

## **Copperweld® Wire & Strand**

Strength of Steel  
Conductivity of Copper  
Theft-resistant

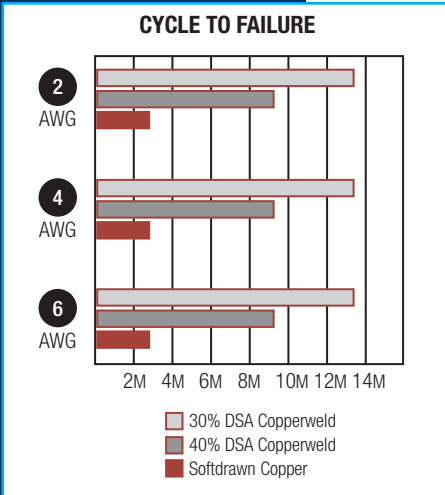




## SYSTEM RELIABILITY

### *Durability of Steel. Flexibility of Copper. Theft Resistant.*

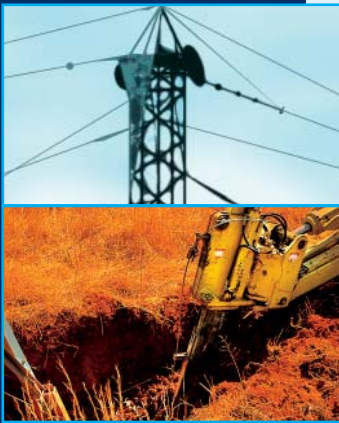
Copperweld® offers the same corrosion-resistance as copper. The high-heat cladding process prevents flaking, cracking or peel-off both at installation and after wire or strand is installed. With much greater fatigue resistance than copper, Copperweld lasts longer in virtually any application. Factor in the wear and tear caused by trucks driving over buried wire or vibrating overhead wire, and Copperweld's durability stands head and shoulders above softer, more fragile copper wire.



### *Fatigue Comparison - Copperweld vs. Copper*

The unique composition of Copperweld copper clad steel wires results in a longer lasting, more durable conductor compared to solid copper. The steel core provides added fatigue resistance, while the permanently bonded, solid copper cladding provides excellent conductivity. The chart shown compares the fatigue properties of copper and Copperweld conductors (independently tested using a rotating beam fatigue test).

The stress test is determined by selecting a percentage (%) of the test material's tensile strength and converting that value into a bending moment. After the specimen is mounted into the machine collets, the speed control is adjusted to bring the machine up to the desired speed; the poise weight is then positioned on the calibrated beam to the bending moment previously calculated and locked into place. When the specimen fractures, the machine automatically stops and the number is recorded from the cycle counter (digital indicator up to 99,999,900). Specimens tested at various loads provide data for plotting a Stress vs. Number of cycles (S/N) curve.



## OTHER APPLICATIONS

Copperweld delivers outstanding reliability and performance in a variety of applications.

### Transmission Lines

- buried counterpoise wire
- structure ground leads

### Distribution Lines

- pole ground wire
- transformer grounds
- surge arrester down leads

### Switch Yards & Substations

*(Transmission & Distribution)*

- substation ground grid wire
- fence and structure grounds

### Generation Plants

- building lightning protection
- building ground wire



## SPECIFICATION COMPLIANCE

Copperweld resists corrosion as well as copper but lasts longer under stress.

### SUBSTATION GROUNDING

ES-1895 Specification for Copperweld Annealed Strand

### COUNTERPOISE

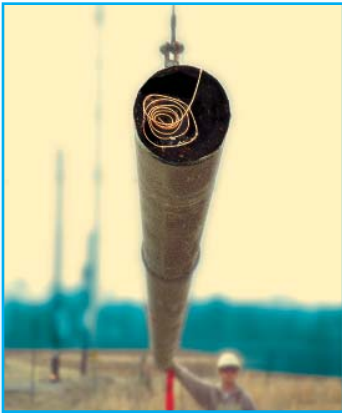
ASTM B 910-00 Specification for Annealed Copper Clad Steel Wire

## SELECTION

*Select the right combination of size, conductivity and strength to meet your project's exact needs.*

Copperweld is available in a large variety of sizes. The thickness of the copper cladding can be adjusted for specific strength and conductivity performance, to match your exact requirements for short-circuit ampacity, area in contact with the earth and temperature rise.

## INSTALLATION



Copperweld is cost-effective to install, providing significant savings in both material and installation time. Copperweld's strength and durability means smaller, lighter, less expensive (and easier to handle) wires can be used. Longer lengths can be installed without breakage or frequent splicing. And Copperweld achieves its mechanical strength without sacrificing flexibility: the carbon content of the steel core has been lowered and annealed, so there is virtually no difference in malleability between Copperweld and copper.

## SERVICE

*Copperweld's strict QC and large production capacities ensure superior product as well as outstanding lead times.*



Our professionals help you assess the specifications and product requirements—as well as timetables, deadlines and cost—to determine the best DSA wire or strand combination for the job. Copperweld's experienced staff works closely with you to integrate our products, delivery schedules and systems with your needs.

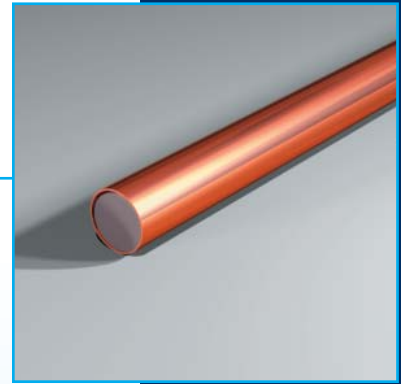
## PACKAGING & SHIPPING

*Quality product packaged in the most convenient and secure form, shipped at the lowest possible handling and freight cost.*

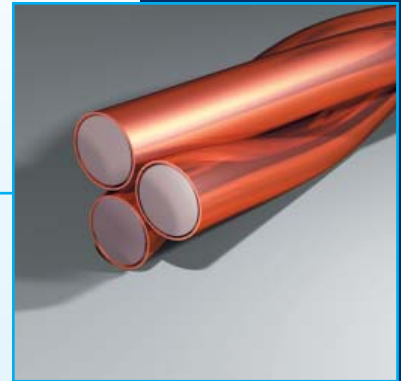


Copperweld carries the quality commitment all the way through to packaging and shipping. We guarantee the right product in the right package, shipped the right way. We work closely with customers to match product protection with appropriate handling, storage and ease of payoff. Copperweld uses the right combination of packages and wrappings to ensure proper delivery of your order. Our traffic specialists

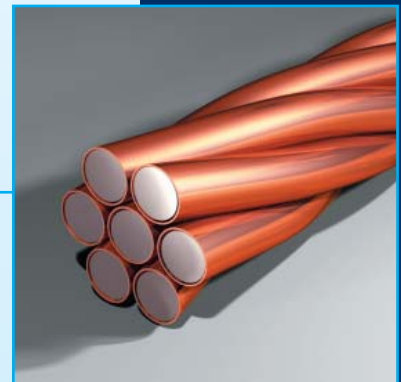
schedule and arrange shipments with commercial and private carriers, both domestic and international. We also provide required overseas packaging, documentation, customs procedures and steamship carrier arrangements.



Single Wire Strand



3-Wire Strand



7-Wire Strand



19-Wire Strand

Physical Characteristics										
Conductor Size AWG	Nominal Diameter		Average Breaking Load				Weight		Cross Section	
			40% Conductivity		30% Conductivity		Pounds Per 1,000 ft.	kg/km	Circular Mils	mm <sup>2</sup>
	Inches	mm	Pounds	kN	Pounds	kN				
<b>19-Wire Strand</b>										
19 No. 5	.910	23.11	24,700	109.9	29,600	131.7	1,700.0	2,529.7	628,900	318.71
19 No. 6	.810	20.57	19,600	87.2	23,500	104.5	1,403.0	2,087.7	498,800	252.71
19 No. 7	.721	18.31	15,500	69.0	18,600	82.7	1,113.0	1,656.2	395,500	200.45
19 No. 8	.642	16.31	12,300	54.7	14,800	65.8	882.7	1,313.5	313,700	158.97
19 No. 9	.572	14.53	9,770	43.5	11,700	52.0	700.0	1,041.6	248,800	126.06
<b>7-Wire Strand</b>										
7 No. 4	.613	15.57	11,500	51.2	13,800	61.4	818.9	1,218.6	292,200	148.04
7 No. 5	.546	13.87	9,100	40.5	10,900	48.5	649.4	966.4	231,700	117.42
7 No. 6	.486	12.34	7,210	32.1	8,660	38.5	515.0	766.4	183,800	93.10
7 No. 7	.433	11.00	5,730	25.5	6,870	30.6	408.4	607.8	145,700	73.87
7 No. 8	.385	9.78	4,540	20.2	5,450	24.2	323.9	482.0	115,600	68.65
7 No. 9	.343	8.71	3,600	16.0	4,320	19.2	256.9	382.3	91,650	46.44
7 No. 10	.306	7.77	2,850	12.7	3,420	15.2	203.7	303.1	72,680	36.83
<b>Solid Wire</b>										
No. 2	.258	6.54	2,350	10.5	2,610	11.6	184.2	274.1	66,370	33.62
No. 4	.204	5.19	1,480	6.9	1,640	7.3	115.8	172.3	41,740	21.15
No. 6	.162	4.11	930	4.1	1,030	4.6	72.9	108.4	26,250	13.30

Approximate Short-Time Fusing Currents							
Conductor Size AWG	Duration of Current in Cycles or Seconds						
	3 cycles (.05 second)	6 cycles (.10 second)	9 cycles (.15 second)	30 cycles (.5 second)	60 cycles (1.0 second)	120 cycles (2.0 second)	
	Current in Amperes						
<b>40% Conductivity</b>							
19 No. 5	330,000	234,000	191,000	104,000	74,000	52,000	
19 No. 6	262,000	185,000	151,000	83,000	59,000	41,000	
19 No. 7	208,000	147,000	120,000	66,000	46,000	33,000	
19 No. 8	165,000	117,000	95,000	52,000	37,000	26,000	
19 No. 9	131,000	92,000	74,000	41,000	29,000	21,000	
7 No. 4	154,000	109,000	89,000	49,000	34,000	24,000	
7 No. 5	122,000	86,000	70,000	38,000	27,000	19,000	
7 No. 6	97,000	68,000	56,000	31,000	22,000	15,000	
7 No. 7	77,000	54,000	44,000	24,200	17,000	12,000	
7 No. 8	61,000	43,000	35,000	19,000	14,000	10,000	
7 No. 9	48,000	34,000	28,000	15,000	11,000	7,600	
7 No. 10	38,000	27,000	22,000	12,000	8,500	6,000	
No. 2 Wire	35,000	25,000	20,000	11,000	7,800	5,500	
No. 4 Wire	22,000	16,000	13,000	6,900	4,900	3,500	
No. 6 Wire	14,000	9,800	8,000	4,400	3,100	2,200	
<b>30% Conductivity</b>							
19 No. 5	294,000	208,000	170,000	93,000	66,000	47,000	
19 No. 6	233,000	165,000	135,000	74,000	52,000	37,000	
19 No. 7	185,000	131,000	107,000	58,000	41,000	29,000	
19 No. 8	147,000	104,000	85,000	46,000	33,000	23,000	
19 No. 9	116,000	82,000	67,000	37,000	26,000	18,000	
7 No. 4	137,000	97,000	79,000	43,000	31,000	22,000	
7 No. 5	108,000	77,000	63,000	34,000	24,000	17,000	
7 No. 6	86,000	61,000	50,000	27,000	19,000	14,000	
7 No. 7	68,000	48,000	39,000	22,000	15,000	11,000	
7 No. 8	54,000	38,000	31,000	17,000	12,000	9,000	
7 No. 9	43,000	30,000	25,000	14,000	9,600	6,800	
7 No. 10	34,000	24,000	20,000	11,000	7,600	5,400	
No. 2 Wire	31,000	22,000	18,000	9,800	6,900	4,900	
No. 4 Wire	20,000	14,000	11,000	6,200	4,400	3,100	
No. 6 Wire	12,000	9,000	7,100	3,900	2,700	1,900	



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