HM Wire International, Inc.

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Properties for Aluminum and Copper Conductors

Copper and Aluminum Conductors — **Physical and Electrical Properties**

Physical Properties	Copper	Aluminum
Density, 20°C (68°F)		
Pounds/Inch³	0.3212	0.09765
Grams/Centimeter³	8.89	2.703
Thermal Capacity, 20°C (68°F)		
BTU/Pound/°F	0.0921	0.214
Thermal Conductivity, 20°C (68°F)		
BTU/Foot²/Sec/°F/In	1.15	0.66
Gram-calories/mm²/Sec/°C/cm	0.93	0.53
Thermal Coefficient of Expansion, Linear		
Change in Unit Length at 0 °C/°C	16.8×10^{-6}	23.8×10^{-6}
Melting Point		
°C	1083	660
°F	1980	1220
Tensile Characteristics, Annealed, 20°C (68°F)		
Ultimate Strength		
Pounds/Inch²	36000-40000	9000-14000
Kilograms Force/mm²	25.3 - 28.1	6.3 - 9.8
Yield Strength, 0.2% Off-Set		
Pounds/Inch²	9000-12000	4000-7000
Kilograms Force/mm²	6.3 - 8.4	2.8 - 4.9

Electrical Properties	Copper	Aluminum
IACS Volume Conductivity, Min %		
20°C (68°F)	100	61.8
Volume Resistivity, Max 20°C (68°F)		
Ohm-Circular Mil/Foot	10.371	16.782
Ohm-Millimeter²/Meter	0.017241	0.027899
Weight Resistivity, Max 20°C (68°F)		
Ohm-Pound/Mile²	875.20	430.59
Ohm-Gram/Meter²	0.15328	0.07541
Thermal Coefficient of Resisitance, 20°C (68°F)		
Change in Unit Resistance at 20 °C/°C	0.00393	0.00408

This information was derived from Superior Essex.

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Allowable Ampacities of Insulated Conductors

Copper				Aluminum			
AWG	Allowable Ampacities*			Allowable Ampacities*			AWG
	60 °C	75 °C	90 °C	60 °C	75 °C	90 °C	
		TYPES THWN, RHW, USE	TYPES THWN-2, USE-2, XHHW-2, XHHW, RHW-2, RHH		TYPES THWN, RHW, USE	TYPES THWN-2, USE-2, XHHW-2, XHHW, RHW-2, RHH	
8	40	50	55	30	40	45	**8**
6	55	65	75	40	50	60	**6**
4	70	85	95	55	65	75	**4**
2	95	115	130	75	90	100	**2**
1	110	130	150	85	100	115	**1**
1/0	125	150	170	100	120	135	**1/0**
2/0	145	175	195	115	135	150	**2/0**
3/0	165	200	225	130	155	175	**3/0**
4/0	195	230	260	150	180	205	**4/0**
250	215	255	290	170	205	230	**250**
300	240	285	320	190	230	255	**300**
350	260	310	350	210	250	280	**350**
400	280	335	380	225	270	305	**400**
500	320	380	430	260	310	350	**500**

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AWG	Copper			Aluminum			AWG
	Allowable Ampacities*			Allowable Ampacities*			
	60 °C	75 °C	90 °C	60 °C	75 °C	90 °C	
		TYPES THWN, RHW, USE	TYPES THWN-2, USE-2, XHHW-2, XHHW, RHW-2, RHH		TYPES THWN, RHW, USE	TYPES THWN-2, USE-2, XHHW-2, XHHW, RHW-2, RHH	
600	355	420	475	285	340	385	**600**
700	385	460	520	310	375	420	**700**
750	400	475	535	320	385	435	**750**
1000	455	545	615	375	445	500	**1000**

* Allowable Ampacities: 30°C (86°F) Ambient Temperature
Based on 2005 NEC, Table 310.16
For different ambient temperatures than the one shown above, consult the NEC tables.

Temperature Limitations: The temperature rating associated with the ampacity of a conductor shall be selected and coordinated so as not to exceed the lowest temperature rating of any connected termination, conductor, or device. Conductors with temperature ratings higher than specified for terminations shall be permitted to be used for ampicity adjustment, correction, or both.

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