit, slit and edge rolled, sheared, sawed, or machined edges.

6.8 The compositions covered by this specification are similar to compositions of the following specifications as indicated:

QQ-B-637a Copper alloy No.	QQ-B-637 Composition	ASTM B-21 Alloy
462	4	D
464	1	A
482	2	B
485	3	C

6.9 With reference to tensile and yield-strength values, the term "k.s.i." replaces the former term "p.s.i.". It is defined as "thousand pounds per square inch".

6.10 Metric equivalents. To obtain tensile and yield strength values in kilograms per square millimeter (k.g.f./mm.²), multiply the values in tables II, III, and IV by 703.

Custodians:

Army - MR
Navy - SH
Air Force - 69

Review activities:

Army - MR, MU, MI
Navy - SH
Air Force - 69

QQ-B-637a

User activities:

Army - MO, EL
Navy - AS, OS
Air Force - None

Civilian Agencies Interest:

GSA
INT
COMM
JUS
HEW
DC
AGRI

Preparing activity: Army - MR

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