CAST COPPER ALLOYS — SAE J462a

SAE Standard

Report of Nonferrous Metals Division approved June 1911 and last revised by Nonferrous Metals Committee July 1971.

Identification System—See SAE J463 for an explanation of the identification system applicable to both cast and wrought materials. As in the case of wrought materials, the three-digit number portion of the identification is nonsignificant, except that numbers of the 800 series and the 900 series are assigned to cast alloys. In the case of cast materials, nonsignificant suffix letters are used to identify two or more alloys of the same general chemical composition which are processed differently to achieve different properties (for example, CA850A and CA850B).

Scope—This standard prescribes the chemical and mechanical requirements for a wide range of copper base casting alloys used in the automotive industry. It is not intended to cover ingot. (ASTM B 30 is suggested for this purpose.)

Chemical and Mechanical Properties—The chemical composition and mechanical properties of products identified by SAE designations shall conform to the limits shown in Tables 1 and 2.

In report chemical analyses obtained by use of instruments, such as spectrograph, x-ray, quantometer, and atomic absorption, the copper (%) may be reported as "calculated by difference."

Mechanical property values are applicable to standard specimens (Sand Cast ASTM B 208, Centrifugal Cast ASTM B 271, Continuous Cast ASTM B 505) cast under production conditions used for casting the part(s) identified by the SAE designation. Samples for chemical analysis should be taken from test bars where practical to do so.

Workmanship—Castings shall be of uniform quality, free from blowholes, porosity, hard spots, shrinkage defects or cracks, or other injurious defects.

TABLE 1—CHEMICAL COMPOSITION OF CAST COPPER ALLOYS

SAE No.	Former SAE No.[a]	ASTM No. (Alloy)[a]	Alloy Name	Weight, max % (except as otherwise indicated)												
				Cu	Sn	Pb	Zn[b]	Fe	Ni	Al	Mn	Si	P	Sb	Misc.	Total Other Elements[b]
CA836	40	B 145 (836)	Leaded red brass	84.0[c]–86.0	4.0–6.0	4.0–6.0	4.0–6.0	0.30	1.0[c]	0.005	—	0.005	0.05[d]	—	—	0.35
CA838		B 145 (838)	Leaded red brass	82.0[c]–84.0	3.3–4.3	5.0–7.0	5.0–8.0	0.30	1.0[c]	0.005	—	0.005	0.03	—	—	0.35
CA852		B 146 (852)	Leaded yellow brass	70.0–74.0	0.7–2.0	1.5–3.8	rem	0.6	1.0	—	—	—	—	—	—	0.35
CA854	41	B 146 (854)	Leaded yellow brass	65.0–70.0	1.5	1.5–3.8	rem	0.8	1.0	0.30	—	—	—	—	—	0.35
CA858		B 176 (858)	Brass die castings	57.0 min	1.5	1.5	30.0 min	0.50	—	0.25	0.25	0.25	0.01	0.05	S, 0.05; As, 0.05	0.50
CA862	430A	B 147 (862)	High strength yellow brass	60.0–66.0	0.20	0.20	rem	2.0–4.0	1.0	3.0–4.9	2.5–5.0	—	—	—	—	0.30
CA863	430B	B 147 (863)	High strength yellow brass	60.0–66.0	0.20	0.20	rem	2.0–4.0	1.0	5.0–7.5	2.5–5.0	—	—	—	—	0.30
CA865	43	B 147 (865)	High strength yellow brass	55.0–60.0	1.0	0.40	rem	0.4–2.0	1.0	0.5–1.5	1.5	—	—	—	—	0.30
CA872		B 198 (872)	Silicon bronze	—[e]	1.0	0.50	5.0	2.5	—	1.5	1.5	1.0–5.0	—	—	—	0.50
CA874		B 198 (874)	Silicon brass	—[e]	—	1.0	12.0–16.0	—	—	0.50	—	2.5–4.0	—	—	—	0.50
CA875		B 198 (875)	Silicon brass	—[e]	—	0.50	12.0–16.0	—	—	0.50	—	3.0–5.0	—	—	—	0.50
CA878		B 176 (878)	Brass die castings	80.0–83.0	0.25	0.15	rem	0.15	—	0.15	0.15	3.8–4.3	0.01	0.05	Mg, 0.01; S, 0.05; As, 0.05	0.25
CA879		B 176 (879)	Brass die castings	63.0–67.0	0.25	0.25	rem	0.15	—	0.15	0.15	0.8–1.3	0.01	0.05	S, 0.05 As, 0.05	0.50
CA903	620	B 143 (903)	Tin bronze	86.0–89.0	7.5–9.0	0.30	3.0–5.0	0.15	1.0	0.005	—	0.005	0.05[d]	—	—	0.30
CA905	62	B 143 (905)	Tin bronze	86.0–89.0	9.0–11.0	0.30	1.0–3.0	0.15	1.0	0.005	—	0.005	0.05[d]	—	—	0.30
CA907	65		Phosphor bronze	88.0–90.0	10.0–12.0	0.50	—	—	0.50	0.005	—	0.005	0.30[d]	—	Total Pb, Zn, and Ni, 1.0	0.30
CA915		B 427 (915)	Leaded nickel tin bronze	—[e]	9.0–11.0	2.0–3.3	—	—	2.7–4.0	0.005	—	0.005	0.5[d]	—	—	0.50
CA922	622	B 143 (922)	Leaded tin bronze	86.0–90.0	5.5–6.5	1.0–2.0	3.0–5.0	0.30	1.0	0.005	—	0.005	0.05[d]	—	—	0.30
CA923	621	B 143 (923)	Leaded tin bronze	85.0–89.0	7.5–9.0	1.0	2.5–5.0	0.30	1.0	0.005	—	0.005	0.05[d]	—	—	0.30

(Table continued on next page)

TABLE 1—CHEMICAL COMPOSITION OF CAST COPPER ALLOYS (CONTINUED)

SAE No.	Former SAE No.[a]	ASTM No. (Alloy)[a]	Alloy Name	Weight, max % (except as otherwise indicated)												
				Cu	Sn	Pb	Zn[b]	Fe	Ni	Al	Mn	Si	P	Sb	Misc.	Total Other Elements[b]
CA925	640		Nickel phosphor bronze	85.0–88.0	10.0–12.0	1.0–1.5	0.50	0.30	0.8–1.5	0.005	—	0.005	0.30	—	—	0.30
CA927	63		Leaded tin bronze	86.0–89.0	9.0–11.0	1.0–2.5	0.8	0.15	1.0	0.005	—	0.005	0.25[d]	—	—	0.30
CA932	660	B 144 (932)	High leaded tin bronze	81.0[c]–85.0	6.2–7.5	6.0–8.0	2.0–4.0	0.20	0.8[c]	0.005	—	0.005	0.50[d]	0.35	—	0.20
CA935	66	B 144 (935)	High leaded tin bronze	83.0[c]–86.0	4.5–6.0	8.0–10.0	2.0	0.20	0.8[c]	0.005	—	0.005	0.05	0.35	—	0.20
CA937	64	B 144 (937)	High leaded tin bronze	78.0[c]–82.0	9.0–11.0	8.0–11.0	0.8	0.15	1.0[c]	0.005	—	0.005	0.50[d]	0.6	—	0.20
CA938	67	B 144 (938)	High leaded tin bronze	75.0[c]–79.0	6.3–7.5	13.0–16.0	0.8	0.15	0.8[c]	0.005	—	0.005	0.05[d]	0.8	—	0.20
CA943		B 144 (943)	High leaded tin bronze	68.5[c]–73.5	4.5–6.0	22.0–25.0	0.50	0.15	0.8[c]	0.005	—	0.005	0.05	0.8	—	0.20
CA947		B 292 (947)	Nickel tin bronze	85.0–90.0	4.5–6.0	0.10[f]	2.5	0.25	4.5–6.0	0.005	0.20	0.005	—	0.15	—	0.25
CA948		B 292 (948)	Leaded nickel tin bronze	84.0–89.0	4.5–6.0	1.0	2.5	0.25	4.5–6.0	0.005	0.20	0.005	—	0.15	—	0.25
CA952	68A	B 148 (952)	Aluminum bronze	86.0 min	—	—	—	2.5–4.0	—	8.5–9.5	—	—	—	—	—	1.00
CA953	68B	B 148 (953)	Aluminum bronze	86.0 min	—	—	—	0.7–1.5	—	9.0–11.0	—	—	—	—	—	1.00
CA954		B 148 (954)	Aluminum bronze	83.0 min	—	—	—	3.0–5.0	2.5	10.0–11.5	0.50	—	—	—	—	0.50
CA955			Aluminum bronze	78.0 min	—	—	—	3.0–5.0	3.0–5.5	10.0–11.5	3.5	—	—	—	—	0.50
CA962		B 369 (962)	Copper nickel	—[g]	—	0.03[h]	—	1.0–1.8	9.0–11.0	—	1.5	0.25	—	—	Cb, 1.0	0.20

[a]Former SAE numbers and ASTM numbers refer to specifications which are chemically similar.
[b]See SAE J463, Table 1, footnote a.
[c]In determining copper minimums, copper may be calculated as copper plus nickel.
[d]For continuous castings, the maximum phosphorus shall be 1.5%.
[e]Copper plus named elements, 99.5% min.
[f]If alloy is to be heat treated, lead should be 0.01% max to attain required mechanical properties.
[g]Copper plus named elements, 99.8% min.
[h]For "welding grade," lead should not exceed 0.01% max.

TABLE 2—MINIMUM MECHANICAL PROPERTIES OF CAST COPPER ALLOYS

SAE No. and Suffix Symbol[a]	Former SAE No.[b]	ASTM No. (Alloy)[b]	Casting Method[c]	Casting Condition	Tensile Strength, min, psi	Yield Strength, min, psi[d]	Elongation min, % (in 2 in)
CA836A	40	B 145 (836)	Sand cast	As-cast	30,000	14,000	20
CA836B		B 505 (836)	Continuous cast	As-cast	36,000	19,000	15
CA836C			Continuous cast	As-cast	50,000	25,000	12
CA838		B 145 (838)	Sand cast	As-cast	29,000	12,000	15
CA852		B 146 (852)	Sand cast	As-cast	35,000	12,000	25
CA854	41	B 146 (854)	Sand cast	As-cast	30,000	11,000	20
CA858		B 176 (858)	Die cast[e]	As-cast	55,000	30,000[f]	15
CA862	430A	B 147 (862)	Sand cast	As-cast	90,000	45,000[f]	18
CA863	430B	B 147 (863)	Sand cast	As-cast	110,000	60,000[f]	12
CA865	43	B 147 (865)	Sand cast	As-cast	65,000	25,000[f]	20
CA872		B 198 (872)	Sand cast	As-cast	45,000	18,000	20
CA874		B 198 (874)	Sand cast	As-cast	50,000	21,000	18
CA875		B 198 (875)	Sand cast	As-cast	60,000	24,000	16
CA878		B 176 (878)	Die cast[e]	As-cast	85,000	50,000[f]	25
CA879		B 176 (879)	Die cast[e]	As-cast	70,000	35,000[f]	25
CA903A	620	B 143 (903)	Sand cast	As-cast	40,000	18,000	20
CA903B		B 505 (903)	Continuous cast	As-cast	44,000	22,000	18
CA905A	62	B 143 (905)	Sand cast	As-cast	40,000	18,000	20
CA905B		B 505 (905)	Continuous cast	As-cast	44,000	25,000	10
CA907A	65		Sand cast	As-cast	35,000	18,000	10
CA907B		B 505 (907)	Continuous cast	As-cast	40,000	25,000	10
CA915A		B 427 (915)	Sand cast	As-cast	45,000	25,000	8
CA915B			Continuous cast	As-cast	47,000	28,000	7
CA922A	622	B 143 (922)	Sand cast	As-cast	34,000	16,000	22
CA922B		B 505 (922)	Continuous cast	As-cast	38,000	19,000	18
CA923A	621	B 143 (923)	Sand cast	As-cast	36,000	16,000	18
CA923B		B 505 (923)	Continuous cast	As-cast	40,000	19,000	16
CA925A	640		Sand cast	As-cast	35,000	18,000	10
CA925B		B 505 (925)	Continuous cast	As-cast	40,000	24,000	10
CA927A	63		Sand cast	As-cast	35,000	18,000	10

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