Bronze, copper and *nickel silver*

Which copper alloys called bronze actually contain tin, six alloys compared, and the wording that makes a specification name the metal.

AT A GLANCE

Alloy (EN number)	Main additions to copper	Colour as described	Hardness, form and typical use
Copper CW004A (C101)	None: about 99.9 % copper	Salmon pink (NAAMM); one stockholder says yellowish gold	40 to 110 HV in sheet; readily cold worked. General engineering, busbars, cold-formed parts
Brass, including the 90/10 "commercial bronze" and "architectural bronze"	Zinc, from about 10 to 45 %	Golden yellows (NAAMM)	See our brass alloys sheet. Hardware, sheet, extrusions
Phosphor bronze CW451K (CuSn5)	Tin 4.5 to 5.5 %, a little phosphorus	Not stated on the datasheet	Proof stress 240 to 670 MPa, 75 to 230 HV by temper; excellent cold working, poor hot working. Gears, bushes, springs
Gunmetal (casting)	Tin about 10 %, zinc about 2 %	Not stated	Cast; leaded kind up to 7 % lead for bearings. Sea water and steam
Aluminium bronze CW307G	Aluminium 8.5 to 11 %, iron 4 to 4.5, nickel 4 to 5 %; no tin	Not stated	Proof stress 400 to 530 MPa, 170 to 220 HV; weldable. Marine valves, pumps, fasteners
Silicon bronze CW116C (CuSi3Mn1)	Silicon about 3 %, manganese about 1 % (from the EN symbol); no tin	Not read	No datasheet read; named from its EN symbol only
Nickel silver CW409J (CuNi18Zn20)	Nickel 18 %, zinc 20 %, copper about 62 %; no silver	Silvery white; warm whites (NAAMM)	85 to 125 HV annealed, to 230 hard; excellent cold forming; tarnish resistant (mill). Tableware, keys, springs
"Antique bronze", "bronze effect"	None: a finish, not an alloy	As the finish	On brass, steel or stainless; see our patination and PVD sheets

From UK stockholder and mill datasheets and a US trade-body manual (NAAMM/NOMMA, 2006), not the EN standards: confirm against the current edition and the mill certificate. Colour words are the sources' own, not a match.

Name in a specification	What is added to copper	Tin?	Strictly a bronze?
Phosphor bronze	tin, 4 to 8 % (wrought)	✓	yes
Gunmetal	tin about 10 %, zinc about 2 %	✓	yes
Aluminium bronze	aluminium, 5 to 12 %	✗	no: no tin
Silicon bronze	silicon about 3 %, manganese about 1 %	✗	no: no tin
Architectural bronze	zinc: it is a brass	✗	no: a brass
Commercial bronze	zinc about 10 %: a brass	✗	no: a brass
Nickel silver	nickel and zinc, no silver	✗	no: no tin
“Antique bronze”	a finish on any base metal	n/a	no: a finish

Names met in specifications, and whether each contains tin (NAAMM/NOMMA 2006; stockholder and mill datasheets). Silicon bronze is named from its EN symbol only. Original drawing by Make Bespoke Studio.

SPECIFICATION WORDING

COPPER ALLOY NAMED

Metal: [alloy name and EN number, e.g. phosphor bronze CW451K (CuSn5)] in [sheet / bar / profile / casting] to [EN 1652 / EN 12163 / EN 12167 / EN 12449 / EN 1982, edition to be confirmed], temper [ ]. Lead content [not above __ %] per the certificate. Material certificate [EN 10204 type 3.1] per batch. Visible parts of one run from one source and batch where possible; no change of alloy or source without written approval.

COLOUR AND LIVING FINISH

Colour and finish as approved physical sample [ref] in [alloy], finish [name], viewed at [arm's length, about 0.6 m] in the project lighting. The finish is [a living finish that will darken and show handling / sealed with [ ]]; the client accepts that it will not stay as the sample. Alloy and finish are stated on separate lines of the schedule.

BRONZE AS A LOOK

Appearance [bronze] by [patinated brass / PVD on stainless steel / solid aluminium bronze CW307G], as the partner confirms in writing with the alloy proposed and whether it contains tin. Not to be described as a bronze alloy unless that is what is supplied.

TERMS USED

Bronze
Strictly an alloy of copper and tin; in architecture often used loosely for brasses and other copper alloys, so name the alloy.

Phosphor bronze
A hard, strong copper-tin alloy with a little phosphorus: 4 to 8 % tin when wrought, 9 to 12 % when cast.

Aluminium bronze
A copper alloy with 5 to 12 % aluminium and no tin, strong and corrosion resistant; not a true bronze.

Nickel silver
A copper alloy with nickel and zinc and no silver; silvery white, with good cold forming and tarnish resistance.

STANDARDS AND SOURCES

- NAAMM/NOMMA Metal Finishes Manual, AMP 500-06 (2006), Chapter 2: US trade body; naming, natural colours, uniformity precautions.
- UK stockholder datasheets (CW004A, CW451K, CW307G) and glossary: alloy facts; not the EN standards.
- Mill datasheets for CuNi18Zn20 (CW409J): composition, tarnish resistance, uses.
- BS EN 1652:1998; BS EN 1982:2008: BSI Knowledge: 1652 current (plate, sheet, strip); 1982 (castings) withdrawn 10 Oct 2017, no replacement listed. Texts not read.

Full guide: https://makebespoke.com/trade/technical/bronze-copper-and-nickel-silver. Make Bespoke Studio coordinates manufacture through its partner workshops. Figures are guidance only and your specification governs; some may be superseded, so contact the studio to verify.