



# COPPERWELD



**COPPERWELD® GROUNDING WIRE & STRAND**

*[www.copperweld.com](http://www.copperweld.com)*

## WELL-GROUNDED CONCERNS

A primary concern of electrical engineers is reducing the chance of hazards to personnel and valuable equipment caused by dangerous voltages and high potential gradients during fault conditions. Whether at electric utility plants, telecommunications stations, military installations or in general industry, elimination of possible damage from lightning strikes or short-circuits is paramount. A reliable grounding system to dissipate the surge current to the earth is required.

Dead soft annealed (DSA) Copperweld® wire and strand have been used for over 90 years as efficient, strong, non-rusting grounding conductors. Combining the strength of its steel core with the conductivity and corrosion resistance of its copper cladding, Copperweld® grounding wire provides a long-lasting, low impedance path to earth. When annealed, Copperweld® exhibits the flexibility necessary for easy handling and is adaptable to standard installation techniques. DSA Copperweld® strand has become widely accepted as a more advantageous alternative to solid copper for grounding grids in substation and industrial installations.

Whatever the grounding application may be, there is a Copperweld® conductor available in the size, conductivity, and strength that is required. The selection of a particular size DSA Copperweld® wire or strand depends on many factors, such as short-circuit ampacity, area in contact with the earth, and temperature rise.



## SAFETY FIRST

The most important step in designing a substation, transmission or distribution grid is to implement a proper grounding system. Directing surges to earth prevents contact with dangerous voltage, and protects valuable equipment, maintenance personnel or any other individual who might come in contact.



DSA Copperweld® wire and strand have the high current-carrying capacity characteristics in short-time durations, high strength properties and corrosion resistance to effectively and economically meet IEEE recommendations. These advantages are particularly evident when compared to a low-strength material such as solid copper. Solid copper conductors must be upsized in many installations to meet the mechanical demands within a system design.

Optimum grounding grid design depends on the dual, complementing action of the conductor and the connected ground rods. An grounding system utilizing DSA Copperweld® strand provides efficient and economical grounding—permanently.

# THE NATURAL CHOICE FOR ANY APPLICATION

## Substation Grounding

In substation grounding, solid copper conductor's ability to handle the maximum fault current is compromised by its low breaking strength. As a result, it is not unusual to select a larger, more costly copper conductor that far exceeds the ampacity rating needed in order to meet the design criteria for minimum breaking strength. Rugged Copperweld® conductors, with their steel core, have a breaking strength exceeding IEEE criteria.

## Pole Grounding Wires

DSA Copperweld® conductors are ideal as down leads for transmission and distribution lines using wood, concrete or fiberglass poles. Their high strength, low impedance, resistance to fatigue and corrosion, and low theft potential combine to make CCS products superior for this application. Although mechanically strong, the pliability of DSA Copperweld® permits the grounding wire to be easily formed from the connection overhead, along the pole and down to the buried electrode.

## Counterpoise Wire

The resistance of the tower footing or structure grounding is dependent on local soil conditions and may vary widely over the length of a transmission line. Where underlying rock prevents the driving of grounding rods to the required depth, or where sandy or rocky surface soils have high resistivity, counterpoise wires have proven very effective in improving the lightning protection afforded by the overhead grounding wires.

In selecting counterpoise material, it is particularly important to choose a conductor that is mechanically strong, resistant to corrosion, and as immune to theft as possible. At the same time, the wire should be pliable to facilitate easy handling and installation in the field. DSA Copperweld® counterpoise wire fulfills all these requirements, and provides a long-lasting, efficient and economical counterpoise grounding system.

## Other Applications

Copperweld® is an excellent choice for any grounding or fault-current application, including

- Wind Farms
- Solar Installations
- Mobile Telephony Towers



## DSA COPPERWELD® STRAND FOR GROUNDING APPLICATIONS: PHYSICAL AND ELECTRICAL CHARACTERISTICS

COPPER CONDUCTOR EQUIVALENCY SIZE	DIAMETER (mm)	ACTUAL CROSS-SECTION AREA (mm <sup>2</sup> )	MINIMUM BREAK LOADS (kgf)	WEIGHT (kg/km)	APPROXIMATE SHORT-TIME FUSING CURRENT AT 1 SECOND/60 CYCLES (kA)
<b>19-Wire Strand</b>					
150 mm <sup>2</sup> EQ	20.57	252.66	6205	2110	47.70
120 mm <sup>2</sup> EQ	18.33	200.47	4923	1674	37.85
95 mm <sup>2</sup> EQ	16.32	158.97	3904	1327	30.01
70 mm <sup>2</sup> EQ	12.94	99.97	2455	835	18.87
<b>7-Wire Strand</b>					
50 mm <sup>2</sup> EQ	11.00	73.86	1814	614	13.94
35 mm <sup>2</sup> EQ	9.36	53.49	1313	445	10.10
16 mm <sup>2</sup> EQ	6.55	26.23	644	218	4.95

## THEY DON'T STEAL STEEL

The value of solid copper makes it so appealing for thieves, it might as well be gold. Copper can be sold for big money to scrap metal dealers who don't frequently inquire as to the source of what's being turned in. Solid copper is susceptible to theft at every stage of operations—whether installed, in the back of a utility vehicle or in a storehouse. Pole grounding wire and exposed copper above ground level are particularly vulnerable. Once the wire is removed or damaged, the system risks unforeseen fault current, potentially harming equipment and personnel, and causing outages for the general public.

Replacing stolen copper grounding material is a costly proposition for utility companies. Copperweld® conductors are theft-resistant, as the strong steel core of our wire is difficult to cut and remove, alerting thieves that our CCS is not a solid copper conductor. There is very little scrap value, so it's not a valuable target.

Our new product, Copperweld® CAMO™ represents the next step in theft protection. By altering the appearance of the external copper layer through our patent-pending process, thieves will mistake it for simple galvanized steel, and pass it by.



## BEATS COPPER IN THE GROUND

DSA Copperweld® wire and strand offers so many advantages over solid copper for grounding applications, it's the clear choice for all grounding applications.

- **Conductivity of copper** ...For grounding applications
- **Strength of steel** ...Far superior to solid copper
- **Fatigue resistance** ...Won't break, crack, flake or peel
- **Corrosion resistance** ...Long life under adverse conditions
- **Ample fusing current** ...Exceeds most design requirements
- **Connects like copper** ...Uses standard copper terminations and lugs
- **Low scrap value** ...Excellent theft resistance

Ask your Copperweld representative or authorized agent for samples, specifics about particular applications, or more information. If you require particular data that are not covered by the tables in this brochure, contact our Engineering Support Center at [engineering@copperweld.com](mailto:engineering@copperweld.com).



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