ALCAVIL

Copper Electrodes & Alloys for Resistance Welding

TECHNICAL DATA SHEET

TDS-C11000-R02

Date: 2025-03

Electrolytic Tough Pitch Copper (Cu-ETP)

UNS C11000 — H02 Half Hard Temper | Maximum Conductivity for Busbars, Shunts & Conductors

COPPER ETP

Reference: ASTM B370 - Copper Sheet and Strip for Building Construction | ASTM B152/B152M - Copper Sheet, Strip, Plate, and Rolled Bar | Data source: Copper Development Association (copper.org)

GENERAL PHYSICAL PROPERTIES

Property	Value	Unit
Electrical Conductivity	**101**	% IACS
Hardness (H02 Half Hard)	**~35 - 45**	HRB
Specific Gravity	8.89 - 8.94	-
Density	0.322 lb/cu.in (8.89-8.94 g/cm³)	at 68°F
Thermal Conductivity	226 BTU/sqft/ft/hr/°F (391 W/m-K)	at 68°F
Coeff. Thermal Expansion	0.0000098/°F (17.6 µm/m·°C)	68-572°F
Modulus of Elasticity	17,000,000 psi (117 GPa)	Tension
Melting Point	1981°F (1083°C)	-
Softening Temperature	~392°F (~200°C)	-

ALLOY IDENTIFICATION

UNS Designation	C11000
Type	ETP (Electrolytic Tough Pitch)
Common Name	Electrolytic Copper, Cu-ETP
EN Designation	CW004A
Copper Content	≥ 99.9% (ASTM B370)
Oxygen (O_2)	0.02 - 0.04%

MECHANICAL PROPERTIES — H02

Property	Value
Tensile Strength	**37 - 46 ksi (255-317 MPa)**
Yield Strength (0.5% ext.)	**≥ 30 ksi (207 MPa)**
Shear Strength	~25 ksi (172 MPa)
Elongation in 2"	~25%
Rockwell F Hardness	~65
Rockwell B Hardness	~35 - 45

MECHANICAL PROPERTIES BY TEMPER (ASTM B370) — FULL REFERENCE

Temper	Description	Tensile Min.	Tensile Max.	Yield Min.	HRB approx.
060 Soft	Annealed	30 ksi (207 MPa)	38 ksi (262 MPa)	—	N/A*
H00	1/8 Hard	32 ksi (221 MPa)	40 ksi (276 MPa)	20 ksi (138 MPa)	~10-20
H01	1/4 Hard	34 ksi (234 MPa)	42 ksi (290 MPa)	28 ksi (193 MPa)	~25-35
H02	**Half Hard ★**	**37 ksi (255 MPa)**	**46 ksi (317 MPa)**	**30 ksi (207 MPa)**	**~35-45**
H03	3/4 Hard	41 ksi (283 MPa)	50 ksi (345 MPa)	32 ksi (221 MPa)	~40-50
H04	Hard	43 ksi (296 MPa)	52 ksi (359 MPa)	35 ksi (241 MPa)	~45-55

★ ALCAVIL standard temper | * Annealed: too soft for HRB, use Rockwell F scale (HRF ~40) | HRB values are approximate (converted from HRF/HR30T)

RECOMMENDED APPLICATIONS

- **Busbars** - Current distribution bars for welding transformers and power systems
- **Welding shunts** - Transformer secondaries, flexible conductors for resistance welding circuits
- **Welder arms** - Conductor arms for spot welding machines (non-contact components)
- **Electrical connections** - Platens, terminals, high-current contacts and conductor bases

NOTE: C11000 is NOT suitable for welding electrodes. Its hardness (~35-45 HRB at H02) and softening temperature (~200°C) make it unsuitable for direct workpiece contact. For electrodes, use RWMA Class 1 (C15000) through Class 4 (C17200). C11000 in H02 temper is specifically optimized for conduction components in the secondary circuit, providing the best balance of conductivity, strength, and machinability.

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Data per ASTM B370 and copper.org.
HRB values are approximate conversions.