

Introduction to Brass

(Copper Development Association)

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Most widely used of copper base alloys; more than 30 brasses used with zinc contents from 5 to 40%.

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TYPES - Based on Shaping

1. MAXIMUM COLD WORKING

Up to 35% zinc - single phase α .

Highest ductility brasses - suitable for deep drawing (cartridge brass 70/30).

Shaped by rolling, drawing, bending and spinning - sheet, strip, tube and wire.

2. COLD WORKING AND MACHINING

As above +lead.

3. HOT WORKING AND CASTING

35-40% zinc (+ lead).

Limited cold working but much more hot workable than type 1.

Forged, hot stamped, extruded and rolled. Also cast - die, sand, continuous, and centrifugal.

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STRENGTH

One factor in the selection of materials is their yield strength. Brasses (and bronzes) may be regarded as medium strength engineering materials falling in the range YS 250 to 500 MPa. Also in this category are the high strength structural steels, some stainless steels and the heat treatable (age hardenable) aluminium alloys 2 xxx, 7 xxx series.

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MACHINABILITY

Brass is the standard by which other materials are judged. Lead is present as finely divided particles which act as chip breakers. Slight reduction in ductility when lead present, hence select lowest lead content from range if extensive cold forming required.

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Regard above data as qualitative.

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RECYCLABILITY

Almost 100% of brass manufactured in UK is made from recycled copper and brass. Process scrap has a high value - approx. 40% of the virgin alloy (variable).

The requirement for recycling may in the future be driven by EU legislation.

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COST-EFFECTIVENESS OF BRASS

Factors

- i) CLOSE TOLERANCES - stamping is a near net shape process
- ii) TOOLING COSTS - low working temperature e.g. stamping 630 to 730 °C (β range)
- iii) EASE OF MACHINING
- iv) GOOD CORROSION RESISTANCE
(No surface treatment needed)
DZR Brass - corrosion resistance and machinability - heat treatment - quench from 550 °C to retain alpha phase
- v) HIGH SCRAP VALUE - prices 15 x M.S., 3.6 x austenitic S.S., 2.3 x Al (variable)
- vi) LONG SERVICE LIFE

When **all** of the above factors are considered it may be that brass is a cheaper material than alternatives such as steel, even though the initial raw material costs are higher.

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UK AND EUROPEAN STANDARDS

Copper and copper alloys like other materials are covered by standards. The use of standards is essential in the proper definition of the type, form and condition of an alloy. Standards form part of the complex technical language used in communication between producers of alloys, manufacturers, designers and stockists and any technical person concerned with materials usage. It is not sufficient to define an alloy as “brass”, “bronze” just as a steel would not be defined as “stainless” or “low alloy”.

For many years copper alloys have been covered by British Standards. These are gradually being replaced by European B.S.E.N. Standards which will include other National Standards such as DIN (German). At the moment the situation is confusing with some materials being defined by the old B.S. Standards and some by the new B.S.E.N. Standards. It is recommended for the time being that both Standards are quoted where appropriate.

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AMERICAN STANDARDS

Americans are not usually familiar with British or European Standards. They use the UNS (Unified Numbering System) which is the accepted alloy designation system in North America for wrought and cast copper and copper alloy products - it is managed by ASTM and SAE. When manufacturing for U.S.A. it is essential to find a U.K. or European Standard which is equivalent to an existing American Standard.

An incorrectly defined material may in the end only be fit for **scrap**.