



# ALUMINUM CLAD STEEL WIRE

IEC 61232-1993

ASTM B415

ASTM B502



# IEC 61232-1993

## Aluminum Clad Steel Wire (AS wire/ACS Wire)

### Specification

Class	Nominal diameter, mm		Minimum Tensile (MPa)	Load @1% extension Mini. (MPa)	Max. Resistance @20°C (n Ω.m)	Conductivity
	Over	Up to and including				
20SA Type A	1.80	3.25	1340	1200	84.80	20.3%IACS
	3.25	3.45	1310	1180		
	3.45	3.65	1270	1140		
	3.65	3.95	1250	1100		
	3.95	4.10	1210	1100		
	4.10	4.40	1180	1070		
	4.40	4.60	1140	1030		
	4.60	4.75	1100	1000		
4.75	5.50	1070	1000			
20SA Type B	1.80	5.50	1320	1100		
27SA	2.50	5.00	1080	800	63.86	27%IACS
30SA	2.50	5.00	880	650	57.47	30%IACS
40SA	2.80	5.00	680	500	43.10	40%IACS

Minimum elongation: 1.5% at fracture, or 1.0% after fracture, gauge length 250mm

Special size and grade are available.

### Physical constant (Informative)

Identification	20SA Type A	20SA Type B	27SA	30SA	40SA
Final modulus of elasticity (practical) GPa	162	155	140	132	109
Coefficient of linear expansion (K <sup>-1</sup> ) x10 <sup>-6</sup>	13.0	12.6	13.4	13.8	15.5
Constant-mass temperature coefficient of resistance (α) (K <sup>-1</sup> )	0.0036	0.0036	0.0036	0.0038	0.0040

# ASTM B 415-07

## Hard Drawn Aluminum Clad Steel Wire

### 1, Tensile Requirement

Nominal Diameter, in./mm		Size, AWG	20.3%		27%		30%		40%	
			psi	MPa	psi	MPa	psi	MPa	psi	MPa
0.2043	5.19	4	155 000	1070	125 000	862	102 000	703	80 000	552
0.1880	4.78		160 000	1100	129 000	889	106 000	731	84 000	579
0.1819	4.62	5	165 000	1140	133 000	917	110 000	758	88 000	607
0.1729	4.39		170 000	1170	137 000	945	114 000	786	92 000	634
0.1620	4.11	6	175 000	1210	141 000	972	114 000	786	96 000	662
0.1549	3.93		180 000	1240	145 000	1000	118 000	814	96 000	662
0.1443	3.67	7	185 000	1280	150 000	1034	122 000	841	98 000	676
0.1369	3.48		190 000	1310	154 000	1062	126 000	869	98 000	676
0.1285	3.26	8	195 000	1340	156 000	1076	128 000	883	99 500	686
0.1144	3.91	9	195 000	1340	156 000	1076	128 000	883	99 500	686
0.1019	2.59	10	195 000	1340	156 000	1076	128 000	883	99 500	686
0.0907	2.30	11	195 000	1340	156 000	1076	128 000	883	99 500	686
0.0808	2.05	12	195 000	1340	156 000	1076	128 000	883	99 500	686

### 2, Physical Constants

% Conductivity	Density at 20°C	Modulus of Elasticity psi	Coef. of Linear Exp.	Temperature Coef. of Resistance
20.3	0.2381 lb/in <sup>3</sup> (6.59 g/cm <sup>3</sup> )	23.5 × 10 <sup>6</sup> (162 GPa)	0.0000072/° F (0.0000126/°C)	0.0020/° F (0.0036/°C)
27	0.2135 lb/in <sup>3</sup> (5.91 g/cm <sup>3</sup> )	20.3 × 10 <sup>6</sup> (140 GPa)	0.0000077/° F (0.0000134/°C)	0.0020/° F (0.0036/°C)
30	0.2027 lb/in <sup>3</sup> (5.61 g/cm <sup>3</sup> )	19.1 × 10 <sup>6</sup> (132 GPa)	0.0000079/° F (0.0000138/°C)	0.0021/° F (0.0038/°C)
40	0.1676 lb/in <sup>3</sup> (4.64 g/cm <sup>3</sup> )	15.8 × 10 <sup>6</sup> (109 GPa)	0.0000089/° F (0.0000155/°C)	0.0022/° F (0.0040/°C)

### 3, Wire Diameter Variations

Specified Diameter, in.	Permissible Variations in Specified Diameter, plus and minus
0.2043 to 0.1000,incl	1.5%
0.1000 to 0.0800,incl	0.0015 in. (0.038mm)

### 4, Aluminum Thickness and Resistance

% Conductivity	% of Nominal Wire Radius	D.C. Resistance at 20°C
20.3	10%	51.01 Ω·cmil/ft
27	14%	38.41 Ω·cmil/ft
30	15%	34.57 Ω·cmil/ft
40	25%	25.93 Ω·cmil/ft



## ASTM B 502-10

### Aluminum-Clad Steel Core Wire for Aluminum Conductors, Aluminum-Clad Steel Reinforced

#### 1. Tensile Requirements

Nominal Diameter in.(mm)	Stress at 1% Extension min. psi(MPa)	Ultimate Tensile Strength min. psi(MPa)	Elongation min %,10in. (250mm)
0.0770 to 0.1289 (1.956 to 3.274),incl	175 000(1206)	195 000(1344)	1.5
0.1290 to 0.1396 (3.275 to 3.477),incl	170 000(1172)	190 000(1310)	1.5
0.1370 to 0.1443 (3.478 to 3.665),incl	165 000(1137)	185 000(1275)	1.5
0.1444 to 0.1549 (3.666 to 3.934),incl	160 000(1103)	180 000(1241)	1.5
0.1550 to 0.1620 (3.935 to 4.115),incl	160 000(1103)	175 000(1206)	1.5
0.1621 to 0.1729 (4.116 to 4.392),incl	155 000(1068)	170 000(1172)	1.5
0.1730 to 0.1819 (4.393 to 4.620),incl	150 000(1034)	165 000(1137)	1.5
0.1820 to 0.1880 (4.621 to 4.775),incl	145 000(1100)	160 000(1103)	1.5

#### 2. Wire Diameter Variations

Nominal Diameter in.(mm)	Permissible Variations in Nominal Diameter
0.0770 to 0.0999 (1.956 to 2.537),incl	0.0015in,(0.038mm)
0.1000 to 0.1880 (2.538 to 4.775),incl	1.5%

### Application of ACS Wire

Manufacture of bare overhead conductor, OPGW, ground wire, messenger wire, guy wire, formed wire for protecting, terminating and splicing transmission and distribution lines, fence, barber wire and hardware.