

Conductor Alloys



Copper Clad Steel (40%)

Copper Clad Steel (CCS) is a composite conductor material containing a low carbon steel core surrounded by copper. The copper provides the electrical conductivity and the steel contributes strength to the conductor. The most common grade of CCS used for electrical conductors has a nominal 40% IACS electrical conductivity. CCS is suitable for applications where high strength and medium conductivity are required. Copper Clad Steel is also suited for high frequency signal applications, since high frequency currents travel mainly in the outer skin of a conductor.

CCS is available bare or plated with silver, nickel or tin.

Reference Specifications: ASTM B 227 and B 228

	SOFT TEMPER	HARD DRAWN
Tensile	110,000 psi (758 MPa)	45,000 psi (310 MPa)
Elongation	1%	10%
Electrical Conductivity	39.2% IACS	39.2% IACS
Electrical Resistivity	(26.45 Ω -cmil/ft)	(26.45 Ω -cmil/ft)
Density	0.2975 lb/in ³ (8.24 gm/cm ³)	0.2975 lb/in ³ (8.24 gm/cm ³)
Thermal Coefficient of Resistance	0.00378/°C	0.00378/°C

Single End - Silver Plated CCS (40%) - Hard/Soft - (50 micro-inch silver thickness)

AWG	Std Plate %	Diameter					Resistance max		Weight max		Break Strength (min)			
		nom	inch	max	mm		Ω /mft	Ω /km	lb/mft	kg/km	Hard		Soft	
30	3	0.0100	0.0099	0.0101	0.251	0.257	269.9	885.4	0.288	0.428	8.47	37.7	3.46	15.4
31	3	0.0089	0.0088	0.0090	0.224	0.229	341.6	1,121	0.229	0.340	6.69	29.8	2.74	12.2
32	4	0.0080	0.0079	0.0081	0.201	0.206	423.8	1,390	0.185	0.276	5.39	24.0	2.21	9.81
33	4	0.0071	0.0070	0.0072	0.178	0.183	539.8	1,771	0.147	0.218	4.23	18.8	1.73	7.70
34	4	0.0063	0.0062	0.0064	0.157	0.163	688.1	2,257	0.116	0.173	3.32	14.8	1.36	6.04
35	5	0.0056	0.0055	0.0057	0.140	0.145	874.4	2,869	0.0921	0.137	2.61	11.6	1.07	4.76
36	5	0.0050	0.0049	0.0051	0.124	0.130	1,102	3,614	0.0739	0.110	2.07	9.23	0.849	3.77
37	6.1	0.0045	0.0044	0.0046	0.112	0.117	1,366	4,482	0.0602	0.0895	1.67	7.44	0.684	3.04
38	6.1	0.0040	0.0039	0.0041	0.099	0.104	1,739	5,705	0.0479	0.0713	1.31	5.85	0.538	2.39
39	8	0.0035	0.0034	0.0036	0.086	0.091	2,288	7,507	0.0370	0.0551	0.999	4.44	0.409	1.82
40	8	0.0031	0.0030	0.0032	0.076	0.081	2,939	9,642	0.0293	0.0436	0.778	3.46	0.318	1.41

Single End - Nickel Plated CCS (40%) - Hard/Soft - (50 micro-inch nickel thickness)

AWG	Std Plate %	Diameter					Resistance max		Weight max		Break Strength (min)			
		nom	inch	max	mm		Ω /mft	Ω /km	lb/mft	kg/km	Hard		Soft	
30	2	0.0100	0.0099	0.0103	0.251	0.262	281.1	922.3	0.298	0.444	8.47	37.7	3.46	15.4
31	4	0.0089	0.0088	0.0092	0.224	0.234	363.4	1,192	0.238	0.354	6.69	29.8	2.74	12.2
32	4	0.0080	0.0079	0.0083	0.201	0.211	450.9	1,479	0.194	0.288	5.39	24.0	2.21	9.81
33	4	0.0071	0.0070	0.0074	0.178	0.188	574.2	1,884	0.154	0.229	4.23	18.8	1.73	7.70
34	4	0.0063	0.0062	0.0066	0.157	0.168	732.0	2,402	0.123	0.182	3.32	14.8	1.36	6.04
35	4	0.0056	0.0055	0.0059	0.140	0.150	930.2	3,052	0.0979	0.146	2.61	11.6	1.07	4.76
36	4	0.0050	0.0049	0.0053	0.124	0.135	1,172	3,845	0.0791	0.118	2.07	9.23	0.849	3.77
37	7	0.0045	0.0044	0.0048	0.112	0.122	1,501	4,926	0.0649	0.097	1.67	7.44	0.684	3.04
38	7	0.0040	0.0039	0.0043	0.099	0.109	1,911	6,270	0.0521	0.0775	1.31	5.85	0.538	2.39
39	7	0.0035	0.0034	0.0038	0.086	0.097	2,514	8,249	0.0407	0.0606	0.999	4.44	0.409	1.82
40	7	0.0031	0.0030	0.0034	0.076	0.086	3,230	10,596	0.0326	0.0485	0.778	3.46	0.318	1.41

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7-Strand Constructions - Bare CCS (40%) - Hard Temper

AWG	Const.	Diameter				Resistance max		Weight max		Break Strength min	
		inch		mm		Ω /mft	Ω /km	lb/mft	kg/km	lb	N
22	7/30	0.0297	0.0303	0.754	0.770	39.1	128.4	2.03	3.02	59.3	263.7
24	7/32	0.0237	0.0243	0.602	0.617	61.1	200.5	1.30	1.93	37.7	167.9
26	7/34	0.0186	0.0192	0.472	0.488	99.3	325.9	0.811	1.21	23.2	103.4
28	7/36	0.0147	0.0153	0.373	0.388	159.0	521.6	0.516	0.767	14.5	64.6
30	7/38	0.0117	0.0123	0.297	0.312	250.1	820.5	0.332	0.495	9.20	40.9
32	7/40	0.0090	0.0096	0.229	0.244	424.1	1391	0.203	0.302	5.44	24.2

7-Strand Constructions - Bare CCS (40%) - Soft Temper

AWG	Const.	Diameter				Resistance max		Weight max		Break Strength min	
		inch		mm		Ω /mft	Ω /km	lb/mft	kg/km	lb	N
22	7/30	0.0297	0.0303	0.754	0.770	39.1	128.4	2.03	3.02	24.2	107.9
24	7/32	0.0237	0.0243	0.602	0.617	61.1	200.5	1.30	1.93	15.4	68.7
26	7/34	0.0186	0.0192	0.472	0.488	99.3	325.9	0.811	1.21	9.51	42.3
28	7/36	0.0147	0.0153	0.373	0.388	159.0	521.6	0.516	0.767	5.94	26.4
30	7/38	0.0117	0.0123	0.297	0.312	250.1	820.5	0.332	0.495	3.76	16.7
32	7/40	0.0090	0.0096	0.229	0.244	424.1	1391	0.203	0.302	2.23	9.90

19-Strand Concentric Constructions - Bare CCS (40%) - Hard Temper

AWG	Const.	Diameter				Resistance max		Weight max		Break Strength min	
		inch		mm		Ω /mft	Ω /km	lb/mft	kg/km	lb	N
18	19/30	0.0495	0.0505	1.257	1.283	14.5	47.4	5.53	8.23	160.9	716
20	19/32	0.0395	0.0405	1.003	1.029	22.7	74.3	3.55	5.28	102.4	456
22	19/34	0.0310	0.0320	0.787	0.813	37.0	121.4	2.23	3.31	63.1	281
24	19/36	0.0245	0.0255	0.622	0.648	58.8	193.0	1.41	2.10	39.4	175
26	19/38	0.0195	0.0205	0.495	0.521	92.9	304.8	0.909	1.35	25.0	111
28	19/40	0.0150	0.0160	0.381	0.406	157.1	515.4	0.554	0.824	14.8	65.7

19-Strand Concentric Constructions - Bare CCS (40%) - Soft Temper

AWG	Const.	Diameter				Resistance max		Weight max		Break Strength min	
		inch		mm		Ω /mft	Ω /km	lb/mft	kg/km	lb	N
18	19/30	0.0495	0.0505	1.257	1.283	14.5	47.4	5.53	8.23	65.8	293
20	19/32	0.0395	0.0405	1.003	1.029	22.7	74.3	3.55	5.28	41.9	186
22	19/34	0.0310	0.0320	0.787	0.813	37.0	121.4	2.23	3.31	25.8	115
24	19/36	0.0245	0.0255	0.622	0.648	58.8	193.0	1.41	2.10	16.1	71.7
26	19/38	0.0195	0.0205	0.495	0.521	92.9	304.8	0.909	1.35	10.2	45.4
28	19/40	0.0150	0.0160	0.381	0.406	157.1	515.4	0.554	0.824	6.04	26.9

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