

## Copper Clad Steel (CCS) 21% Products



Copper Clad Steel on stem packs

Bimetallic wire is composed of two metals, such as copper and steel, in a single composite conductor. Historically, solid copper has been used in many applications but with the higher cost of copper, people are searching for an alternative material. Bimetallic wire is a suitable alternative that costs less and guarantees better conductivity.

Copper clad steel (CCS) is produced by metallurgically bonding copper to a steel wire core. CCS encompasses the benefits from both copper and steel giving the product strength and corrosion-resistance. The process temperature and pressure ensure a uniformly bonded and tightly adherent copper coating. The nominal thickness of copper is 6.5% of the radius of the wire. Bimetallic wire is readily drawn to small diameter sizes.

There are many applications for this product where added strength compared to solid copper is required, and where the corrosion resistance of copper is also preferred. Industries that benefit from using bimetallic wire include telecommunications, automotive, military, utilities and geophysical to name a few. Various applications include ground wires and mats, tracer wire, telephone or coaxial drop wire, electronic components, radio frequency shielding, building wire, magnet wire, automotive wiring harnesses and wind turbines. Copper clad steel can be used in many other applications as an alternative solution to using solid copper.

### Advantages:

- Lower cost alternative to using solid copper
- Better conductivity
- High mechanical strength
- Easy installation with fewer breaks
- Corrosion resistant
- No scrap value (theft deterrent)



CCS tracer wire used to locate buried utilities

## Product Summary & Specification

Attribute	ASTM B-910
Core	Low Carbon Steel
Cladding	Copper
Density	0.2885 lbs/in <sup>3</sup> (7.99 gm/cm <sup>3</sup> )
AC Conductivity >5MHz	Equal to Copper
DC Conductivity	21.0% min
% Copper by Area	13.4% nom
% Copper by Weight	14.3% nom
Tensile Strength as Drawn	120,000 psi min (827 Mpa)
% Elongation	1% min



CCS used in CATV dropwire

## Physical & Mechanical Properties of 21% Copper Clad Steel

AWG*	Diameter in / (mm)		Area in <sup>2</sup> / (mm <sup>2</sup> )		Minimum Copper Thickness in / (mm)		Breaking Strength lb / (kg)		CCS lb / k-ft (kg / km)		CCS ohms / k-ft (ohms / km)	
<b>3</b>	0.2294	(5.827)	0.04134	(26.67)	0.0074	(0.1892)	2480	(1125)	143.11	(212.88)	0.938	(3.079)
<b>4</b>	0.2043	(5.189)	0.03278	(21.15)	0.0066	(0.1685)	2393	(1085)	113.49	(168.83)	1.183	(3.882)
<b>5</b>	0.1819	(4.621)	0.02600	(16.77)	0.0059	(0.1501)	2131	(967)	90.00	(133.89)	1.492	(4.895)
<b>6</b>	0.1620	(4.115)	0.02062	(13.30)	0.0053	(0.1337)	1896	(860)	71.38	(106.18)	1.881	(6.172)
<b>7</b>	0.1443	(3.665)	0.01635	(10.55)	0.0047	(0.1192)	1717	(779)	56.61	(84.21)	2.372	(7.783)
<b>8</b>	0.1285	(3.264)	0.01297	(8.37)	0.0042	(0.1062)	1430	(649)	44.89	(66.78)	2.991	(9.814)
<b>9</b>	0.1144	(2.906)	0.01028	(6.63)	0.0037	(0.0946)	1264	(573)	35.60	(52.96)	3.772	(12.375)
<b>10</b>	0.1019	(2.588)	0.00816	(5.26)	0.0033	(0.0843)	1052	(477)	28.23	(42.00)	4.756	(15.604)
<b>11</b>	0.0907	(2.305)	0.00647	(4.17)	0.0030	(0.0751)	859	(390)	22.39	(33.31)	5.997	(19.676)
<b>12</b>	0.0808	(2.053)	0.00513	(3.31)	0.0026	(0.0670)	733	(332)	17.76	(26.41)	7.562	(24.811)
<b>13</b>	0.0720	(1.828)	0.00407	(2.62)	0.0024	(0.0597)	619	(281)	14.08	(20.95)	9.536	(31.286)
<b>14</b>	0.0641	(1.628)	0.00323	(2.08)	0.0021	(0.0532)	513	(233)	11.17	(16.61)	12.024	(39.450)
<b>15</b>	0.0571	(1.450)	0.00256	(1.65)	0.0019	(0.0475)	423	(192)	8.86	(13.17)	15.162	(49.745)
<b>16</b>	0.0508	(1.291)	0.00203	(1.31)	0.0017	(0.0423)	351	(159)	7.02	(10.45)	19.119	(62.726)
<b>17</b>	0.0453	(1.150)	0.00161	(1.04)	0.0015	(0.0377)	290	(132)	5.57	(8.29)	24.108	(79.095)
<b>18</b>	0.0403	(1.024)	0.00128	(0.82)	0.0013	(0.0337)	236	(107)	4.42	(6.57)	30.399	(99.735)
<b>19</b>	0.0359	(0.912)	0.00101	(0.65)	0.0012	(0.0300)	192	(87)	3.50	(5.21)	38.332	(125.761)
<b>20</b>	0.0320	(0.812)	0.00080	(0.52)	0.0011	(0.0268)	157	(71)	2.78	(4.13)	48.335	(158.579)
<b>21</b>	0.0285	(0.723)	0.00064	(0.41)	0.0009	(0.0239)	108	(49)	2.20	(3.28)	60.948	(199.961)
<b>22</b>	0.0253	(0.644)	0.00050	(0.33)	0.0008	(0.0214)	86	(39)	1.75	(2.60)	76.853	(252.143)
<b>22.5**</b>	0.0239	(0.608)	0.00045	(0.29)	0.0008	(0.0202)	77	(35)	1.56	(2.31)	86.300	(283.137)
<b>23</b>	0.0226	(0.573)	0.00040	(0.26)	0.0008	(0.0191)	71	(32)	1.39	(2.06)	96.908	(317.941)
<b>24</b>	0.0201	(0.511)	0.00032	(0.20)	0.0007	(0.0171)	58	(26)	1.10	(1.63)	122.197	(400.910)

\* American Wire Gauge

\*\* 22.5 AWG = .023920

21% CCS Equivalent Cu/CCA resistance

k = 2.182270994



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