HM Wire International, Inc.
Ph: 330-244-8501 Fax: 330-244-8561
www.litz-wire.com info@litz-wire.com www.hmwire.com

The fusing current in amperes at which a wire **will melt** can be calculated from the constant (K) that depends oin the metal used multiplied by the square root of the wire diameter in inches. Due to the fact there is many factors than can influence the rate of heat loss, these calculations must be considered as approximates and not exact.

If the power supply will provide more current (without shutting down or tripping a curcuit breaker or fuse) than the fusing current listed, **it is not a good idea** to use that size wire.

Basic Equations to use for fuses:

Preece Equation: i = A * D^1.5

where A is the constant depending on the metal and D is the diameter if the wire.

I.M. Onderdonk Equation: Ifuse = Area * SQRT(LOG((Tmelt - Tambient)/(234-Tambient)+1)/Time * 33))

where
Tmelt - melting temp of wire in deg C
Tambient - ambient temp in deg C
Time - melting time in seconds
Ifuse - fusing current in amps
Area - wire area in circular mils

*Circular Mils = the diameter of the wire in thousandths of an inch (mils) squared. That is, it is the area of a circle 0.001" in diameter. (1 cmil = 0.507E-3 sq mm)

*This equation isn't as valid for non-circular cross sections, or where there isn't free flow of air around the wire.

Practical Example: Situation is 16 gauge copper wire: Tmelt = 1083, Area = 2581 cmils, Time = 5 seconds, Diameter = .0524 in.

Preece: 10244*.0524^1.5 = 123 Amps

Onderdonk: Ifuse = 2581 * SQRT (LOG((1083-25)/(234-25)+1)/(5*33))
= 2581 * SQRT (LOG(1058/209+1)/165)
= 2581 * SQRT (.0047)
= 178 Amps

HM Wire International, Inc.

Ph: 330-244-8501 Fax: 330-244-8561

www.litz-wire.com info@litz-wire.com www.hmwire.com

Fusing Currents - Melting Temperature

Fuse Wire	A (d in inches)	A (d in mm)	Melting Temp (Degree C & F)	Boiling Temp (Degree C)
Copper	10244	80.0	1083 C / 1981.4 F	2300
Aluminum	7585	59.3	660 C / 1220 F	1800

AWG Gauge	Diameter (inch)	Alum Wire Fusing Current (A)	Copper Wire Fusing Current (A)
6	0.162000	495.000	668.000
7	0.144300	416.000	561.000
8	0.128500	349.000	472.000
9	0.114400	299.000	396.000
10	0.101900	247.000	333.000
11	0.090740	207.000	280.000
12	0.080810	174.000	235.000
13	0.071960	146.000	197.000
14	0.064080	123.000	166.000
15	0.057070	103.000	140.000
16	0.051200	88.800	117.000
17	0.045260	72.900	98.400
18	0.040300	61.400	82.900
19	0.036890	51.600	69.700
20	0.031960	43.200	58.400
21	0.028460		
22	0.025350	30.500	41.200
23	0.022570		
24	0.020100	21.600	29.200
25	0.017900		
26	0.015940	15.200	20.500
27	0.014200		
28	0.012640	10.700	14.400
29	0.011260		
30	0.010300	7.580	10.200
31	0.008929		
32	0.007960	5.320	
33	0.007080		
34	0.006306	3.790	5.120
35	0.005615		4.280

HM Wire International, Inc.

Ph: 330-244-8501 Fax: 330-244-8561

www.litz-wire.com info@litz-wire.com www.hmwire.com

Fusing Currents - Melting Temperature

Fuse Wire	A (d in inches)	A (d in mm)	Melting Temp (Degree C & F)	Boiling Temp (Degree C)
Copper	10244	80.0	1083 C / 1981.4 F	2300
Aluminum	7585	59.3	660 C / 1220 F	1800

AWG Gauge	Diameter (inch)	Alum Wire Fusing Current (A)	Copper Wire Fusing Current (A)
36	0.005000	2.680	3.620
37	0.004453		
38	0.003965	1.850	2.500
39	0.003531		
40	0.009146	1.310	1.770
41	0.002800		1.520
42	0.002500		1.280
43	0.002200		1.060
44	0.002000		0.916

 Revised 1. 01/07/09

This information was gathered from a resource, to find more information, please go to this website.