Designation: B 763 – 98

Standard Specification for Copper Alloy Sand Castings for Valve Application[1]

This standard is issued under the fixed designation B 763; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope *

1.1 This specification establishes requirements for copper alloy sand castings for valve applications. Nominal compositions of the alloys defined by this specification are shown in Table 1.[2]

NOTE 1—This specification does not cover Copper Alloy UNS Nos. C83600, C92200, C96200, and C96400. These alloys are also used in valve applications. They are covered by the following specifications:

C83600, B 62
C92200, B 61
C96200, B 369
C96400, B 369

1.2 The castings produced under this specification are used in products which may be manufactured in advance and supplied for sale from stock by the manufacturer.

1.3 The values stated in inch-pound units are to be regarded as the standard. SI values given in parentheses are for information only.

2. Referenced Documents

2.1 The following documents in the current issue of the Book of Standards form a part of this specification to the extent referenced herein:

2.2 *ASTM Standards:*

B 61 Specification for Steam or Valve Bronze Castings[3]

B 62 Specification for Composition Bronze or Ounce Metal Castings[3]

B 208 Practice for Preparing Tension Test Specimens for Copper-Base Alloys for Sand, Permanent Mold, Centrifugal, and Continuous Castings[3]

B 369 Specification for Copper-Nickel Alloy Castings[3]

B 824 Specification for General Requirements for Copper Alloy Castings[3]

E 10 Test Method for Brinell Hardness of Metallic Materials[4]

E 527 Practice for Numbering Metals and Alloys (UNS)[5]

3. General Requirements

3.1 The following sections of Specification B 824 form a part of this specification.

3.1.1 Terminology (Section 3),

3.1.2 Other Requirements (Section 6),

3.1.3 Dimensions, Mass, and Permissible Variations (Section 7),

3.1.4 Workmanship, Finish, and Appearance (Section 8),

3.1.5 Sampling (Section 9),

3.1.6 Number of Tests and Retests (Section 10),

3.1.7 Specimen Preparation (Section 11),

3.1.8 Test Methods (Section 12),

3.1.9 Significance of Numerical Limits (Section 13),

3.1.10 Inspection (Section 14),

3.1.11 Rejection and Rehearing (Section 15),

3.1.12 Certification (Section 16),

3.1.13 Test Report (Section 17),

3.1.14 Product Marking (Section 18),

3.1.15 Packaging and Package Marking (Section 19),

3.1.16 Supplementary Requirements.

4. Ordering Information

4.1 Orders for castings under this specification should include the following information:

4.1.1 Specification title, number, and year of issue,

4.1.2 Quantity of castings,

4.1.3 Copper Alloy UNS Number and temper (as-cast, heat-treated, etc.),

4.1.4 Pattern or drawing number and condition (as-cast, machined, etc.),

4.1.5 When castings are purchased for agencies of the U.S. Government, the Supplementary Requirements of Specification B 824 may be specified.

4.2 The following requirements are optional and should be specified in the purchase order when required.

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[1] This specification is under the jurisdiction of ASTM Committee B-5 on Copper and Copper Alloys and is the direct responsibility of Subcommittee B05.05 on Castings and Ingots for Remelting.

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[2] The UNS system for copper and copper alloys (see Practice E 527) is a simple expansion of the former standard designation system accomplished by the addition of a prefix "C" and a suffix "00". The suffix can be used to accommodate composition variations of the base alloy.

[3] *Annual Book of ASTM Standards,* Vol 02.01.

[4] *Annual Book of ASTM Standards,* Vol 03.01.

[5] *Annual Book of ASTM Standards,* Vol 01.01.

***A Summary of Changes section appears at the end of this standard.**

TABLE 1 Nominal Compositions

Classification	Copper Alloy UNS No.	Commercial Designation	Copper	Tin	Lead	Zinc	Nickel	Iron	Alumi-num	Man-ganese	Sili-con	Bismuth
Leaded red brass	C83450		88	2½	2	6½	1	...	...	...	...	...
	C83800	83-4-6-7 or commercial red brass	83	4	6	7	...	...	...	...	...	...
Leaded semi-red brass	C84400	81-3-7-9 or valve composition	81	3	7	9	...	...	...	...	...	...
	C84800	76-2½-6½-15, or semi-red brass	76	2½	6½	15	...	...	...	...	...	...
Leaded yellow brass	C85200	high-copper yellow brass	72	1	3	24	...	...	...	...	...	...
	C85400	commercial No. 1 yellow brass	67	1	3	29	...	...	...	...	...	...
	C85700	leaded naval brass	61	1	1	37	...	...	...	...	...	...
High-strength yellow brass	C86200	high-strength manganese bronze	63	...	...	27	...	3	4	3	...	...
	C86300	high-strength manganese bronze	61	...	...	27	...	3	6	3	...	...
	C86400	leaded manganese bronze	58	1	1	38	...	1	½	½	...	...
	C86500	No. 1 manganese bronze	58	...	...	39	...	1	1	1	...	...
	C86700	leaded manganese bronze	58	1	1	34	...	2	2	2	...	...
Silicon bronze and silicon brass	C87300	silicon bronze	95	...	...	...	...	...	...	1	4	...
	C87400	silicon brass	82	...	½	14	...	...	...	...	3½	...
	C87500	silicon brass	82	...	...	14	...	...	...	...	4	...
	C87600	silicon bronze	89	...	...	6	...	...	...	...	5	...
	C87610	silicon bronze	92	...	...	4	...	...	...	...	4	...
Bismuth semi-red brass	C89844	bismuth brass	84½	4	...	8	...	...	...	...	...	3
Tin bronze and leaded tin bronze	C90300	88-8-0-4, or modified “G” bronze	88	8	...	4	...	...	...	...	...	...
	C90500	88-10-0-2, on “G” bronze	88	10	...	2	...	...	...	...	...	...
	C92300	87-8-1-4, or Navy PC	87	8	1	4	...	...	...	...	...	...
	C92600	87-10-1-2	87	10	1	2	...	...	...	...	...	...
High-lead tin bronze	C93200	83-7-7-3	83	7	7	3	...	...	...	...	...	...
	C93500	85-5-9-1	85	5	9	1	...	...	...	...	...	...
	C93700	80-10-10	80	10	10	...	...	...	...	...	...	...
	C93800	78-7-15	78	7	15	...	...	...	...	...	...	...
	C94300	71-5-24	71	5	24	...	...	...	...	...	...	...
Nickel-tin bronze and leaded nickel-tin bronze	C94700	nickel-tin bronze grade “A”	88	5	...	2	5	...	...	...	...	...
	C94800	leaded nickel-tin bronze grade “B”	87	5	1	2	5	...	...	...	...	...
	C94900	leaded nickel-tin bronze grade “C”	80	5	5	5	5	...	...	...	...	...
Aluminum bronze	C95200	Grade A	88	...	...	...	...	3	9	...	...	...
	C95300	Grade B	89	...	...	...	...	1	10	...	...	...
	C95400	Grade C	85	...	...	...	...	4	11	...	...	...
	C95410		84	...	...	...	2	4	10	...	...	...
Silicon aluminum bronze	C95600	Grade E	91	...	...	...	...	...	7	...	2	...
Nickel aluminum bronze	C95500	Grade D	81	...	...	...	4	4	11	...	...	...
	C95800		81.3	...	...	...	4.5	4	9	1.2	...	...
Leaded nickel bronze	C97300	12 % leaded nickel silver	57	2	9	20	12	...	...	...	...	...
	C97600	20 % leaded nickel silver	64	4	4	8	20	...	...	...	...	...
	C97800	25 % leaded nickel silver	66	5	2	2	25	...	...	...	...	...
Special alloys	C99400		87	...	...	4.4	3.0	3.0	1.6	...	1.0	...
	C99500		87	...	...	1.5	4.5	4.0	1.7	...	1.3	...

4.2.1 Chemical analysis of residual elements (6.3),

4.2.2 Pressure test or soundness requirements (Specification B 824),

4.2.3 Approval of weld repair and records of repair (Section 9),

4.2.4 Certification (Specification B 824),

4.2.5 Foundry test report (Specification B 824),

4.2.6 Witness inspection (Specification B 824),

4.2.7 Product marking (Specification B 824),

4.2.8 Castings for seawater service (5.1).

5. Materials and Manufacture

5.1 For better corrosion resistance in sea water applications, castings in Copper Alloy UNS No. C95800 shall be given a temper anneal heat treatment at 1250 ± 50°F (675 ± 10°C) for 6-h minimum. Cooling shall be by the fastest means possible that will not cause excessive distortion or cracking.

5.2 Copper Alloy UNS Nos. C94700, C95300, C95400, C95410, and C95500 may be supplied in the heat-treated condition to obtain the higher mechanical properties shown in Table 4. Suggested heat treatments for these alloys and copper alloy UNS No. C95520 are given in Table 5. Actual practice may vary by manufacturer.

5.3 Separately cast test bar coupons representing castings made in Copper Alloy UNS Nos. C94700HT, C95300HT, C95400HT, C95410HT, and C95500HT shall be heat treated with the castings.

6. Chemical Composition

6.1 The castings shall conform to the requirements for major elements shown in Table 2.

6.2 These specification limits do not preclude the presence of other elements. Limits may be established and analysis required for unnamed elements agreed upon between the manufacturer or supplier and the purchaser. Copper or zinc may be given as remainder and may be taken as the difference between the sum of all elements analyzed and 100 %. When all named elements in Table 2 are analyzed, their sum shall be as specified in Table 3.

6.3 It is recognized that residual elements may be present in cast copper-base alloys. Analysis shall be made for residual elements only when specified in the purchase order.

TABLE 2 Chemical Requirements

Copper Alloy UNS No.	Composition, % max Except as Indicated																		
	Major Elements										Residual Elements								
	Copper	Tin	Lead	Zinc	Iron	Nickel incl Cobalt	Aluminum	Manganese	Silicon	Bismuth	Iron	Antimony	Nickel incl Cobalt	Sulfur	Phosphorus	Aluminum	Manganese	Silicon	Lead
C83450	87.0–89.0	2.0–3.5	1.5–3.0	5.5–7.5	...	0.75–2.0	...	...	...	...	0.30	0.25	...	0.08	0.05	0.005	...	0.005	...
C83800	82.0–83.8	3.3–4.2	5.0–7.0	5.0–8.0	...	1.0[A]	...	...	...	...	0.30	0.25	...	0.08	0.03	0.005	...	0.005	...
C84400	78.0–82.0	2.3–3.5	6.0–8.0	7.0–10.0	...	1.0[A]	...	...	...	...	0.40	0.25	...	0.08	0.02	0.005	...	0.005	...
C84800	75.0–77.0	2.0–3.0	5.5–7.0	13.0–17.0	...	1.0[A]	...	...	...	...	0.40	0.25	...	0.08	0.02	0.005	...	0.005	...
C85200	70.0–74.0	0.7–2.0	1.5–3.8	20.0–27.0	...	...	...	...	...	...	0.6	0.20	1.0	0.05	0.02	0.005	...	0.05	...
C85400	65.0–70.0	0.50–1.5	1.5–3.8	24.0–32.0	...	...	...	...	...	...	0.7	...	1.0	...	...	0.35	...	0.05	...
C85700	58.0–64.0	0.50–1.5	0.8–1.5	32.0–40.0	...	...	...	...	...	...	0.7	...	1.0	...	...	0.55	...	0.05	...
C86200	60.0–66.0	0.20	0.20	22.0–28.0	2.0–4.0	...	3.0–4.9	2.5–5.0	...	...	...	...	1.0	...	...	...	...	...	...
C86300	60.0–66.0	0.20	0.20	22.0–28.0	2.0–4.0	...	5.0–7.5	2.5–5.0	...	...	...	...	1.0	...	...	...	...	...	...
C86400	56.0–62.0	0.50–1.5	0.50–1.5	34.0–42.0	0.40–2.0	...	0.50–1.5	0.10–1.0	...	...	...	...	1.0	...	...	...	...	...	...
C86500	55.0–60.0	1.0	0.40	36.0–42.0	0.40–2.0	...	0.50–1.5	0.10–1.5	...	...	...	...	1.0	...	...	...	...	...	...
C86700	55.0–60.0	1.5	0.50–1.5	30.0–38.0	1.0–3.0	...	1.0–3.0	1.0–3.5	...	...	...	...	1.0	...	...	...	...	...	...
C87300	94.0 min	...	0.20	0.25	...	...	...	0.8–1.5	3.5–5.0	...	0.20	...	...	...	...	...	...	...	...
C87400	79.0 min	...	1.0	12.0–16.0	...	...	...	...	2.5–4.0	...	...	...	...	...	...	0.80	...	...	...
C87500	79.0 min	...	0.50	12.0–16.0	...	...	...	...	3.0–5.0	...	...	...	...	...	...	0.50	...	...	...
C87600	88.0 min	...	0.50	4.0–7.0	...	...	...	...	3.5–5.5	...	...	...	...	...	...	...	...	...	...
C87610	90.0 min	...	0.20	3.0–5.0	0.20	...	...	...	3.0–5.0	...	...	...	...	...	...	...	0.25	...	...
C89844	83.0–86.0	3.0–5.0	...	7.0–10.0	...	1.0[A]	...	...	...	2.0–4.0	0.30	0.25	...	0.08	0.05	0.005	...	0.005	0.2
C90300	86.0–89.0	7.5–9.0	0.30	3.0–5.0	...	1.0[A]	...	...	...	...	0.20	0.20	...	0.05	0.05	0.005	...	0.005	...
C90500	86.0–89.0	9.0–11.0	0.30	1.0–3.0	...	1.0[A]	...	...	...	...	0.20	0.20	...	0.05	0.05	0.005	...	0.005	...
C92300	85.0–89.0	7.5–9.0	0.30–1.0	2.5–5.0	...	1.0[A]	...	...	...	...	0.25	0.25	...	0.05	0.05	0.005	...	0.005	...
C92600	86.0–88.5	9.3–10.5	0.8–1.5	1.3–2.5	...	0.7[A]	...	...	...	...	0.20	0.25	...	0.05	0.03	0.005	...	0.005	...
C93200	81.0–85.0	6.3–7.5	6.0–8.0	2.0–4.0	...	1.0[A]	...	...	...	...	0.20	0.35	...	0.08	0.15	0.005	...	0.005	...
C93500	83.0–86.0	4.3–6.0	8.0–10.0	2.0	...	1.0[A]	...	...	...	...	0.20	0.30	...	0.08	0.05	0.005	...	0.005	...
C93700	78.0–82.0	9.0–11.0	8.0–11.0	0.8	...	1.0[A]	...	...	...	...	0.15	0.50	...	0.08	0.15	0.005	...	0.005	...
C93800	75.0–79.0	6.3–7.5	13.0–16.0	0.8	...	1.0[A]	...	...	...	...	0.15	0.80	...	0.08	0.05	0.005	...	0.005	...
C94300	67.0–72.0	4.5–6.0	23.0–27.0	0.8	...	1.0[A]	...	...	...	...	0.15	0.80	...	0.08	0.05	0.005	...	0.005	...
C94700	85.0–90.0	4.5–6.0	0.10[B]	1.0–2.5	...	4.5–6.0	...	...	...	...	0.25	0.15	...	0.05	0.05	0.005	0.20	0.005	...
C94800	84.0–89.0	4.5–6.0	0.30–1.0	1.0–2.5	...	4.5–6.0	...	...	...	...	0.25	0.15	...	0.05	0.05	0.005	0.20	0.005	...
C94900	79.0–81.0	4.0–6.0	4.0–6.0	4.0–6.0	...	4.0–6.0	...	...	...	...	0.30	0.25	...	0.08	0.05	0.005	0.10	0.005	...
C95200	86.0 min	...	...	...	2.5–4.0	...	8.5–9.5	...	...	...	...	...	...	...	...	...	...	...	...
C95300	86.0 min	...	...	...	0.80–1.5	...	9.0–11.0	...	...	...	...	...	...	...	...	...	...	...	...
C95400	83.0 min	...	...	...	3.0–5.0	1.5	10.0–11.5	0.50	...	...	...	...	...	...	...	...	...	...	...
C95410	83.0 min	...	...	...	3.0–5.0	1.5–2.5	10.0–11.5	0.50	...	...	...	...	...	...	...	...	...	...	...
C95500	78.0 min	...	...	...	3.0–5.0	3.0–5.5	10.0–11.5	3.5	...	...	...	...	...	...	...	...	...	...	...
C95600	88.0 min	...	...	...	...	0.25	6.0–8.0	...	1.8–3.2	...	...	...	...	...	...	...	...	...	...
C95800	79.0 min	...	0.03	...	3.5–4.5[C]	4.0–5.0[C]	8.5–9.5	0.80–1.5	...	...	...	...	...	...	...	...	...	0.10	...
C97300	53.0–58.0	1.5–3.0	8.0–11.0	17.0–25.0	1.5	11.0–14.0	...	...	...	...	...	0.35	...	0.08	0.05	0.005	0.50	0.15	...
C97600	63.0–67.0	3.5–4.5	3.0–5.0	3.0–9.0	1.5	19.0–21.5	...	...	...	...	...	0.25	...	0.08	0.05	0.005	1.0	0.15	...
C97800	64.0–67.0	4.0–5.5	1.0–2.5	1.0–4.0	1.5	24.0–27.0	...	...	...	...	...	0.20	...	0.08	0.05	0.005	1.0	0.15	...
C99400	remainder	...	0.25	0.5–5.0	1.0–3.0	1.0–3.5	0.5–2.0	0.5	0.5–2.0	...	...	...	...	...	...	...	...	...	...
C99500	remainder	...	0.25	0.5–2.0	3.0–5.0	3.5–5.5	0.5–2.0	0.5	0.5–2.0	...	...	...	...	...	...	...	...	...	...

[A] In determining copper minimum copper may be calculated as copper plus nickel.
[B] It is possible that the mechanical requirements of Copper Alloy UNS No. C94700 (heat treated) will not be obtained if the lead content exceeds 0.01 %.
[C] Iron content shall not exceed the nickel content.

TABLE 3 Sum of all Known Elements Analyzed

Copper Alloy UNS No.	Copper Plus Known Elements, % min
C83450	99.3
C83800	99.3
C84400	99.3
C84800	99.3
C85200	99.1
C85400	98.9
C85700	98.7
C86200	99.0
C86300	99.0
C86400	99.0
C86500	99.0
C86700	99.0
C87300	99.5
C87400	99.2
C87500	99.5
C87600	99.5
C87610	99.5
C89844	99.3
C90300	99.4
C90500	99.7
C92300	99.3
C92600	99.3
C93200	99.2
C93500	99.4
C93700	99.0
C93800	98.9
C94300	99.0
C94700	99.3
C94800	99.3
C94900	99.2
C95200	99.0
C95300	99.0
C95400	99.5
C95410	99.5
C95500	99.5
C95600	99.0
C95800	99.5
C97300	99.0
C97600	99.7
C97800	99.6
C99400	99.7
C99500	99.7

7. Mechanical Properties

7.1 Mechanical properties shall be determined from separately cast test bars, and shall meet the requirements shown in Table 4.

8. Sampling

8.1 Copper Alloy UNS Nos. C86200, C86300, C86400, C86500, C86700, C95200, C95300, C95400, C95410, C95500, C95600, C95800, C99400, and C99500 test bar castings shall be cast to the form and dimensions shown in Figs. 1 or 2 of Practice B 208. For all other alloys listed in this specification test bars shall be cast to the form and dimensions shown in Figs. 2, 3 or 4 of Practice B 208.

9. Test Methods

9.1 Analytical chemical methods are given in Specification B 824 (Section 12).

9.2 Brinell hardness readings, if specified on the purchase order, shall be taken in the grip end of the tension test bar and shall be made in accordance with Test Method E 10, with the exception that a 3000-kg load shall be used.

10. Casting Repair

10.1 Copper Alloy UNS Nos. C95200, C95300, C95400, C95410, C95500, C95600, and C95800 included in this specification are generally weldable. Weld repairs may be made at the manufacturer's discretion provided each excavation does not exceed 20 % of the casting section or wall thickness or 4 % of the casting surface area.

10.2 Excavations that exceed those described in 10.1 may be made at the manufacturer's discretion except that when specified in the purchase order (4.1.8) the weld procedure shall be approved by the purchaser and the following records shall be maintained:

10.2.1 A sketch or drawing showing the dimensions, depth, and location of excavations,

10.2.2 Post-weld heat treatment, when applicable,

10.2.3 Weld repair inspection results,

10.2.4 Casting identification number,

10.2.5 Weld procedure identification number,

10.2.6 Welder identification, and

10.2.7 Name of inspector.

10.3 The casting shall not be impregnated without approval of the purchaser.

10.4 The castings shall not be plugged.

10.5 Other Copper Alloy UNS Numbers in this specification are not weldable.

11. Keywords

11.1 copper alloy castings; copper-base alloy castings; valve castings

TABLE 4 Mechanical Requirements

Copper Alloy UNS No.	Tensile Strength, min		Yield Strength,[A] min		Elongation in 2 in. or 50 mm, min, %	Brinell Hardness No.[B] (3000-kg Load), min
	ksi[C]	MPa[D]	ksi[C]	MPa[D]		
C83450	30	207	14	97	25	. . .
C83800	30	207	13	90	20	. . .
C84400	29	200	13	90	18	. . .
C84800	28	193	12	83	16	. . .
C85200	35	241	12	83	25	. . .
C85400	30	207	11	76	20	. . .
C85700	40	276	14	97	15	. . .
C86200	90	621	45	310	18	. . .
C86300	110	758	60	414	12	. . .
C86400	60	414	20	138	15	. . .
C86500	65	448	25	172	20	. . .
C86700	80	552	32	221	15	. . .
C87300	45	310	18	124	20	. . .
C87400	50	345	21	145	18	. . .
C87500	60	414	24	165	16	. . .
C87600	60	414	30	207	16	. . .
C87610	45	310	18	124	20	. . .
C89844	28	193	13	90	15	. . .
C90300	40	276	18	124	20	. . .
C90500	40	276	18	124	20	. . .
C92300	36	248	16	110	18	. . .
C92600	40	276	18	124	20	. . .
C93200	30	207	14	97	15	. . .
C93500	28	193	12	83	15	. . .
C93700	30	207	12	83	15	. . .
C93800	26	179	14	97	12	. . .
C94300	24	165	. . .	. . .	10	. . .
C94700	45	310	20	138	25	. . .
C94700(HT)	75	517	50	345	5	. . .
C94800	40	276	20	138	20	. . .
C94900	38	262	15	103	15	. . .
C95200	65	450	25	170	20	110
C95300	65	450	25	170	20	110
C95300(HT)	80	550	40	275	12	160
C95400	75	515	30	205	12	150
C95400(HT)	90	620	45	310	6	190
C95410	75	515	30	205	12	150
C95410(HT)	90	620	45	310	6	190
C95500	90	620	40	275	6	190
C95500(HT)	110	760	60	415	5	200
C95600	60	415	28	195	10	. . .
C95800[E]	85	585	35	240	15	. . .
C97300	30	207	15	103	8	. . .
C97600	40	276	17	117	10	. . .
C97800	50	345	22	152	10	. . .
C99400	60	414	30	207	20	. . .
C99500	70	483	40	276	12	. . .

[A] Yield strength shall be determined as the stress producing an elongation under load of 0.5 %, that is 0.01 in. (0.254 mm) in a gage length of 2 in. (50.8 mm).
[B] For information only.
[C] ksi = 1000 psi.
[D] See appendix.
[E] As cast or temper annealed.

TABLE 5 Suggested Heat Treatments Copper Alloy

Copper Alloy UNS No.	Solution Treatment (not less than 1 h followed by water quench), °F (°C)	Annealing Treatment (not less than 2 h followed by air cool), °F (°C)
C95300	1585–1635 (860–890)	1150–1225 (620–660)
C95400		
C95410	1600–1675 (870–910)	1150–1225 (620–660)
C95500	Solution Treatment (not less than 2 h followed by water quench)	Precipitation Hardening (5 h)
C94700	1425–1475 (775–800)	580–620 (305–325)

APPENDIX

(Nonmandatory Information)

X1. METRIC EQUIVALENTS

X1.1 The SI unit for strength properties now shown is in accordance with the International System of Units (SI). The derived SI unit for force is the newton (N), which is defined as that force when applied to a body having a mass of one kilogram gives it an acceleration of one metre per second squared ($N = kg \cdot m/s^2$). The derived SI unit for pressure or stress is the newton per square metre (N/m^2), which has been named the pascal (Pa) by the General Conference on Weights and Measures. Since 1 ksi = 6 894 757 Pa the metric equivalents are expressed as megapascal (MPa) which is the same as MN/m^2 and N/mm^2.

SUMMARY OF CHANGES

Committee B-5 has identified the location of selected changes to this standard since the last issue (B 763 – 96) that may impact the use of this standard.

(*1*) Added Alloy C89844, bismuth semi-red brass, to Table 1, Table 2, Table 3, and Table 4.

(*2*) Added “Bismuth” column to Table 1.

(*3*) Added “Bismuth” and “Lead” columns to Table 2.