

US dimensions for cables – comparison with metric dimensions

In North America the cross section of cables are mostly stated in AWG sizes (American Wire Gauge) or for bigger cross sections (higher than AWG 4/0) in the dimension 'kcmil'. The respective standards for rating the cable according the ampacity also refer to these dimensions.

Hence multi standard cables have to fulfil the requirements of the metric system, stating the cross section in mm² as well as the requirements of the AWG system, in the following these systems are compared on the basis of their nominal sizes.

Please consider that there are no definite equivalents,

because the requirements of both systems regarding cross section and conductor resistance differ to each other. The following table should help to find the right nominal cross section.

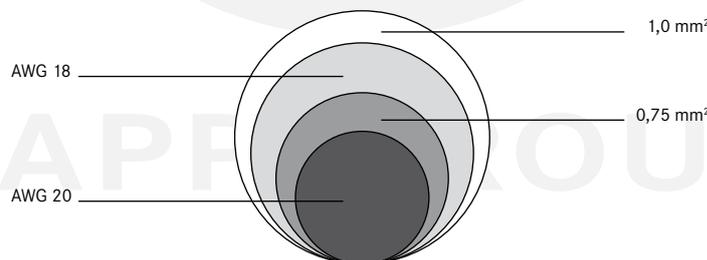
The respective standards for the project planning, e.g. UL 1581 or IEC 60228 (VDE 0295) have to be applied accordingly.

For choosing the appropriate matching parts, e.g. conductor end sleeves, always the **effective** size or cross section has to be regarded. This dimension is stated on the respective catalogue page of the product itself.

column 1a		column 1b	column 2	column 3	column 4	column 5a		column 5b
Required Northamerican dimension		Geo-metrical conversion	Metrical nominal cross section, which fulfils the electrical requirements	Required metrical cross section	Northamerican dimension, which fulfils the electrical requirements			
AWG	kcmil	mm ²	mm ²	mm ²	AWG	kcmil		
750		380.03	400	400			800	
500		253.35	300	300			750	
450		228.02	240	240			500	
400		202.68					450	
350		177.35	185	185			400	
300		152.01					350	
250		126.68	150	150			300	
4/0		107.22	120	120			250	
3/0		85.01	95	95	4/0			
2/0		67.43	70	70	3/0			
1/0		53.49			2/0			
1		42.41	50	50	1/0			
2		33.62	35	35	1			
3		26.67			2			
4		21.15	25	25	3			
5		16.77			4			
6		13.30	16	16	5			
7		10.55			6			
8		8.37	10	10	7			

column 1a		column 1b	column 2	column 3	column 4	column 5a		column 5b
Required Northamerican dimension		Geo-metrical conversion	Metrical nominal cross section, which fulfils the electrical requirements	Required metrical cross section	Northamerican dimension, which fulfils the electrical requirements			
AWG	kcmil	mm ²	mm ²	mm ²	AWG	kcmil		
9		6.63					8	
10		5.26	6	6			9	
11		4.17					10	
12		3.31	4	4			11	
13		2.62					12	
14		2.08	2.5	2.5			13	
15		1.65					14	
16		1.31	1.5	1.5			15	
17		1.04					16	
18		0.82	1	1			17	
19		0.65	0.75	0.75			18	
20		0.52					19	
21		0.41	0.5	0.5			20	
22		0.33	0.34	0.34			21	
23		0.26					22	
24		0.20	0.25	0.25			23	
25		0.16					24	
26		0.13	0.14	0.14			25	

Schematic diagram of the cross section dimensions



Example 1:

Because of the power rating according to the Northamerican standards a cable size of AWG 20 is required.

On the catalogue page of the product you cannot find a cable with this AWG size. The table above shows in column 1a the size AWG 20 and in column 3 you can find the metric cross section which fulfils the electrical requirements of AWG 20 at least. Thus a cable with cross section 0,75 mm² has to be chosen.

Example 2:

Because of the power rating according to the European standards a cable with cross section 0,75 mm² is required.

On the catalogue page of the product you only can find AWG sizes or bigger metric cross sections. The table above shows in column 4 the cross section 0,75 mm² and in column 5a you can find the AWG size which fulfils the electrical requirements of 0,75 mm² at least. Thus a cable with AWG 18 has to be chosen.

T16 Selection Table

T16: Anglo-american Dimensions

General dimensions*:

The basic units are in the english gravitational system:
length (ft) - force (lbf = Lb) - time (s)

in the english absolute system:
length (ft) - mass (lb) - time (s)

Length dimensions

1 mil	= 0.0254 mm
1 inch (in;")	= 25.4 mm
1 foot (ft;')	= 0.305 m
1 yard (yd)	= 0.914 m
1 chain (ch)	= 20.1 m
1 statute mile	= 1.61 km
1 nautical mile	= 1.835 km
1 statute mile	= 1760 yards

Cubic dimensions

1 cubic inch	= 16.39 cm ³
1 cubic foot	= 0.0283 m ³
1 cubic yard	= 0.765 mm ³
1 US liquid gallon	= 3.79 l
1 pint	= 0.473 l
1 quart	= 0.946 l
1 brit gallon	= 4.53 l
1 barrel	= 119.2 l

Area dimensions

1 circ. mil (CM)	= 0.507 · 10 ⁻³ mm ²
1 kcmil (MCM)	= 0.5067 mm ²
1 square inch (sq. in.)	= 645.16 mm ²
1 square foot (sq.ft.)	= 0.0929 m ²
1 square yard	= 0.836 m ²
1 acre	= 0.00405 km ²
1 square mile	= 2.59 km ²
1 m ²	= 10.764 sq. ft.

Mass units

English gravitational system:
1 slug = 1 lbs · s²/ft

English absolute system:
1 pound = 1 lb

1 slug = 32.174 lb, with 32.174 ft/s² as the standard value of acceleration due to gravity

1 grain	= 64.80 mg
1 dram	= 1.770 g
1 ounce (oz)	= 16 drams = 28.35 g
1 pound (lb)	= 16 oz = 453.59 g
1 stone	= 14 lbs = 6.35 kg
1 US ton (short ton)	= 0.907 t
1 Brit. ton (long ton)	= 0.016 t

Units of force

English gravitational system:
pound-force 1 lbf = 1 Lb

English absolute system:
poundal 1 pdl = 1 lb · ft/s²

1 lbf = 32.174 pdl - 9.80665 lb · m/s²

Conversion to metric units:

1 pound-force (lbf)	= 0.454 kp
1 Brit. ton-force	= 1016 kp
1 poundal (pdl)	= 0.1383 N
1 lbf	= 4.445 N

Electrical unit per unit length:

1µf per mile	= 0.62 µF/km
1 megohm per mile	= 1.61 MΩ · km
1 megohm per 1000 ft	= 3.28 Ω · km
1 ohm per 1000 yd	= 1.0936 Ω/km

Weight per unit length

1 lb per foot	= 1.488 kg/m
1 lb per yard	= 0.469 kg/m
1 lb per mile	= 0.282 kg/m

Density

1 lbf/ft ³	= 16.02 kg/m ³
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Weight (specific weight)

1 lbf/ft ³	= 16.02 kp/m ³
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Copper wire weight per mile

lb/mile	Ø mm
5	0.404
6.5	0.51
7.5	0.55
10	0.64
20	0.90
40	1.27

Units of energy

1 horsepower	= 0.746 kW (H.P.)
1 brit. therm. unit	= 0.252 kcal

The insulation wall thickness is often expressed in n/64 inches, 1/64 inch being roughly equaled to 0.4 mm.

Further dimensions for wire weights and for electrical field strengths:

lbf pr. MFeet	= 1.488 kg/km
lbf pr. Mile	= 0.282 kg/km
40 V/mil	= 1.6 kV/mm
80 V/mil	= 3.2 kV/mm
100 V/mil	= 4.0 kV/mm
250 V/mil	= 10.0 kV/mm

* these units are mostly not in use. They are for information only.



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