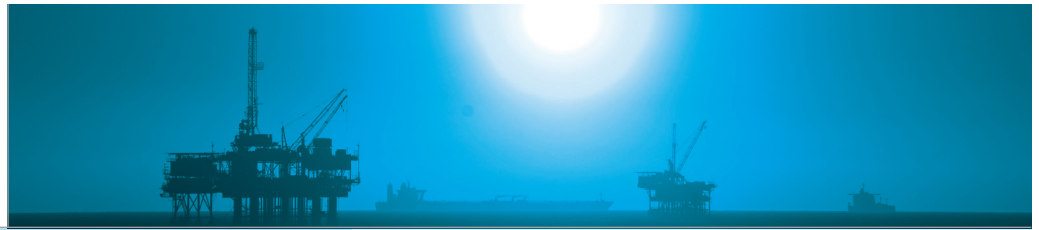




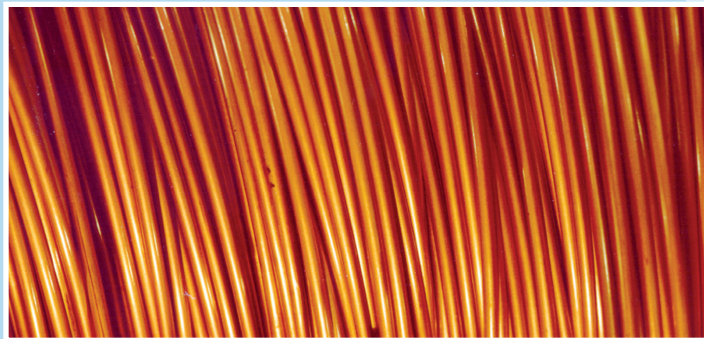
MATERION



# Alloy 3

## High Conductivity, High Strength Wire for Power Cables

Alloy 3 (C17510) wire, by Materion Performance Alloys, provides good strength with high electrical conductivity and good resistance to stress relaxation. Alloy 3 is ideally suited for long-reach power and signal cables for offshore oil and gas operations.



### Benefits:

- High electrical conductivity
- Superior structural strength
- Excellent resistance to fretting wear
- Easy to cold work
- Weldable to copper

### CHEMICAL COMPOSITION (weight percent)

Alloy	UNS Number	Beryllium	Nickel	Cobalt	Copper
3	C17510	0.2 – 0.6	1.4 – 2.2	–	Balance

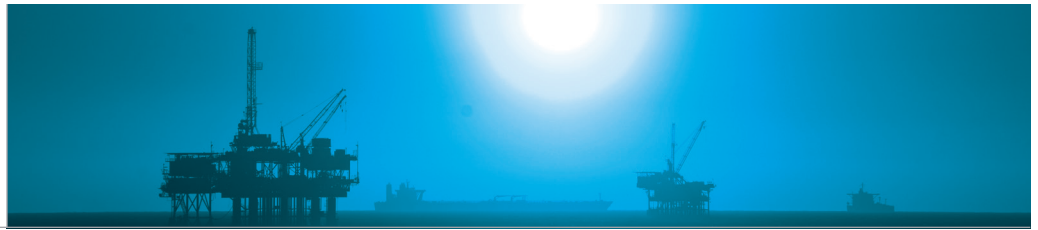
### PHYSICAL PROPERTIES

Alloy	Elastic Modulus	Melting Point (Solidus)	Electrical Conductivity/ Resistivity	Density	Thermal Expansion Coefficient	Thermal Conductivity (25 °C)
3	20,000 ksi 138 GPa	1900°F 1040°C	50 - 75% IACS 3.5 - 2.3 μΩ-cm	0.319 lb/in <sup>3</sup> 8.83 g/cm <sup>3</sup>	9.8x10 <sup>-6</sup> in/in °F 17.6x10 <sup>-6</sup> m/m °C	140 BTU/ft hr °F 240 W/m K

### MECHANICAL PROPERTIES

Temper	Heat Treatment Required	0.2% Offset Yield Strength		Ultimate Tensile Strength		Elongation Percent
		ksi	MPa	ksi	MPa	
HT (TH04)	2 hr. @ 900°F (480°C)	125-80	870-550	140-100	970-690	10 min.

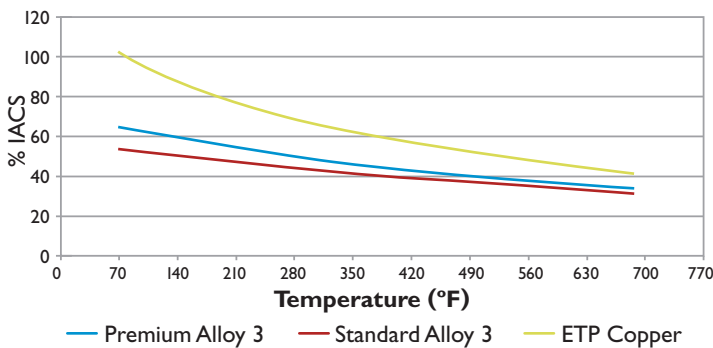
Wire is typically provided in an annealed or cold drawn temper and heat treated after forming. In special cases, wire may also be provided pretempered (heat treated).



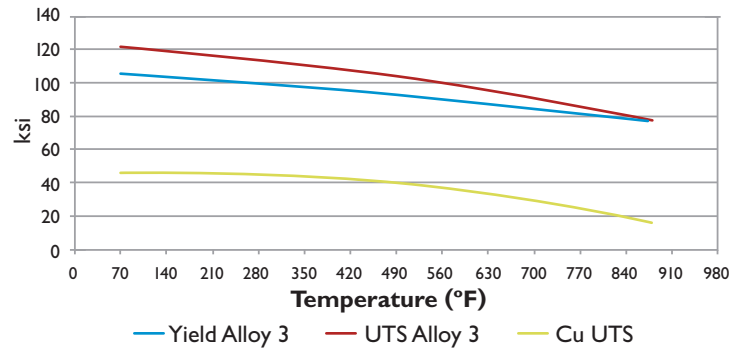
## The benefits of using Alloy 3 in deep ocean power cable applications include:

- **High Electrical Conductivity** – high electrical conductivity with age hardening. The guaranteed minimum electrical conductivity of the standard product at room temperature is 50% of the IACS. The minimum specific electrical conductivity is 157% IACS-in<sup>3</sup> /LB (5.6% IACS-cc/g) at room temperature. The electrical conductivity of the premium product approaches 75% of the IACS. The specific electrical conductivity approaches 235% IACS-in<sup>3</sup> /LB (8.5% IACS-cc/g).
- **High Strength** – provides higher strength than other copper alloys.
- **Processability** – readily cold worked and will accept as much as 60-70 % cold work before annealing is required for more reductions.
- **Weldability** – is excellent for joining to C110 or C102 copper.

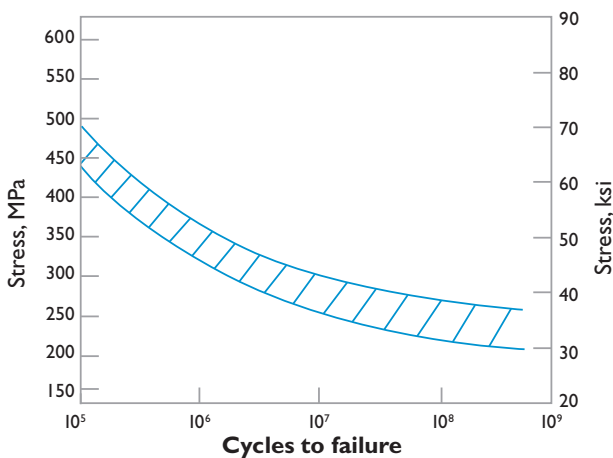
### TYPICAL ELECTRICAL CONDUCTIVITY



### TENSILE PROPERTIES



### FATIGUE R=-1 (ROTARY)



### STRESS RUPTURE

