

Conductor Selection and Calculations Review, 26302-14

NEC Chapter 9, Table 8

Hardness: SD, HD, MHD

Coated and Uncoated

AWG

Compact conductors

Feeder, Branch Circuit, Tap Conductor

Look up definitions

Article 240

Tap Conductor Definition (See 240.2)

240.4 Rules (Very important rules that lead to other chapters and conductor concepts)

240.21 Rule: Protect at point where conductors receive their supply

Feeder Taps: 240.21(B)

Focus on the 10ft, the 25ft, and the Outside Feeder Taps

What's a 30A, or a 125A circuit?

Derating Exercises

Read 310.15(A)(2)

10 x 12 AWG conductors in a conduit with more than 10% of the conduit run passes near a boiler where the temperature reaches 134F.

See Table 310.15(B)(2)(a)

30 x 14 AWG in a 12" long conduit between two control panels

Conductors for 3 X 10 HP, 3 Phase, 460 VAC, cooling fan motors need to be run in one conduit across a flat roof. The architect wants them flat against the roof for aesthetic reasons. What size conductors do you need. No voltage drop needs to be considered.

<https://www.usclimatedata.com/climate/gillette/wyoming/united-states/uswy0067>

	Jan	Feb	Mar	Apr	May	Jun
Average high in °F:	37	39	48	57	67	77
Average low in °F:	14	16	23	31	40	49
Av. precipitation in inch:	0.47	0.59	1.06	1.85	3.15	2.56
Days with precipitation:	-	-	-	-	-	-
Hours of sunshine:	-	-	-	-	-	-
Average snowfall in inch:	7	8	11	10	2	0

	Jul	Aug	Sep	Oct	Nov	Dec
Average high in °F:	87	86	74	60	45	35
Average low in °F:	56	55	44	33	22	13
Av. precipitation in inch:	1.81	1.3	1.34	1.5	0.67	0.63

Circular and Square Mils

Look them up! That's the normal procedure.

Formulas

1" = 1000 mils, so 1.5" = 1500 mils

Circular Mil Area = d^2 , so $1500 \times 1500 = 2,250,000$ circular mils

This only works for solid wire, but $d^2 \times n$, works for stranded wire, if you know the exact number of strands and the exact diameter, in mils, of each strand. If you are using stranded wire, just look it up.

Conversion to and from Circular Mils

Circular mil Area = Square mils / 0.7854

Square mil Area = Circular mils * 0.7854

What's the circular mil area of a 0.25" x 2.00" buss bar?

$250 \times 2000 = 500,000$ square mils.

$500,000$ square mils / 0.7854 = 636,618 circular mils

What's the circular mil area of a 0.25" x 0.25" buss bar?

$$250 \times 250 = 62,500 \text{ square mils.}$$

$$62,500 \text{ square mils} / 0.7854 = 79,577 \text{ circular mils}$$

What's the equivalent wire size? #1

https://en.wikipedia.org/wiki/Circular_mil

Resistance measurements on loop of wire

Use Chapter 9, Table 8

Alternate VD Formulas

Use Chapter 9, Table 8

$$VD = (2 \times L \times R \times I) / 1000$$

$$VD = (1.732 \times L \times R \times I) / 1000$$

Solving for Circular Mils

$$CM = (2 \times K \times I \times L) / VD$$

$$CM = (1.732 \times K \times I \times L) / VD$$