



Copper Clad Steel (40%) Conductor Wire

Introduction

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.

Custom constructions are available, please contact the sales department.

Fisk Alloy Wire, Inc.
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Physical Properties and Specifications

PHYSICAL PROPERTIES		
	HARD DRAWN	SOFT
Tensile	110 ksi	45 ksi
Elongation	1%	10%
Electrical Conductivity	39% IACS @ 68°F	39% IACS @ 68°F
Electrical Resistivity	26.45 Ω-cmil/ft @ 68°F	26.45 Ω-cmil/ft @ 68°F
Melting Point	--	--
Density	0.294 lbs/in ³	0.294 lbs/in ³
Thermal Coefficient of Resistance	0.00210/°F	0.00210/°F

SPECIFICATIONS
ASTM B227
ASTM B228
ASTM B250

PHYSICAL PROPERTIES - METRIC		
	HARD DRAWN	SOFT
Tensile	758 MPa	310 MPa
Elongation	1%	10%
Electrical Conductivity	0.226 MΩ/cm @ 20°C	0.226 MΩ/cm @ 20°C
Electrical Resistivity	4.397 MΩ/cm @ 20°C	4.397 MΩ/cm @ 20°C
Melting Point	--	--
Density	8.14 g/cm ³	8.14 g/cm ³
Thermal Coefficient of Resistance	0.00378/°C	0.00378/°C

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Alloy Characteristics

ALLOY NAME	TEMPER	TENSILE STRENGTH	CONDUCTIVITY	ELONGATION	FLEX LIFE	MECHANICAL PROCESSING	AVAILABLE PLATINGS	SOFTENING RESISTANCE
COPPER	Soft	32,000	100%	15%	P	E	S, N, T	-
COPPER	Hard	60,000	96%	1%	P	E	S, N, T	P
PERCON 15	Hard	95,000	70%	1%	VG	G	S, N, T	P
PERCON 17	Soft	58,000	85%	6%	G	E	S, N	VG
PERCON 17	Hard	95,000	80%	1%	VG	E	S, N, T	G
PERCON 19	Hard	110,000	73%	1%	E	E	S, N, T	G
PERCON 24	Soft	60,000	90%	8%	E	E	S, N	E
PERCON 28	Soft	80,000	85%	6%	E	E	S, N	E
PERCON HS-95	Soft	95,000	63%	6%	E	VG	S, N	VG
CCS (40%)	Hard	110,000	39%	1%	E	G	S, N, T	G

E = Excellent, VG = Very Good, G = Good, P = Poor, S = Silver Plate, N = Nickel Plate, T = Tin Plate

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7-Strand Constructions

BARE CCS (40%) - HARD TEMPER											
AWG	CONST	DIAMETER				RESISTANCE		WEIGHT		BREAK STRG	
		inch		mm		max		max		min	
		min	max	min	max	Ω/mft	Ω/km	lb/mft	kg/km	(lb)	(N)
22	7/30	0.0297	0.0303	0.754	0.770	39.1	128.3	2.01	2.99	59.2	263
24	7/32	0.0237	0.0243	0.602	0.617	61.1	200.5	1.28	1.90	37.7	168
26	7/34	0.0186	0.0192	0.472	0.488	99.3	325.8	0.803	1.20	23.2	103
28	7/36	0.0147	0.0153	0.373	0.389	159.0	521.6	0.510	0.759	14.5	64.5
30	7/38	0.0117	0.0123	0.297	0.312	250.1	820.5	0.328	0.488	9.20	40.9
32	7/40	0.0090	0.0096	0.229	0.244	424.1	1,391.4	0.201	0.299	5.44	24.2

BARE CCS (40%) - SOFT TEMPER											
AWG	CONST	DIAMETER				RESISTANCE		WEIGHT		BREAK STRG	
		inch		mm		max		max		min	
		min	max	min	max	Ω/mft	Ω/km	lb/mft	kg/km	(lb)	(N)
22	7/30	0.0297	0.0303	0.754	0.770	39.1	128.3	2.01	2.99	24.2	108
24	7/32	0.0237	0.0243	0.602	0.617	61.1	200.5	1.28	1.90	15.4	68.5
26	7/34	0.0186	0.0192	0.472	0.488	99.3	325.8	0.803	1.20	9.50	42.3
28	7/36	0.0147	0.0153	0.373	0.389	159.0	521.6	0.510	0.759	5.94	26.4
30	7/38	0.0117	0.0123	0.297	0.312	250.1	820.5	0.328	0.488	3.76	16.7
32	7/40	0.0090	0.0096	0.229	0.244	424.1	1,391.4	0.201	0.299	2.23	9.92

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19-Strand Unilay Constructions

BARE CCS (40%) - HARD TEMPER											
AWG	CONST	DIAMETER				RESISTANCE		WEIGHT		BREAK STRG	
		inch		mm		max		max		min	
		min	max	min	max	Ω/mft	Ω/km	lb/mft	kg/km	(lb)	(N)
18	19/30	0.0495	0.0505	1.257	1.283	14.5	47.6	5.47	8.14	160.9	716
20	19/32	0.0395	0.0405	1.003	1.029	22.7	74.5	3.51	5.22	102.4	455
22	19/34	0.0310	0.0320	0.787	0.813	37.0	121.4	2.20	3.27	63.1	281
24	19/36	0.0245	0.0255	0.622	0.648	58.8	192.9	1.39	2.07	39.4	175
26	19/38	0.0195	0.0205	0.495	0.521	92.9	304.8	0.899	1.34	25.0	111
28	19/40	0.0150	0.0160	0.381	0.406	157.1	515.4	0.548	0.816	14.8	65.8

BARE CCS (40%) - SOFT TEMPER											
AWG	CONST	DIAMETER				RESISTANCE		WEIGHT		BREAK STRG	
		inch		mm		max		max		min	
		min	max	min	max	Ω/mft	Ω/km	lb/mft	kg/km	(lb)	(N)
18	19/30	0.0495	0.0505	1.257	1.283	14.5	47.6	5.47	8.14	65.8	29.
20	19/32	0.0395	0.0405	1.003	1.029	22.7	74.5	3.51	5.22	41.9	186
22	19/34	0.0310	0.0320	0.787	0.813	37.0	121.4	2.20	3.27	25.8	115
24	19/36	0.0245	0.0255	0.622	0.648	58.8	192.9	1.39	2.07	16.1	71.6
26	19/38	0.0195	0.0205	0.495	0.521	92.9	304.8	0.899	1.34	10.2	45.4
28	19/40	0.0150	0.0160	0.381	0.406	157.1	515.4	0.548	0.816	6.04	26.9

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Single End Constructions

NICKEL PLATED CCS (40%) - HARD/SOFT														
AWG	STD PLATE %	DIAMETER					RESISTANCE		WEIGHT		BREAK STRG HARD		BREAK STRG SOFT	
		inch			mm		max		max		min		min	
		Nom	min	max	min	max	Ω/mft	Ω/km	lb/mft	kg/km	lb	N	lb	N
30	2	0.0101	0.0099	0.0103	0.251	0.262	281.1	922.2	0.298	0.443	8.47	37.7	3.46	15.4
31	4	0.0090	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	0.0081	0.0079	0.0083	0.201	0.211	450.9	1,479	0.194	0.289	5.39	24.0	2.21	9.83
33	4	0.0071	0.0069	0.0073	0.175	0.185	574.2	1,884	0.154	0.229	4.23	18.8	1.73	7.70
34	4	0.0064	0.0062	0.0066	0.157	0.168	732.0	2,402	0.121	0.180	3.32	14.8	1.36	6.05
35	4	0.0057	0.0055	0.0059	0.140	0.150	930.2	3,052	0.0966	0.144	2.61	11.6	1.07	4.76
36	4	0.0051	0.0049	0.0053	0.124	0.135	1,172	3,845	0.0779	0.116	2.07	9.21	0.849	3.78
37	7	0.0046	0.0044	0.0048	0.112	0.122	1,501	4,924	0.0639	0.095	1.67	7.43	0.684	3.04
38	7	0.0041	0.0039	0.0043	0.0991	0.1092	1,911	6,270	0.0513	0.076	1.31	5.83	0.538	2.39
39	7	0.0036	0.0034	0.0038	0.0864	0.0965	2,514	8,248	0.0401	0.060	.0999	4.44	0.409	1.82
40	7	0.0032	0.0030	0.0034	0.0762	0.0864	3,230	10,597	0.0321	0.048	.0778	3.46	0.318	1.41

SILVER PLATED CCS (40%)

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AWG	STD PLATE %	DIAMETER					RESISTANCE		WEIGHT		BREAK STRG HARD		BREAK STRG SOFT	
		inch			mm		max		max		min		min	
		Nom	min	max	min	max	Ω/mft	Ω/km	lb/mft	kg/km	lb	N	lb	N
30	3	0.0100	0.0099	0.0101	0.251	0.262	281.1	885.5	0.288	0.429	8.47	37.7	3.46	15.4
31	3	0.0089	0.0088	0.0090	0.224	0.234	363.4	1,121	0.229	0.341	6.69	29.8	2.74	12.2
32	4	0.0080	0.0079	0.0081	0.201	0.211	450.9	1,390	0.185	0.275	5.39	24.0	2.21	9.83
33	4	0.0071	0.0069	0.0072	0.175	0.185	574.2	1,771	0.147	0.219	4.23	18.8	1.73	7.70
34	4	0.0063	0.0062	0.0064	0.157	0.168	732.0	2,258	0.116	0.173	3.32	14.8	1.36	6.05
35	5	0.0056	0.0055	0.0057	0.140	0.150	930.2	2,869	0.0921	0.137	2.61	11.6	1.07	4.76
36	5	0.0050	0.0049	0.0051	0.124	0.135	1,172	3,615	0.0739	0.110	2.07	9.21	0.849	3.78
37	6.1	0.0045	0.0044	0.0046	0.112	0.122	1,501	4,482	0.0602	0.0896	1.67	7.43	0.684	3.04
38	6.1	0.0040	0.0039	0.0041	0.0991	0.1092	1,911	5,705	0.0479	0.0713	1.31	5.83	0.538	2.39
39	8	0.0035	0.0034	0.0036	0.0864	0.0965	2,514	7,506	0.0370	0.0551	.0999	4.44	0.409	1.82
40	8	0.0031	0.0030	0.0032	0.0762	0.0864	3,230	9,642	0.0293	0.0436	.0778	3.46	0.318	1.41

NICKEL PLATED CCS (40%) - HARD/SOFT													
AWG	STD PLATE %	DIAMETER					RESISTANCE		WEIGHT		LENGTH		
		inch			mm		max		max		(ft/lb)	(m/kg)	
		Nom	min	max	min	max	Ω/mft	Ω/km	lb/mft	kg/km	Nom	Nom	
30	3	0.0101	0.0099	0.0101			269.9		0.288				

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31	3	0.0090	0.0088	0.0090			341.6		0.229			
32	4	0.0081	0.0079	0.0081			423.8		0.185			
33	4	0.0071	0.0069	0.0072			539.8		0.147			
34	4	0.0064	0.0062	0.0062			688.1		0.116			
35	5	0.0057	0.0055	0.0055			874.4		0.0921			
36	5	0.0051	0.0049	0.0049			1,102		0.0739			
37	6.1	0.0046	0.0044	0.0044			1,366		0.0602			
38	6.1	0.0041	0.0039	0.0039			1,739		0.0479			
39	8	0.0036	0.0034	0.034			2,288		0.0370			
40	8	0.0032	0.0030	0.0030			2,939		0.0293			

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