

## C110 (ETP)

Composition

Cu\* (%) 99.90 min

**Physical Properties** 

| Temper | Melting    | Density            | Specific  | Electrical | Thermal     | Mod. of    | Coef.of              |
|--------|------------|--------------------|-----------|------------|-------------|------------|----------------------|
|        | point      |                    | heat cap. | cond.      | cond. at    | elasticity | therm.exp            |
|        | (liquidus) |                    | at 68 F   | Nom in     | 68 F        |            | at 68 F              |
|        |            |                    | (20 °C)   | black      | (20 °C)     |            | (20 °C)              |
|        | °F         | lb/in <sup>3</sup> | Btu/lb°F  |            | Btu/ft h °F | X1000 ksi  | 10 <sup>-6</sup> /°F |
|        | °C         | g/cm3              | kJ/(kg°K) | % IACS     | W/(m°K)     | GPa        | 10-6/°C              |
| All    | 1981       | 0.323              | 0.092     | 100        | 226         | 17         | 9.8                  |
|        | 1083       | 8.9                | 0.394     | 100        | 391         | 117        | 17.6                 |

#### **Mechanical Properties**

At max 0.040" (1 mm)

| Temper     | R <sub>p0.2</sub> | R <sub>m</sub> Tensile | A <sub>50</sub> | Hardness  | Min bend ratio 90° |     | Min bend ratio 180° |     |
|------------|-------------------|------------------------|-----------------|-----------|--------------------|-----|---------------------|-----|
|            | Yield             | strength               | Elongation      | for       |                    |     |                     |     |
|            | strength          |                        | 2"              | reference |                    |     |                     |     |
|            | ksi               | ksi                    | %               | HR30T     |                    |     |                     |     |
|            | N/mm <sup>2</sup> | N/mm <sup>2</sup>      |                 | HV        | GW                 | BW  | GW                  | BW  |
| Soft       | 10                | 26-38                  | 35              |           | 0.0                | 0.0 | 0.0                 | 0.0 |
|            | 69                | 179-262                |                 |           |                    |     |                     |     |
| H02 (1/2H) | 37                | 37-46                  | 20              | 50        | 0.0                | 0.5 | 0.0                 | 1.0 |
|            | 255               | 255-317                |                 | 90        |                    |     |                     |     |
| H04 (H)    | 45                | 43-52                  | 8               | 58        | 1.0                | 2.0 | 2.0                 | 3.0 |
|            | 310               | 297-359                |                 | 100       |                    |     |                     |     |
| H06 (EH)   | 50                | 47-56                  | 3               | 60        | 2.0                | 3.0 | 2.5                 |     |
|            | 349               | 324-386                |                 | 105       |                    |     |                     |     |
| H08 (SH)   | 52                | 50-58                  | 3               | 63        | 3.0                |     | 4.0                 |     |
|            | 359               | 345-400                |                 | 110       |                    |     |                     |     |
| H10 (ES)   | 54                | 52 min                 | 2               | 61 min    |                    |     |                     |     |
|            | 373               | 359 min                |                 | 112       |                    |     |                     |     |

Other tempers are avaliable upon request.

Data for information only and not for use as purchase specification.

Yield strength, Elongation and Hardness are typical values for each temper.



### C110 (ETP)

#### Alloy attributes

Electrolytic Tough Pitch Copper (ETP) - 110 alloy is the most widely used of the coppers because of its combination of electrical and thermal conductivity, corrosion resistance, workability and aesthetic beauty. The superb corrosion resistance makes it a favored material for building applications and when exposed to weather for long periods, even centuries, this copper will develop a relatively impervious protective film which eventually becomes the familiar green patina of weathered copper. The beauty and ease of finishing make this copper a favorite for articles in the home.

Superior electrical and thermal conductivity Excellent corrosion resistance Good formability High scrap value

#### Typical applications

Architectural metal-work, gutters, flashing, roofing, downspouts, perforated metal screens, automotive and industrial radiators, electrical conductors, contacts, terminals, chemical process equipment, vats, kettles, pans. pots, cooking utensils, electric percolator bodies, lamps, dishes, and planters for home and office.

#### **Design limitations**

Exposure to hydrogen at elevated temperatures causes embrittlement. Brazing in hydrogen containing atmospheres must be avoided. Brazing and welding must be done in inert atmospheres only. Exposure to high sulfide media should be avoided.

# Applicable specifications

ASTM B152, B370, ASME SB152