

The recommended practices detailed below are based on information compiled from field studies and experience installing electrical conductors that are recognized by applicable codes and standards. These recommendations are intended to optimize a conductor or cable's life.

Conductors and cables must not be installed below the minimum installation temperature without warming. When installing in cold weather, conductors and cables should be stored in a heated environment for a period of *at least* 24 hours prior to installation.

Jacket/Insulation Type	Minimum Installation Temperature	
PVC	-10°C	14°F
XLPE	-40°C	-40°F
NYLON	-3.9°C	25°F

Guidelines for Installing Conductors in Cable Tray or Raceways

Before installation, be sure the raceway is sized in accordance with the requirements of the National Electrical Code (NEC). Care should be taken to ensure that no sharp edges exist to cut the conductor's insulation as it is being installed. It is essential to run a clean brush through the raceway to remove or loosen any burrs. When finished, pull a swab through to clean out foreign objects.

When installing conductors or cables in wet, underground locations, the conductor or cable ends must be sealed to prevent entry of moisture into the conductor strands. These seals should be left intact or remade after pulling is disrupted, until splicing, terminating, or testing is to be done. This practice is recommended to avoid unnecessary corrosion of the conductors and to safeguard against entry of moisture into the conductor strands, which would generate steam under overload, or emergency loadings, or short circuit conditions after the conductor or cable is energized.

Another important consideration is to not exceed the maximum allowable tensile strength or the minimum bending radius of the conductor or cable. The force required for pulling a given length can be reduced by the application of a pulling compound on conductors or cables in raceways and the use of rollers in cable trays.

A. Maximum Pulling Tension on Conductors or Cables

The maximum pulling tension on a conductor or cable should never exceed the rated tension of the pulling device. Maximum pulling tension can be calculated by the following formulas:

Single Conductor: $T = S \times A$

Multi-Conductors: $T = N \times S \times A$

Where: T = Maximum Pulling Tension (lbs)

S = Conductor Stress (lbs/cmil)*

A = Area (cmils)

N = Number of Conductors

*Copper: S = .008

*8000 Series Aluminum Alloy: S = .006

*1350 Series Aluminum Alloy (½ Hard): S = .003

*1350 Series Aluminum Alloy (Hard): S = .008

Example: (4) 500 KCMIL THHN/THWN-2 Copper Conductors

S = .008

N = 4

A = 500,000 CMILS

$T = N \times S \times A$

Solution: $4 \times .008 \times 500,000 = 16,000$ lbs. Tension*

*Encore Wire recommends not to exceed 75% of the maximum pulling tension calculated.

B. Maximum Side Wall Pressure

For conductors 8 AWG and smaller the SWP should not exceed 300 lbs. per foot of bend radii for one single conductor and 500 lbs. per foot of bend radii for two or more conductors paralleled or plexed.

For conductors 6 AWG and larger the SWP should not exceed 500 lbs. per foot of bend radii for one single conductor and 1000 lbs. per foot of bend radii for two or more conductors paralleled or plexed.

For single- or multi-conductor cables (like Type TC) it would be 500 lbs. per foot of bend radii for one single cable or 1000 lbs. per foot for two or more cables.

C. Minimum Bending Radius for Cables

The minimum bending radii for both single and multiple conductor cable, without metallic sheathing, can be calculated using the below table:

Thickness of Conductor Insulation (in)	Outside Diameter of Cable (in)		
	1.00 or less	1.001 - 2.000	2.001 or more
Minimum Bending Radius as a Multiple of Cable Diameter			
.156 and less	4	5	6
.157 to .312	5	6	7
.313 and larger	x	7	8

D. Minimum Bending Radius for Conductors

The minimum bending radii for single insulated conductor:

14 AWG through 4/0 AWG : 6 x O.D. of largest individual conductor

250 KCMIL through 500 KCMIL : 7 x O.D. of largest individual conductor

600 KCMIL through 1000 KCMIL : 8 x O.D. of largest individual conductor

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