AFL

COPPERWELD® WIRE AND STRAND

Dead Soft Annealed | Hard Drawn | High Strength

Extra High Strength | Composite Conductors | Guy Wire

Founded in 1984, AFL is a global leader providing fiber optic products, equipment, and engineering services to the telecommunications, electric utility, wireless, energy, private network and OEM markets. AFL also serves a diverse mix of industry segments that include service providers, military and defense, mining, oil and gas, and biomedical.

AFL brings years of experience in developing solutions for customers, fostering a creative culture to drive and deploy innovative technologies that will improve communications for years to come. Our product line consists of fiber optic cable, optical connectivity, fusion splicers and test equipment as well as fiber management systems, closures and accessories.

AFL is dedicated to bringing our customers a quality product as well as delivering superior value.

AFL

Copperweld® Wire and Strand

Copperweld® wire and strand combines the strength of steel with the conductivity and corrosion resistance of copper. These properties make Copperweld® wire and strand ideal for many utility, telecommunication, and general industry applications.

What is Copperweld® Wire?

Copperweld® wire is a composite in which a concentric copper cladding is metallurgically bonded to a steel core through a continuous, solid-cladding process using pressure rolling for primary bonding. The copper cladding thickness remains constant surrounding the steel. It measures from 6% of the overall wire diameter for 30% conductivity wires, and 10% of the overall wire diameter for 40% conductivity wires. Different steel grades for the steel core result in Dead Soft Annealed, High Strength and Extra High Strength characteristics.

What is Copperweld® Strand?

Copperweld® strand is concentrically stranded cable of one to three layers with left-hand lay in the outer layer, unless otherwise specified. All individual wires are the same size.

Applications

- Utility Market
- Telecommunications Market
- Military

Features

Stronger Than Copper

The steel component of Copperweld® wire creates a strong conductor which can withstand more mechanical abuse than solid copper wire. Its superior mechanical strength makes Copperweld® wire less likely to be damaged during installation, or fatigue from vibration or bending.

Easy installation

Copperweld® wire and strand has been specially designed with a low carbon steel core to give the maximum amount of flexibility while maintaining high strength. A special heat treat process results in a very malleable wire that is easy to handle and install without special tools or equipment. Copperweld® wire and strand is also lighter than solid copper of the same size.

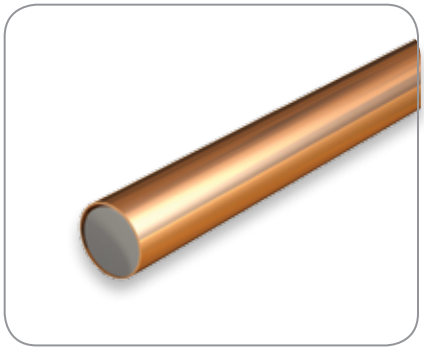
Theft Resistant

Because the copper cladding is permanently bonded to the central steel core, Copperweld® wire and strand offers very little scrap value, discouraging theft and leaving the grounding system intact.

Corrosion Resistant

Copperweld® wire and strand exhibits the same corrosion resistant properties as copper, but maintains the high strength of steel.

Dead Soft Annealed Copperweld® Wire and Strand



Copperweld® wire and strand has been utilized and relied upon for years as a strong, non-rusting, efficient grounding conductor. Combining the strength of steel with the conductivity and corrosion resistance of copper, Copperweld® wire and strand provides a long-lasting, low impedance path to the earth. It is also less susceptible to theft because it is a bimetallic product and does not have the high scrap value of solid copper. When annealed, Copperweld® wire and strand exhibits the flexibility necessary for easy handling.

To eliminate the possibility of damage from lightning strikes or short-circuit conditions, an efficient, reliable grounding system is necessary to rapidly dissipate the surge current to ground. Whatever the grounding application may be, there is a Copperweld® conductor available in the size, conductivity and strength that is required.

Applications

Grounding Conductors for Primary Surge Arresters

Selecting Dead Soft Annealed (DSA) Copperweld® wire as the grounding conductor for primary surge arresters permits a continuous length of conductor to be installed from the arrester to the buried grounding electrode. This is a practice which is not usually recommended with aluminum conductors. The steel core of the DSA Copperweld® ground wire provides a rugged lead. It can withstand more mechanical abuse and is less susceptible to vibration-induced fatigue than solid copper or aluminum wire.

When DSA Copperweld® wire is used in place of copper, the grounding conductor is far less likely to be stolen. This feature is important not only from an economic standpoint, but also from the standpoint of safety and reliability. Often, the fact that a copper downlead has been removed is not evident until a surge current causes a failure in the system.

Connectors

Standard connectors used for copper wire can be used on all Copperweld® products. This also includes exothermic connections.

Selecting the Right Size for Your Application

Design engineers should be concerned with two factors when selecting a conductor for a ground grid. The conductor must: meet the maximum fault current for a certain duration, and meet a minimum breaking load as required by the substation design (typically 5,000 pounds).

Traditionally, we have used a chart comparing the ampacity ratings of copper and Copperweld® CCS that allowed the user to visually select the Copperweld® equivalent. For example:

- The equivalent to 4/0 copper per the graph is 19#9 40% DSA
- A typical maximum fault current for a distribution substation is ~18 kA at 30 cycles
- A 2/0 copper or 7#6 CCS conductor will meet this requirement instead of the larger size 4/0 copper commonly used for ground grids

Dead Soft Annealed Copperweld® Wire and Strand

- 7#6 CCS Conductor safety margin – 30%
- Most engineers upsize to 4/0 copper in order to meet the mechanical strength requirement
- 7#6 CCS meets the fault current and mechanical strength requirements

AFL now has a simple, new computerized selection program for sizing Copperweld®. Contact us today for your free version.

Pole Ground Wire

DSA Copperweld® wire is ideally suited as a downlead on transmission or distribution lines using wood, concrete, or fiberglass poles. Although mechanically strong, the pliability of DSA Copperweld® wire permits the downlead to be easily formed from the connection at the overhead ground wire, along the pole and down to the buried electrode.

On metal transmission towers, short lengths of DSA Copperweld® wire are often used to connect the tower legs to driven electrodes.

Substation Ground Grid Wire and Fence Grounds

Copperweld® 4THOUGHT™ is the new 4/0 equivalent 19-wire dead soft annealed (DSA) copper-clad steel strand that brings numerous advantages to the power utility industry for electrical grounding. Both mechanically rugged and flexible, Copperweld® 4THOUGHT™ is the smarter alternative to solid copper conductors for grounding applications in generation plants, substations, switchyards and industrial installations. As a grounding conductor, DSA Copperweld® 4THOUGHT™ strand is specifically designed to replace 4/0 copper cable at an initial cost savings, while continuing to provide long-term value thanks to its excellent resistance to fatigue and breakage.

IEEE Std. 80 states that "each element of a grounding system, including grid conductors" should:

a) Have sufficient conductivity, so that it will not contribute substantially to local voltage differences.
b) Resist fusing and mechanical deterioration under the most adverse combination of a fault magnitude and duration.
c) Be mechanically reliable and rugged to a high degree.
d) Be able to maintain its function even when exposed to corrosion or physical abuse.

For a distribution substation, the 4/0 solid copper cable commonly used for grounding complies with the mechanical characteristics recommended by the IEEE, but its ampacity rating far exceeds what is required. A smaller copper conductor would suffice for ampacity, but wouldn't be mechanically rugged enough. Copperweld® 4THOUGHT™ not only exceeds the mechanical strength of 4/0 copper, but its ampacity falls within recommended parameters for the maximum fault current rating typically designed for a substation grid.

Dead Soft Annealed Copperweld® Wire and Strand

Easy to Install, Hard to Damage

Solid 4/0 copper is malleable and flexible, but it's also susceptible to damage during the installation phase when trenching in. Previous configurations of Copperweld® DSA strand have long been available for substation grounding purposes, and provided a mechanically stronger conductor than 4/0 copper. However, these configurations also evidenced more stiffness due to the stronger steel core.

With Copperweld 4THOUGHT™, stiffness is no longer an issue. The size equivalency of this annealed conductor, coupled with the low carbon content of the steel provides flexibility very similar to 4/0 copper. Along with comparable handling characteristics, CCS can use the same connectors as copper, so no special tools, adaptors or equipment is necessary.

Once Copperweld 4THOUGHT™ is installed underground, other benefits emerge. Traffic over the grid area by trucks and heavy equipment that may adversely affect copper will have little or no affect on it. In addition, our proprietary high-temperature cladding process bonds Copperweld's thick, highly conductive copper cladding to the steel core, so it doesn't flake, crack or peel off when the wire is bent or twisted, yielding unsurpassed corrosion resistance.

In short, Copperweld 4THOUGHT™ offers a genuine 4/0 size strand that meets or surpasses solid copper in every important category.

Hide. In Plain Sight.

Copperweld HIDE™ is a new range of bimetallic conductors from Fushi Copperweld jacketed with a thin layer of grey UV-stabilized PVC so it doesn't resemble bare copper wire.

Solid copper wire is a hot commodity on the black market, leading to a sharp rise in theft across the globe. Scrap dealers offer big money for copper, and many that are less scrupulous may fail to question the source of the material being turned in. In applications where copper is used for grounding, any exposed wire is vulnerable. Copper is by its nature soft and easy to cut, so thieves can remove it quickly. Damage to the grounding grid can endanger equipment, personnel and your customers. In the long run, the money lost continually replacing stolen grounding wire can be substantial.

Installing even bare Copperweld® wire and strand substantially reduces the risk of theft. With its high-strength steel core, our CCS strand is very hard to sever, and there is little incentive to make away with it. The copper in bimetallics cannot be recycled or melted down, thanks to the permanent metallurgical bond between it and the steel. If thieves try to cash the stolen cable in, they'll find that it is practically worthless on the scrap market.

But Copperweld® looks just like copper to the thief on the prowl. They may in haste decide to cut it anyway only to be disappointed when they go to cash in on their loot, which still means outages or unsafe, ungrounded poles that are at risk for fault.

HIDE™ goes one step further. The grey PVC jacket wrapping the outside of our strong CCS effectively makes the wire in question look at first glance like simple galvanized steel – and as such of no interest to copper thieves.

Cut It – Strip It – Connect It.

We've listened to our users, and we know that fast installations mean more ground gets covered when trenching in grounding wire. Time is money. So there's not a lot of extra fuss involved in installing Copperweld HIDE™ in the field. Just cut the wire, strip the PVC coating at the terminal end, and connect it as you would copper. Simple.

Copper Theft

The money lost in copper thefts aren't even the greatest concern. A recent FBI criminal intelligence assessment warns: "Copper thieves are threatening U.S. critical infrastructure by targeting electrical substations.... The theft of copper from these targets disrupts the flow of electricity... and presents a risk to both public safety and national security."

For a few dollars in money, thieves risk their lives and those of service providers, field workers, and customers. Ungrounded facilities can be an epic disaster in case of fault. In these uncertain times, a safe and steady supply of electricity is paramount to maintaining our way of life. HIDE™ from Fushi Copperweld represents another first-line defense in the fight to keep our energy grids safe and secure.

Physical and Electrical Characteristics – Copperweld® Hide™ DSA Conductors

40% CONDUCTIVITY								
NO. OF STRANDS	CATALOG NUMBER	CONDUCTOR SIZE AWG	DIAMETER	LENGTH PER SPOOL	MIN BREAKING LOADS	WEIGHT	CROSS SECTION AREA	APPROXIMATE SHORT-TIME FUSING CURRENT AT 30 CYCLES (kA)
			inch	ft	lbf	lbs/kft	cmil	
7	CCS07104D-JV *	7#10 Stranded 7W	0.1019	160	1994	205	72685	9.83
7	CCS2STR4D-JV	2 AWG Stranded 7W	0.258	134	1435	145	51772	7.00
7	CCS4STR4D-JV	4 AWG Stranded 7W	0.204	214	897	91	32368	4.38
1	CCS01024-JV	2 AWG Solid	0.258	134	2023	200	66368	8.98
1	CCS01044D-JV	4 AWG Solid	0.204	214	1272	116	41738	5.65
1	CCS01064D-JV	6 AWG Solid	0.162	338	800	73	26244	3.55

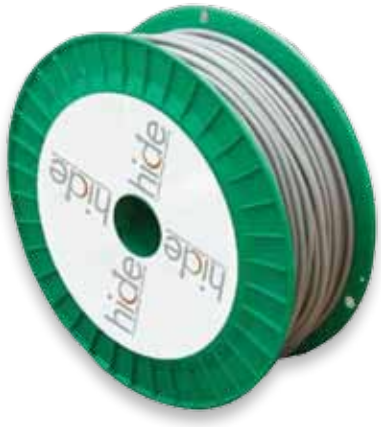
NOTE: Standard green spools weigh approximately 25 lbs. (11.3 kg) and have 2 inch (5.1 cm) arbor holes. Other packaging options are available.

* Available in 50 lb. coil.

Approximate Short-Time Fusing Currents – Copperweld® DSA Conductors

40% CONDUCTIVITY							
NO. OF STRANDS	SIZE	DURATION OF CURRENT IN kA					
		3 CYCLES (0.05 SEC.)	6 CYCLES (0.10 SEC.)	9 CYCLES (0.15 SEC.)	30 CYCLES (0.5 SEC.)	60 CYCLES (1.0 SEC.)	120 CYCLES (2.0SEC.)
7	7 No. 10	26.94	19.05	15.56	8.52	6.02	4.26
7	2 AWG	22.14	15.66	12.79	7.00	4.95	3.50
7	4 AWG	13.84	9.79	7.99	4.38	3.10	2.19
1	2 AWG	24.60	17.40	14.20	7.78	5.50	3.89
1	4 AWG	17.85	12.62	10.31	5.65	3.99	2.82
1	6 AWG	11.23	7.94	6.48	3.55	2.51	1.78

NOTE: Short-time fusing data for DSA Copperweld® strand are shown for fault currents at various durations. These currents were derived from the formulae and constants provided in IEEE Standard 80 (IEEE Guide for Safety in AC Substation Grounding), which lists copper-clad steel as an accepted conductor material. Tests conducted by an independent outside laboratory verified that the DSA Copperweld® conductors meet and actually exceed the IEEE standard by 5 to 8%.



Insist on the Real Thing

We hear the trademarked name, Copperweld®, tossed around all the time in the utility industry — many people say it any time they mean copper-clad steel. But make no mistake: there is only one manufacturer in the world of genuine Copperweld® CCS, and we are an exclusive licensed distributor. Their patented cladding process is proprietary, and has stood the test of almost 100 years in the marketplace. Nobody else can say that.

Because the conductive copper of Copperweld® bimetallic wire is always solid, it doesn't crack, flake or peel like plated products can. So... unless you buy genuine Copperweld® from us, you're buying something else entirely. Who knows what? Only Fushi Copperweld makes genuine Copperweld® CCS. And only Fushi Copperweld makes HIDE™, with genuine Copperweld® at its core. So you can rest assured of the highest quality bimetallic conductors available on the market.

The Whole Package

Copperweld HIDE™ is available on our easily identified green spools (12" diameter, 2" arbor hole, approximately 25 lb. capacity) and packed 20 to a pallet. Other packaging configurations are available upon request. Ask your representative to explain your options. We're sure to be able to suit your needs.

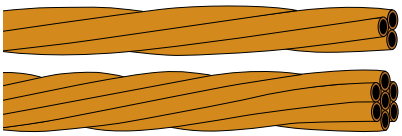
Dead Soft Annealed Copperweld® Wire and Strand for Grounding Applications

Single Wire Copperweld® Strand

3-Wire Copperweld® Strand

7-Wire Copperweld® Strand

19-Wire Copperweld® Strand



Specifications and Ordering Information

40% CONDUCTIVITY														
CONDUCTOR CONFIGURATION		CATALOG NUMBERS	CONDUCTOR SIZE AWG	OVERALL DIAMETER		MIN BREAKING LOADS		WEIGHT		CROSS SECTION AREA		I^2t	APPROXIMATE SHORT-TIME FUSING CURRENT AT 30 CYCLES (kA)	NOMINAL DC RESISTANCE AT 68°F (Ω /KFT)
STRANDING	AWG			inch	mm	lbf	kN	lbs/kft	kg/km	cmil	mm^2	kA^2s		
1	2	CCS01024D	No. 2	0.258	6.54	2023	9.0	186.1	276.94	66368	33.63	40.29	8.98	0.3907
1	4	CCS01044D	No. 4	0.204	5.19	1272	5.7	117.0	174.16	41738	21.15	15.94	5.65	0.6212
1	6	CCS01064D	No. 6	0.162	4.12	800	3.6	73.6	109.54	26250	13.30	6.30	3.55	0.9877
3	4	CCS03044D	3 No. 4	0.440	11.18	3626	16.1	353.9	526.67	125215	63.45	143.43	16.94	0.2087
3	5	CCS03054D	3 No. 5	0.392	9.96	2874	12.8	280.5	417.51	99263	50.30	90.13	13.43	0.2633
3	6	CCS03064D	3 No. 6	0.349	8.87	2280	10.1	222.5	331.16	78732	39.89	56.70	10.65	0.3319
3	7	CCS03074D	3 No. 7	0.311	7.90	1809	8.0	176.6	262.75	62467	31.65	35.70	8.45	0.4184
3	8	CCS03084D	3 No. 8	0.277	7.03	1434	6.4	140.0	208.36	49537	25.10	22.45	6.70	0.5276
3	9	CCS03094D	3 No. 9	0.247	6.26	1137	5.1	111.0	165.14	39262	19.89	14.10	5.31	0.6657
3	10	CCS03104D	3 No. 10	0.220	5.58	902	4.0	88.0	131.02	31151	15.78	8.88	4.21	0.8390
3	12	CCS03124D	3 No. 12	0.174	4.42	567	2.5	55.4	82.38	19586	9.92	3.51	2.65	1.3344
7	4	CCS07044D	7 No. 4	0.613	15.57	8015	35.7	827.4	1231.34	292169	148.04	780.87	39.52	0.0896
7	5	CCS07054D	7 No. 5	0.546	13.86	6354	28.3	655.9	976.13	231613	117.36	490.72	31.33	0.1131
7	6	CCS07064D	7 No. 6	0.486	12.34	5040	22.4	520.2	774.23	183708	93.09	308.72	24.85	0.1425
7	7	CCS07074D	7 No. 7	0.433	11.00	3998	17.8	412.8	614.29	145757	73.86	194.34	19.72	0.1797
7	8	CCS07084D	7 No. 8	0.386	9.79	3171	14.1	327.3	487.13	115586	58.57	122.21	15.63	0.2266
7	9	CCS07094D	7 No. 9	0.343	8.72	2513	11.2	259.4	386.09	91612	46.42	76.77	12.39	0.2858
7	10	CCS07104D	7 No. 10	0.306	7.76	1994	8.9	205.8	306.33	72685	36.83	48.33	9.83	0.3603
19	5	CCS19054D	19 No. 5	0.910	23.10	17246	76.7	1787.4	2659.98	628665	318.55	3615.33	85.03	0.0418
19	6	CCS19064D	19 No. 6	0.810	20.57	13679	60.8	1417.7	2109.81	498636	252.66	2274.45	67.45	0.0527
19	7	CCS19074D	19 No. 7	0.722	18.33	10853	48.3	1124.8	1673.96	395627	200.47	1431.80	53.51	0.0665
19	8	CCS19084D	19 No. 8	0.643	16.32	8606	38.3	892.0	1327.45	313733	158.97	900.39	42.44	0.0838
19	9	CCS19094D	19 No. 9	0.572	14.53	6821	30.3	707.0	1052.12	248660	126.00	565.62	33.63	0.1057
19	-	CCS4/0	4THOUGHT™	0.528	13.40	5801	25.8	601.2	894.78	211475	107.16	409.10	28.60	0.1243
19	10	CCS19104D	19 No. 10	0.510	12.94	5412	24.1	560.9	834.76	197289	99.97	356.05	26.69	0.1333
7	-	CCS2/0	2/0	0.414	10.51	3652	16.2	377.0	561.01	133115	67.45	162.09	18.01	0.1967

Coils

All Copperweld® wire, 3 and 7 strand, is available in 50 lb, 100 lb, and 200 lb coils.

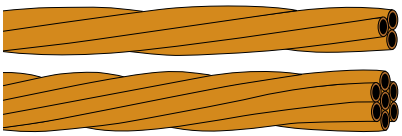
Dead Soft Annealed Copperweld® Wire and Strand for Grounding Applications

Single Wire Copperweld® Strand

3-Wire Copperweld ® Strand

7-Wire Copperweld® Strand

19-Wire Copperweld® Strand



Specifications and Ordering Information

30% CONDUCTIVITY														
CONDUCTOR CONFIGURATION		CATALOG NUMBERS	CONDUCTOR SIZE AWG	DIAMETER		MIN BREAKING LOADS		WEIGHT		CROSS SECTION AREA		I^2t	APPROXIMATE SHORT-TIME FUSING CURRENT AT 30 CYCLES (kA)	NOMINAL DC RESISTANCE AT 68°F (Ω /KFT)
STRANDING	AWG			inch	mm	lbf	kN	lbs/kft	kg/km	cmil	mm^2	kA^2s		
1	2	CCS01024D	No. 2	0.258	6.54	2276	10.1	184.1	274.04	66368	33.63	30.26	7.78	0.5209
1	4	CCS01044D	No. 4	0.204	5.19	1431	6.4	115.8	172.34	41738	21.15	11.97	4.89	0.8283
1	6	CCS01064D	No. 6	0.162	4.12	900	4.0	72.8	108.39	26250	13.30	4.73	3.08	1.3169
3	4	CCS03044D	3 No. 4	0.440	11.18	4079	18.1	350.2	521.17	125215	63.45	107.73	14.68	0.2761
3	5	CCS03054D	3 No. 5	0.392	9.96	3234	14.4	277.6	413.15	99263	50.30	67.70	11.64	0.3483
3	6	CCS03064D	3 No. 6	0.349	8.87	2565	11.4	220.2	327.70	78732	39.89	42.59	9.23	0.4391
3	7	CCS03074D	3 No. 7	0.311	7.90	2035	9.1	174.7	260.00	62467	31.65	26.81	7.32	0.5534
3	8	CCS03084D	3 No. 8	0.277	7.03	1614	7.2	138.5	206.18	49537	25.10	16.86	5.81	0.6979
3	9	CCS03094D	3 No. 9	0.247	6.26	1279	5.7	109.8	163.42	39262	19.89	10.59	4.60	0.8805
3	10	CCS03104D	3 No. 10	0.220	5.58	1015	4.5	87.1	129.66	31151	15.78	6.67	3.65	1.1098
3	12	CCS07044D	3 No. 12	0.174	4.42	638	2.8	54.8	81.52	19586	9.92	2.64	2.30	1.7650
7	4	CCS07044D	7 No. 4	0.613	15.57	9017	40.1	818.8	1218.48	292169	148.04	586.53	34.25	0.1183
7	5	CCS07054D	7 No. 5	0.546	13.86	7148	31.8	649.1	965.93	231613	117.36	368.59	27.15	0.1493
7	6	CCS07064D	7 No. 6	0.486	12.34	5670	25.2	514.8	766.15	183708	93.09	231.89	21.54	0.1882
7	7	CCS07074D	7 No. 7	0.433	11.00	4498	20.0	408.5	607.87	145757	73.86	145.98	17.09	0.2372
7	8	CCS07084D	7 No. 8	0.386	9.79	3567	15.9	323.9	482.04	115586	58.57	91.80	13.55	0.2991
7	9	CCS07094D	7 No. 9	0.343	8.72	2827	12.6	256.7	382.06	91612	46.42	57.67	10.74	0.3774
7	10	CCS07104D	7 No. 10	0.306	7.76	2243	10.0	203.7	303.13	72685	36.83	36.30	8.52	0.4756
19	5	CCS19054D	19 No. 5	0.910	23.10	19402	86.3	1768.7	2632.20	628665	318.55	2715.55	73.70	0.0550
19	6	CCS19064D	19 No. 6	0.810	20.57	15389	68.5	1402.9	2087.77	498636	252.66	1708.39	58.45	0.0693
19	7	CCS19074D	19 No. 7	0.722	18.33	12210	54.3	1113.1	1656.48	395627	200.47	1075.46	46.38	0.0874
19	8	CCS19084D	19 No. 8	0.643	16.32	9682	43.1	882.7	1313.59	313733	158.97	676.30	36.78	0.1102
19	9	CCS19094D	19 No. 9	0.572	14.53	7674	34.1	699.6	1041.13	248660	126.00	424.85	29.15	0.1390
19	10	CCS4/0	19 No. 10	0.510	12.94	6089	27.1	555.1	826.04	197289	99.97	267.44	23.13	0.1752

Coils

All Copperweld® wire, 3 and 7 strand, is available in 50 lb, 100 lb, and 200 lb coils.

Dead Soft Annealed Copperweld® Conductors

Approximate Short-Time Fusing Currents – 40% Conductivity

CONDUCTOR SIZE		DURATION OF CURRENT IN CYCLES OR SECONDS IN kA						
NO. OF STRANDS	AWG	I^2t	3 CYCLES (0.05 SEC.)	6 CYCLES (0.10 SEC.)	9 CYCLES (0.15 SEC.)	30 CYCLES (0.5 SEC.)	60 CYCLES (1.0 SEC.)	120 CYCLES (2.0SEC.)
19	19 No. 5	3616.62	268.95	190.17	155.28	85.05	60.14	42.52
19	19 No. 6	2275.27	213.32	150.84	123.16	67.46	47.70	33.73
19	19 No. 7	1432.31	169.25	119.68	97.72	53.52	37.85	26.76
19	19 No. 8	900.71	134.22	94.91	77.49	42.44	30.01	21.22
19	19 No. 9	565.82	106.38	75.22	61.42	33.64	23.79	16.82
19	CCS4/0	409.24	90.47	63.97	52.23	28.61	20.23	14.30
7	7 No. 4	781.15	124.99	88.38	72.16	39.53	27.95	19.76
7	7 No. 5	490.90	99.09	70.06	57.21	31.33	22.16	15.67
7	7 No. 6	308.83	78.59	55.57	45.37	24.85	17.57	12.43
7	7 No. 7	194.41	62.36	44.09	36.00	19.72	13.94	9.86
7	7 No. 8	122.26	49.45	34.97	28.55	15.64	11.06	7.82
7	7 No. 9	76.80	39.19	27.71	22.63	12.39	8.76	6.20
7	7 No. 10	48.35	31.10	21.99	17.95	9.83	6.95	4.92
7	2 AWG	24.53	22.15	15.66	12.79	7.00	4.95	3.50
7	4 AWG	9.59	13.85	9.79	7.99	4.38	3.10	2.19
7	CCS2/0	162.09	56.94	40.26	32.87	18.00	12.73	9.00
1	2 AWG	40.31	28.39	20.08	16.39	8.98	6.35	4.49
1	4 AWG	15.94	17.86	12.63	10.31	5.65	3.99	2.82
1	6 AWG	6.31	11.23	7.94	6.48	3.55	2.51	1.78

NOTE: These currents were derived from the formulae and constants provided in IEEE Standard 80 (IEEE Guide for Safety in AC Substation Grounding), which lists copper-clad steel as an accepted conductor material. Tests conducted by an independent outside laboratory verified that the DSA Copperweld® conductors meet and actually exceed the IEEE standard by between 5 and 8%.

Dead Soft Annealed Copperweld® Conductors

Approximate Short-Time Fusing Currents – 30% Conductivity

CONDUCTOR SIZE		DURATION OF CURRENT IN CYCLES OR SECONDS IN kA						
NO. OF STRANDS	AWG	I^2t	3 CYCLES (0.05 SEC.)	6 CYCLES (0.10 SEC.)	9 CYCLES (0.15 SEC.)	30 CYCLES (0.5 SEC.)	60 CYCLES (1.0 SEC.)	120 CYCLES (2.0SEC.)
19	19 No. 5	2715.55	233.05	164.79	134.55	73.70	52.11	36.85
19	19 No. 6	1708.39	184.85	130.71	106.72	58.45	41.33	29.23
19	19 No. 7	1075.46	146.66	103.70	84.67	46.38	32.79	23.19
19	19 No. 8	676.30	116.30	82.24	67.15	36.78	26.01	18.39
19	19 No. 9	424.85	92.18	65.18	53.22	29.15	20.61	14.57
19	19 No. 10	267.44	73.14	51.71	42.22	23.13	16.35	11.56
7	7 No. 4	586.53	108.31	76.59	62.53	34.25	24.22	17.12
7	7 No. 5	368.59	85.86	60.71	49.57	27.15	19.20	13.58
7	7 No. 6	231.89	68.10	48.15	39.32	21.54	15.23	10.77
7	7 No. 7	145.98	54.03	38.21	31.20	17.09	12.08	8.54
7	7 No. 8	91.80	42.85	30.30	24.74	13.55	9.58	6.77
7	7 No. 9	57.67	33.96	24.01	19.61	10.74	7.59	5.37
7	7 No. 10	36.30	26.94	19.05	15.56	8.52	6.02	4.26
1	2 AWG	30.26	24.60	17.40	14.20	7.78	5.50	3.89
1	4 AWG	11.97	15.47	10.94	8.93	4.89	3.46	2.45
1	6 AWG	4.73	9.73	6.88	5.62	3.08	2.18	1.54

NOTE: These currents were derived from the formulae and constants provided in IEEE Standard 80 (IEEE Guide for Safety in AC Substation Grounding), which lists copper-clad steel as an accepted conductor material. Tests conducted by an independent outside laboratory verified that the DSA Copperweld® conductors meet and actually exceed the IEEE standard by between 5 and 8%.

Copperweld® Wire and Strand
High Strength / Extra High Strength

High Strength (HS) and Extra High Strength (EHS) Copperweld® wire and strand combines the electrical characteristics of copper with the mechanical properties of high strength and extra high strength steel. This combination, often used as overhead ground wire and messenger wire, can resist mechanical damage during installation, as well as electrical damage during a fault condition. The heat process that bonds the thick copper to the exterior of the steel core ensures that the copper will not flake, crack, or peel when the wire is twisted, installed, or buried.

Applications

Overhead Ground Wire

The reliable, uninterrupted transmission of electrical power is vital to the electric utility industry. Power lines carrying large blocks of power must be permanently protected from lightning. Copperweld® HS and EHS wire and strand provide a means of obtaining this protection. The combination of conductivity, corrosion resistance and high strength are the foundation of this protection.

Guy Wire

Copperweld® HS and EHS strand can be used as a corrosion resistant guying material for distribution and transmission lines. The thick cladding of copper on each wire protects the high strength steel core from rusting and subsequent loss of strength.

Messenger Wire

Copperweld® HS and EHS wire and strand can be used as a messenger wire. Copperweld® wire and strand provides the overhead support and electrification of a catenary system. High strength and conductivity make Copperweld® wire and strand a good choice for this application.

Hard Drawn Copperweld® Wire and Strand High Strength

Specifications and Ordering Information

30% CONDUCTIVITY – HIGH STRENGTH							
CATALOG NUMBERS	CONDUCTOR SIZE AWG	DIAMETER	MIN BREAKING LOADS	WEIGHT	NOMINAL DC RESISTANCE AT 68°F (Ω/kft)	CROSS SECTION AREA	
		inch	lbf	lbs/kft		cmil	in^2
CCS03043H	3 No. 4	0.440	10878	350.2	0.2783	125215	0.0983
CCS03053H	3 No. 5	0.392	8983	277.6	0.3511	99263	0.0780
CCS03063H	3 No. 6	0.349	7410	220.2	0.4426	78732	0.0618
CCS03073H	3 No. 7	0.311	6105	174.7	0.5578	62467	0.0491
CCS03083H	3 No. 8	0.277	5022	138.5	0.7034	49537	0.0389
CCS03093H	3 No. 9	0.247	4121	109.8	0.8875	39262	0.0308
CCS03103H	3 No. 10	0.220	3406	87.12	1.1186	31151	0.0245
CCS03123H	3 No. 12	0.174	1719	54.78	1.7792	19586	0.0154
CCS07043H	7 No. 4	0.613	24047	818.8	0.1195	292169	0.2295
CCS07053H	7 No. 5	0.546	19858	649.1	0.1507	231613	0.1819
CCS07063H	7 No. 6	0.486	16380	514.8	0.1901	183708	0.1443
CCS07073H	7 No. 7	0.433	13495	408.5	0.2395	145757	0.1145
CCS07083H	7 No. 8	0.386	11101	323.9	0.3021	115586	0.0908
CCS07093H	7 No. 9	0.343	9110	256.7	0.3811	91612	0.0720
CCS07103H	7 No. 10	0.306	7529	203.7	0.4804	72685	0.0571
CCS07123H	7 No. 12	0.242	3799	128.1	0.7640	45700	0.0359
CCS19053H	19 No. 5	0.910	53899	1769	0.0558	628665	0.4938
CCS19063H	19 No. 6	0.810	44460	1403	0.0703	498636	0.3916
CCS19073H	19 No. 7	0.722	36628	1113	0.0886	395627	0.3107
CCS19083H	19 No. 8	0.643	30130	882.7	0.1117	313733	0.2464
CCS19093H	19 No. 9	0.572	24727	699.6	0.1410	248660	0.1953
CCS19103H	19 No. 10	0.510	20435	555.1	0.1777	197289	0.1550

Breaking load of 7-wire and 19-wire Copperweld® strands are taken as 90% of the sum of the breaking loads of the individual wires; breaking load of 3-wire Copperweld® strand is taken as 95% of the sum of the breaking loads of the individual wires used in the manufacturing of the strand.

NOTE:
Modulus of Elasticity: Strand, 23 x 10^6 psi
Coefficient of Linear Expansion: 7.2 X 10^{-6}/°F.
Temperature Coefficient of Resistance: 2.1 x 10^{-3}/°F.

Hard Drawn Copperweld® Wire and Strand High Strength

Specifications and Ordering Information

40% CONDUCTIVITY – HIGH STRENGTH							
CATALOG NUMBERS	CONDUCTOR SIZE AWG	DIAMETER	MIN BREAKING LOADS	WEIGHT	NOMINAL DC RESISTANCE AT 68°F (Ω/kft)	CROSS SECTION AREA	
		inch	lbf	lbs/kft		cmil	in^2
CCS03044H	3 No. 4	0.440	9790	353.9	0.2087	125215	0.0983
CCS03054H	3 No. 5	0.392	8120	280.5	0.2633	99263	0.0780
CCS03064H	3 No. 6	0.349	6726	222.5	0.3319	78732	0.0618
CCS03074H	3 No. 7	0.311	5563	176.6	0.4184	62467	0.0491
CCS03084H	3 No. 8	0.277	4591	140.0	0.5276	49537	0.0389
CCS03094H	3 No. 9	0.247	3779	111.0	0.6657	39262	0.0308
CCS03104H	3 No. 10	0.220	3126	88.04	0.8390	31151	0.0245
CCS03124H	3 No. 12	0.174	1713	55.36	1.3344	19586	0.0154
CCS07044H	7 No. 4	0.613	21641	827.4	0.0896	292169	0.2295
CCS07054H	7 No. 5	0.546	17949	655.9	0.1131	231613	0.1819
CCS07064H	7 No. 6	0.486	14868	520.2	0.1425	183708	0.1443
CCS07074H	7 No. 7	0.433	12298	412.8	0.1797	145757	0.1145
CCS07084H	7 No. 8	0.386	10149	327.3	0.2266	115586	0.0908
CCS07094H	7 No. 9	0.343	8354	259.4	0.2858	91612	0.0720
CCS07104H	7 No. 10	0.306	6911	205.8	0.3603	72685	0.0571
CCS07124H	7 No. 12	0.242	3786	129.4	0.5730	45700	0.0359
CCS19054H	19 No. 5	0.910	48718	1787	0.0418	628665	0.4938
CCS19064H	19 No. 6	0.810	40356	1418	0.0527	498636	0.3916
CCS19074H	19 No. 7	0.722	33379	1125	0.0665	395627	0.3107
CCS19084H	19 No. 8	0.643	27548	892.0	0.0838	313733	0.2464
CCS19094H	19 No. 9	0.572	22675	707.0	0.1057	248660	0.1953
	19 No. 10	0.510	18759	560.9	0.1333	197289	0.1550

Breaking load of 7-wire and 19-wire Copperweld® strands are taken as 90% of the sum of the breaking loads of the individual wires; breaking load of 3-wire Copperweld® strand is taken as 95% of the sum of the breaking loads of the individual wires used in the manufacturing of the strand.

NOTE:
Modulus of Elasticity: Strand, 23 x 10^6 psi
Coefficient of Linear Expansion: 7.2 X 10^{-6}/°F.
Temperature Coefficient of Resistance: 2.1 x 10^{-3}/°F.

Copperweld® Wire and Strand Extra High Stength

Specifications and Ordering Information

30% CONDUCTIVITY – EXTRA HIGH STRENGTH							
CATALOG NUMBERS	CONDUCTOR SIZE AWG	DIAMETER	MIN BREAKING LOADS	WEIGHT	NOMINAL DC RESISTANCE AT 68°F (Ω/kft)	CROSS SECTION AREA	
		inch	lbf	lbs/kft		cmil	in^2
CCS03043E	3 No. 4	0.440	12916	350.2	0.2783	125215	0.0983
CCS03053E	3 No. 5	0.392	10816	277.6	0.3511	99263	0.0780
CCS03063E	3 No. 6	0.349	8978	220.2	0.4426	78732	0.0618
CCS03073E	3 No. 7	0.311	7416	174.7	0.5578	62467	0.0491
CCS03083E	3 No. 8	0.277	6096	138.5	0.7034	49537	0.0389
CCS03093E	3 No. 9	0.247	4948	109.8	0.8875	39262	0.0308
CCS03103E	3 No. 10	0.220	4036	87.12	1.1186	31151	0.0245
CCS03123E	3 No. 12	0.174	2565	54.78	1.7792	19586	0.0154
CCS07043E	7 No. 4	0.613	28552	818.8	0.1195	292169	0.2295
CCS07053E	7 No. 5	0.546	23909	649.1	0.1507	231613	0.1819
CCS07063E	7 No. 6	0.486	19845	514.8	0.1901	183708	0.1443
CCS07073E	7 No. 7	0.433	16393	408.5	0.2395	145757	0.1145
CCS07083E	7 No. 8	0.386	13476	323.9	0.3021	115586	0.0908
CCS07093E	7 No. 9	0.343	10937	256.7	0.3811	91612	0.0720
CCS07103E	7 No. 10	0.306	8921	203.7	0.4804	72685	0.0571
CCS07123E	7 No. 12	0.242	5670	128.1	0.7640	45700	0.0359
CCS19053E	19 No. 5	0.910	64895	1769	0.0558	628665	0.4938
CCS19063E	19 No. 6	0.810	53865	1403	0.0703	498636	0.3916
CCS19073E	19 No. 7	0.722	44494	1113	0.0886	395627	0.3107
CCS19083E	19 No. 8	0.643	36577	882.7	0.1117	313733	0.2464
CCS19093E	19 No. 9	0.572	29686	699.6	0.1410	248660	0.1953
	19 No. 10	0.510	24214	555.1	0.1777	197289	0.1550

Breaking load of 7-wire and 19-wire Copperweld® strands are taken as 90% of the sum of the breaking loads of the individual wires; breaking load of 3-wire Copperweld® strand is taken as 95% of the sum of the breaking loads of the individual wires used in the manufacturing of the strand.

NOTE:
Modulus of Elasticity: Strand, 23 x 10^6 psi
Coefficient of Linear Expansion: 7.2 X 10^{-6}/°F.
Temperature Coefficient of Resistance: 2.1 x 10^{-3}/°F.

Copperweld®
Composite Conductors (CCC)

TYPE K:
4 Copperweld® Wires / 3 Copper Wires

Applications

- Neutral messenger for aerial cable
- Catenary messenger
- Grounding and power conductor for electrified railroads
- Electrical conductor for utilities

Available Size

Copperweld® Copper Composite conductors are available in standard reels of 600 lbs. Contact an AFL Sales Representative for more information or other reel sizes.

Copperweld® Copper Composite (CCC) conductor provides the designer flexibility of strength and conductivity. By manufacturing the conductor with varying proportions of hard drawn copper wire and 30% conductivity Extra High Strength (EHS) Copperweld® wire, these characteristics can be achieved.

Features

Strength

The steel component of the CCC provides a higher tensile strength. Additionally, it is a lighter weight product compared to solid copper. Combining these factors, it has minimum sag over maximum span lengths. A high and well-defined modulus of elasticity accommodates recurring seasonal temperature changes and stresses without permanent stretch.

Ampacity

CCC conductor offers higher ampacity for the same wire size as standard Copperweld® strand.

Fatigue Resistance

The steel cores within the strands of Copperweld® allow the composite conductors to perform better than solid copper under stress. It is less susceptible to fracture from repeated flexing and mechanical vibration.

Corrosion Resistance

The EHS Copperweld® wire component has the equivalent rust resisting life of an all-copper wire of equal size. CCC conductor is ideally suited for corrosive environments along seaboards, in moist foggy regions, and in industrial and metropolitan areas.

Theft Resistant

With a steel core permanently bonded to a thick copper exterior, the composite conductors offer less scrap value, discouraging theft and leaving the electrical system intact.

Ordering Instructions

Contact an AFL Sales Representative at 1.800.235.3423 to order Copperweld® Copper Composite Conductor.

Copperweld® Composite Conductors (CCC)

TYPE E: 7 Copperweld® Wires
12 Copper Wires

TYPE EK: 4 Copperweld® Wires
15 Copper Wires

TYPE F: 1 Copperweld® Wire
6 Copper Wires

TYPE G: 2 Copperweld® Wires
5 Copper Wires

TYPE J: 3 Copperweld® Wires
4 Copper Wires

TYPE N: 5 Copperweld® Wires
2 Copper Wires

TYPE P: 6 Copperweld® Wires
1 Copper Wire

TYPE K: 4 Copperweld® Wires
3 Copper Wires

TYPE A / TYPE C: 1 Copperweld® Wire
2 Copper Wires

TYPE D: 2 Copperweld® Wires
1 Copper Wire

Copperweld® Composite Conductors (CCC)

Physical and Electrical Characteristics

CATALOG NUMBER	TYPE OF CONDUCTOR	DIAMETER (IN.)	DESIGN OF CONDUCTOR		MINIMUM BREAKING LOAD (LBS)	WEIGHT (LBS/ 1000 FT)	CROSS SECTION (SQ IN)
			NUMBER AND DIAMETER OF EHS 30% CCS WIRES (IN)	NUMBER AND DIAMETER OF HARD DRAWN COPPER WIRES (IN)			
350,000 CIRCULAR MILS COPPER EQUIVALENT -.03143 OHMS/K FT AT 68°F							
CCC350E	E	0.788	7 X .1576	12 X .1576	32420	1403.00	0.3704
CCC350EK	EK	0.735	4 X .1470	15 X .1470	23850	1238.00	0.3224
300,000 CIRCULAR MILS COPPER EQUIVALENT -.03667 OHMS/K FT AT 68°F							
CCC300E	E	0.729	7 X .1459	12 X .1459	27770	1203.00	0.3175
CCC300EK	EK	0.680	4 X .1361	15 X .1361	20960	1061.00	0.2763
250,000 CIRCULAR MILS COPPER EQUIVALENT -.04400 OHMS/K FT AT 68°F							
CCC250E	E	0.666	7 X .1332	12 X .1332	23920	1002.00	0.2646
CCC250EK	EK	0.621	4 X .1242	15 X .1242	17840	884.20	0.2303
4/0 AWG CIRCULAR MILS COPPER EQUIVALENT (211,600 CIRCULAR MILS) -.05199 OHMS/K FT AT 68°F							
CCC4/0E	E	0.613	7 X .1225	12 X .1225	20730	848.30	0.2239
CCC4/0EK	EK	0.571	4 X .1143	15 X .1143	15370	748.40	0.1949
CCC4/0F	F	0.550	1 X .1833	6 X .1833	12290	710.20	0.1847
2/0 AWG CIRCULAR MILS COPPER EQUIVALENT (133,100 CIRCULAR MILS) -.08265 OHMS/K FT AT 68°F							
CCC2/0K	K	0.534	4 X .1780	3 X .1780	17600	645.90	0.1742
CCC2/0J	J	0.494	3 X .1648	4 X .1648	13430	560.60	0.1493
CCC2/0F	F	0.436	1 X .1454	6 X .1454	8094	446.80	0.1162
1/0 AWG CIRCULAR MILS COPPER EQUIVALENT (105,500 CIRCULAR MILS) -.1043 OHMS/K FT AT 68°F							
CCC1/0K	K	0.475	4 X .1585	3 X .1585	14490	512.00	0.1381
CCC1/0J	J	0.440	3 X .1467	4 X .1467	10970	444.30	0.1184
CCC1/0F	F	0.388	1 X .1294	6 X .1294	6536	354.10	0.0921
NO. 1 AWG CIRCULAR MILS COPPER EQUIVALENT (83,690 CIRCULAR MILS) -.1315 OHMS/K FT AT 68°F							
CCC1K	K	0.423	4 X .1412	3 X .1412	11900	406.20	0.1096
CCC1J	J	0.392	3 X .1307	4 X .1307	9000	352.50	0.0939
CCC1F	F	0.346	1 X .1153	6 X .1153	5266	280.90	0.0730
NO. 2 AWG CIRCULAR MILS COPPER EQUIVALENT (66,370 CIRCULAR MILS) -.1658 OHMS/K FT AT 68°F							
CCC2K	K	0.377	4 X .1257	3 X .1257	9730	322.10	0.0869
CCC2J	J	0.349	3 X .1164	4 X .1164	7322	279.50	0.0745
CCC2A	A	0.366	1 X .1699	2 X .1699	5876	256.80	0.0680
CCC2F	F	0.308	1 X .1026	6 X .1026	4233	222.80	0.0579
NO. 4 AWG CIRCULAR MILS COPPER EQUIVALENT (41,740 CIRCULAR MILS) -.2636 OHMS/K FT AT 68°F							
CCC4D	D	0.348	2 X .1615	1 X .1615	7340	225.50	0.0615
CCC4A	A	0.290	1 X .1347	2 X .1347	3938	161.50	0.0428
NO. 6 AWG CIRCULAR MILS COPPER EQUIVALENT (26,250 CIRCULAR MILS) -.4150 OHMS/K FT AT 68°F							
CCC6D	D	0.276	2 X .1281	1 X .1281	4942	141.80	0.0387
CCC6A	A	0.230	1 X .1068	2 X .1068	2585	101.60	0.0269
CCC6C	C	0.225	1 X .1046*	2 X .1046	2143	97.34	0.0258
NO. 8 AWG CIRCULAR MILS COPPER EQUIVALENT (16,510 CIRCULAR MILS) -.6598 OHMS/K FT AT 68°F							
CCC8D	D	0.219	2 X .1016	1 X .1016	3256	89.21	0.0243
CCC8A	A	0.199	1 X .1127	2 X .0797	2233	74.27	0.0200
CCC8C	C	0.179	1 X .0808*.	2 X .0834	1362	60.67	0.0160

Copperweld® Composite Conductors (CCC)

Loading Tables

CATALOG NUMBER	TYPE OF CONDUCTOR	DIAMETER IN	AREA OF WIRE (A) SQ IN	MODULUS X AREA (EA)	VERTICAL, HORIZONTAL, AND RESULTANT* LOADS (LOADING IN LBS PER LINEAR FOOT OF CONDUCTOR)								
					LIGHT LOADING DISTRICT			MEDIUM LOADING DISTRICT			HEAVY LOADING DISTRICT		
					VERTICAL CONDUCTOR ONLY	HORIZONTAL WIND 9 LBS PER SQ FT	RESULTANT	VERTICAL CONDUCTOR +¼" OF ICE	HORIZONTAL WIND 4 LBS PER SQ FT ¼" OF ICE	RESULTANT	VERTICAL CONDUCTOR +½" OF ICE	HORIZONTAL WIND 4 LBS PER SQ FT ½" OF ICE	RESULTANT
350,000 CIRCULAR MILS COPPER EQUIVALENT													
CCC350E	E	0.788	0.3704	7,223,000	1.4030	0.5910	1.5720	1.7260	0.4293	1.9790	2.2040	5.6900	2.5830
CCC350EK	EK	0.735	0.3224	5,964,000	1.2380	0.5513	1.4050	1.5440	0.4117	1.7980	2.0060	0.5786	2.3880
300,000 CIRCULAR MILS COPPER EQUIVALENT													
CCC300E	E	0.729	0.3175	6,191,000	1.2030	0.5468	1.3710	1.5070	0.4097	1.7620	1.9670	0.5763	2.3500
CCC300EK	EK	0.68	0.2763	5,112,000	1.0610	0.5100	1.2270	1.3500	0.3933	1.6060	1.7950	0.5600	2.1800
250,000 CIRCULAR MILS COPPER EQUIVALENT													
CCC250E	E	0.666	0.2646	5,160,000	1.0020	0.4995	1.1700	1.2870	0.3887	1.5440	1.7270	0.5553	2.1140
CCC250EK	EK	0.621	0.2303	4,261,000	0.8842	0.4658	1.0490	1.1550	0.3737	1.4140	1.5810	0.5403	1.9710
4/0 AWG CIRCULAR MILS COPPER EQUIVALENT (211,600 CIRCULAR MILS)													
CCC4/0E	E	0.613	0.2239	4,366,000	0.8483	0.4598	1.0150	1.1170	0.3710	1.3770	1.5400	0.5377	1.9310
CCC4/0G	G	0.583	0.2077	3,946,000	0.7894	0.4373	0.9524	1.0480	0.3610	1.3090	1.4630	0.5277	1.8550
CCC4/0EK	EK	0.571	0.1949	3,606,000	0.7484	0.4283	0.9123	1.0040	0.3570	1.2650	1.4140	0.5237	1.8080
CCC4/0F	F	0.55	0.1847	3,325,000	0.7102	0.4125	0.8713	0.9589	0.3500	1.2210	1.3630	0.5167	1.7580
2/0 AWG CIRCULAR MILS COPPER EQUIVALENT (133,100 CIRCULAR MILS)													
CCC2/0K	K	0.534	0.1742	3,658,000	0.6459	0.4005	0.8100	0.8896	0.3447	1.1540	1.2890	0.5113	1.6870
CCC2/0J	J	0.494	0.1493	2,986,000	0.5606	0.3705	0.7220	0.7919	0.3313	1.0580	1.1790	0.4980	1.5800
CCC2/0G	G	0.463	0.1307	2,483,000	0.4966	0.3473	0.6560	0.7183	0.3210	0.9301	1.0290	0.4877	1.4350
CCC2/0F	F	0.436	0.1162	2,092,000	0.4468	0.3270	0.6037	0.6601	0.3120	0.9301	1.0290	0.4787	1.4350
1/0 AWG CIRCULAR MILS COPPER EQUIVALENT (105,500 CIRCULAR MILS)													
CCC1/0K	K	0.475	0.1381	2,900,000	0.5120	0.3563	0.6737	0.7374	0.3250	1.0060	1.1180	0.4917	1.5220
CCC1/0J	J	0.44	0.1184	2,368,000	0.4443	0.3300	0.6034	0.6588	0.3133	0.9295	1.0290	0.4800	1.4350
CCC1/0G	G	0.412	0.1036	1,968,000	0.3936	0.3090	0.5504	0.5994	0.3040	0.8721	0.9607	0.4707	1.3700
CCC1/0F	F	0.388	0.09207	1,657,000	0.3541	0.2910	0.5083	0.5524	0.2960	0.8267	0.9062	0.4627	1.3180
NO. 1 AWG CIRCULAR MILS COPPER EQUIVALENT (83,690 CIRCULAR MILS)													
CCC1N	N	0.464	0.1315	2,893,000	0.4813	0.3480	0.6439	0.7033	0.3213	0.9732	1.0810	0.4880	1.5220
CCC1K	K	0.423	0.1096	2,302,000	0.4062	0.3173	0.5654	0.6154	0.3077	0.8880	0.9801	0.4743	1.3890
CCC1J	J	0.392	0.0939	1,878,000	0.3525	0.2940	0.5090	0.5521	0.2973	0.8271	0.9071	0.4640	1.3190
CCC1G	G	0.367	0.08216	1,561,000	0.3122	0.2753	0.4662	0.5040	0.2890	0.7810	0.8513	0.4557	1.2660
CCC1F	F	0.346	0.07303	1,315,000	0.2809	0.2595	0.4324	0.4662	0.2820	0.7448	0.8069	0.4487	1.2230
NO. 2 AWG CIRCULAR MILS COPPER EQUIVALENT (66,370 CIRCULAR MILS)													
CCC2P	P	0.462	0.1303	2,997,000	0.4711	0.3465	0.6348	0.6925	0.3207	0.9631	1.0690	0.4873	1.4750
CCC2N	N	0.413	0.1043	2,295,000	0.3817	0.3098	0.5416	0.5878	0.3043	0.8619	0.9494	0.4710	1.3600
CCC2K	K	0.377	0.08688	1,824,000	0.3221	0.2828	0.4786	0.5170	0.2923	0.7940	0.8674	0.4590	1.2810
CCC2J	J	0.349	0.07447	1,489,000	0.2795	0.2618	0.4329	0.4657	0.2830	0.7450	0.8074	0.4497	1.2240
CCC2A	A	0.366	0.06799	1,292,000	0.2568	0.2745	0.4259	0.4483	0.2887	0.7332	0.7953	0.4553	1.2160
CCC2G	G	0.327	0.06516	1,238,000	0.2476	0.2453	0.3985	0.4270	0.2757	0.7082	0.7618	0.4423	1.8180
CCC2F	F	0.308	0.05792	1,043,000	0.2228	0.2310	0.3709	0.3963	0.2693	0.6791	0.7252	0.4360	1.1460
NO. 4 AWG CIRCULAR MILS COPPER EQUIVALENT (41,740 CIRCULAR MILS)													
CCC4P	P	0.366	0.08196	1,885,000	0.2963	0.2745	0.4539	0.4878	0.2887	0.7668	0.8348	0.4553	1.2510
CCC4N	N	0.328	0.06556	1,442,000	0.2400	0.2460	0.3937	0.4197	0.2760	0.7023	0.7548	0.4427	1.1750
CCC4D	D	0.348	0.06147	1,352,000	0.2255	0.2610	0.3949	0.4114	0.2827	0.6692	0.7528	0.4493	1.1770
CCC4A	A	0.29	0.04276	812,400	0.1615	0.2175	0.3209	0.3294	0.2633	0.6217	0.6527	0.4300	1.0820
NO. 6 AWG CIRCULAR MILS COPPER EQUIVALENT (26,250 CIRCULAR MILS)													
CCC6D	D	0.276	0.03866	850,500	0.1418	0.2070	0.3009	0.3053	0.2587	0.6002	0.6243	0.4253	1.0550
CCC6A	A	0.23	0.02689	510,900	0.1016	0.1725	0.2502	0.2508	0.2433	0.5495	0.5555	0.4100	0.9904
CCC6C	C	0.225	0.02577	489,600	0.0973	0.1688	0.2448	0.2450	0.2417	0.5441	0.5481	0.4083	0.9835
NO. 8 AWG CIRCULAR MILS COPPER EQUIVALENT (16,510 CIRCULAR MILS)													
CCC8D	D	0.219	0.02491	534,800	0.0892	0.1643	0.2369	0.2350	0.2397	0.5357	0.5363	0.4063	0.9728
CCC8A	A	0.199	0.01995	419,000	0.0743	0.1493	0.2167	0.2139	0.2330	0.5163	0.5089	0.3997	0.9471
CCC8C	C	0.179	0.01604	304,800	0.0607	0.1343	0.1973	0.1940	0.2263	0.4981	0.4829	0.3930	0.9226

*Based on Rule 251, National Electrical Safety Code, 1990 Edition

Copperweld® Type M Guy Strand

Applications

Guying for:
- Power lines
- Telephone lines
- Railway signals
- Communication lines
- Towers
- Masts

Available Sizes

Copperweld® Type M guy strand is available in the following coil sizes:

COIL SIZES
250 feet
500 feet
1,000 feet

Copperweld® Type M Guy Strand is available in the following reel sizes:

REEL SIZES
2,500 feet
5,000 feet
10,000 feet

Features

Low Cost, Corrosion Resistance

Copperweld® Type M guy strand is an economical, corrosion resistant guying material for use on overhead lines. The thick cladding of copper on each wire protects the high-strength steel core from rusting and subsequent loss of strength. The copper also provides more ampacity within the strand, thus protecting from damage during a fault condition. Costly maintenance resulting from corrosion is eliminated, and the original safety factor of the guy is maintained throughout the life of the line.

Stronger than Copper

The steel core of Type M guy strand provides a strong lead that can withstand more mechanical abuse and is less susceptible to vibration-induced fatigue than solid copper wire. In fact, the steel core creates approximately 100% more breaking strength than solid copper conductors.

Theft Resistant

Because of the molecular bond between the copper and the steel core, there is virtually no scrap value in Copperweld® Type M guy strand, discouraging theft and leaving the guying system intact.

Copperweld® Type M Guy Strand

Physical Characteristics

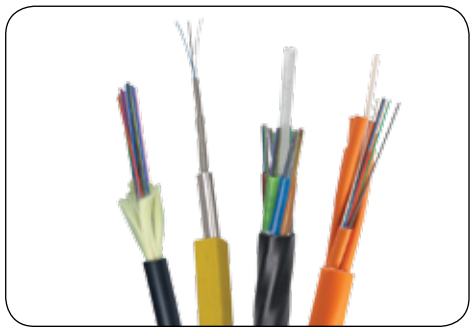
CATALOG NUMBER	DESIGNATION	NOMINAL DIAMETER OF STRAND		NUMBER AND DIAMETER OF INDIVIDUAL WIRES		RATED STRENGTH (lbs)		WEIGHT (lbs/ 1000 ft)		STANDARD PACKAGE	
										COIL LENGTH (ft)	APPROXIMATE WEIGHT (lbs)
		in	mm	in	mm	lbs	kg	lbs/1000 ft	kg/km		
CCS2.2M	2.2M	0.1640	4.17	3 X .076	1.93	2200	998	49	73	1000	45
CCS4M	4M	0.2090	5.31	3 X .097	2.46	4000	1814	79	118	2-500	50
CCS6M3	6M3	0.258	6.55	3 X .120	3.05	6000	2722	121	180	500	65
CCS6M	6M	0.2370	6.02	7 X .079	2.01	6000	2722	122	182	500	65
CCS8M	8M	0.2760	7.01	7 X .092	2.31	8000	3629	166	247	500	85
CCS10M	10M	0.3030	7.70	7 X .101	2.57	10000	4536	200	298	500	100
CCS12.5M	12.5M	0.3450	8.76	7 X .115	2.92	12500	5670	259	385	2501	65
CCS14M	14M	0.3600	9.14	7 X .120	3.05	14000	6350	283	421	2501	70
CCS16M	16M	0.3860	9.80	7 X .128	3.25	16000	7257	324	482	2501	80
CCS18M	18M	0.4140	10.52	7 X .138	3.51	18000	8165	374	557	2501	95
CCS20M	20M	0.4380	11.13	7 X .146	3.71	20000	9072	418	622	2501	100

Notes:
1. Put up in 500-foot coils when specified. Reels of 2,500, 5,000 and 10,000 feet are available.
2. Copperweld® Type M Guy Strand is composed of 30% conductivity EHS Copperweld® wire.

Please Contact your AFL Sales Rep for information about any of our other products or services.

FIBER OPTIC CABLE

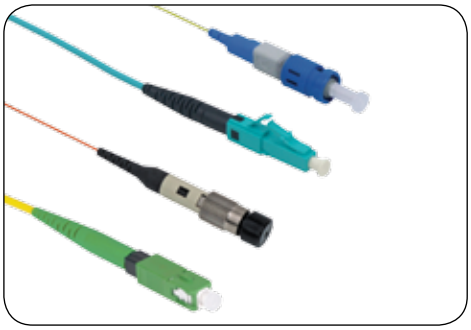
OPGW



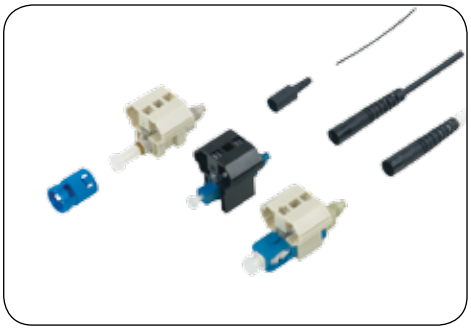
ADSS

Armored Loose Tube

FIELD-INSTALLABLE CONNECTORS



FuseConnect™ Connectors



FAST™ Connectors

Along with a broad range of products, we also offer professional training through The Light Brigade. Over 40,000 people have completed a Light Brigade training course making us the leading fiber optic training provider in the world.

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