

CONSTRUCTION GUIDELINE

BENDING, TRAINING, RACKING AND RE-REELING OF UNDERGROUND PRIMARY CABLE

TRAINING AND RACKING OF CABLE

Safe minimum bending radius, cable creepage and splicing requirements must be considered when training and racking cables.

The locations of cables in manholes and vaults is determined by the ducts they occupy. The cables should always be fanned out from the duct mouth so they do not cross other ducts or cables. This allows access to other ducts for cable replacement and inspection. Allow from six to ten inches of straight cable, depending on size, out of the duct before starting the bend in the vault or manhole. Newly trained cable will tend to straighten out. If the bend is too near the duct mouth, it will spread into the duct which will eventually cause sheath damage at the duct edge.

When the bottom ducts are used, the splices will be made low on the side walls. If higher ducts are used first, the cable should be supported high enough as to leave a splicing area for the cable from other ducts. When splicing lead cable, enough straight cable between the duct mouth and splice must be left to move the lead sleeve clear of the splice area.

CABLE SUPPORTS

The most common type of cable support is a rack assembly consisting of a rackback bolted on the wall with slots where the steps can be attached. The steps vary in length. The spacing of the rackback is determined by the length of the splice and weight of the cable. The bottom mounting hole is offset for overlapping to allow two rackbacks to be combined as one unit.

Use tie wraps (shown on Stock Catalog page 73-40) to secure the cables to the rack assembly.

The rackback spacing for supporting splices shall be as shown in the following table:

Splice Support Rackbacks

Type of Splice	Standard Rackback Spacing
5 kV	24"
13 kV	24"
27 kV	24"
34.5 kV	24"

Standard spacing is a minimum for design purposes and is to be increased only when other splices requiring a greater rackback spacing are to be racked on the same wall.

The Maximum Rackback Spacing for Cables NOT Having a Splice

Type and Size Cable	Spacing
1/C, 500 kcmil or LESS	24"
3/C, 1/0 or LESS	24"
1/C, 600 kcmil or MORE	24"
3/C, 2/0 or MORE	24"

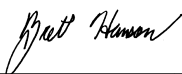
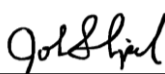
The vertical spacing of the steps on the rackback will depend on the size of the splicing sleeves. A spacing of eight to ten inches is recommended.

Where wall supports cannot be installed, ceiling supports (Construction Guideline NCI-110) or support from the floor shall be installed. Floor supports may be either commercial cable trays or Unistrut type construction anchored to the floor. The cables shall be tied securely to the support with plastic cable ties or spool insulators.

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Bending, Training, Racking And Re-Reeling Of Underground
Primary Cable

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CABLE BENDING RADIUS AND REEL DRUM SIZE

The type of insulation and size of cable will determine the safe bending radius. The following table gives recommended minimum bending radius. For low pressure oil or gas filled cable, follow that shown for solid type paper insulated cable.

DRUM DIAMETERS AND CABLE BENDING RADIUS

Note: Drum diameters and cable bending radii do not correlate.

Stock No.	Cable	Description	Voltage Class	Min. Drum Diameter, Inches	Min. Bending Radius, Inches
XLPE CABLES					
613212	#6 Cu	1/C	5 kV	9	8
613222	350 Cu	1/C	5 kV	17	14
613523	#1 Cu CR	3/C	15 kV	32	27
613520	2/0 Cu CCR	3/C	15 kV	34	29
613526	3/0 Cu CR	3/C	15 kV	36	30
613530	350 Cu CCR	3/C	15 kV	42	36
613531	500 Cu CS	3/C Compact Sect.	15 kV	40	35
613532	500 Cu CCR	3/C	15 kV	45	38
613533	750 Cu CS	3/C Compact Sect.	15 kV	45	38
613534	750 Cu CCR	3/C	15 kV	52	44
623650	#8 Cu	3 ea. 1/C Kerite triplexed w/2 ea. #8 neut.	28 kV	30	26
613540	#1 Cu	3/C w/ 3 neut.	28 kV	37	32
602025	1/0 Solid Al	2/C Concentric	28 kV	19	16
613613	350 Al CCR	1/C Drain wire	28 kV	26	19
613543	350 Cu CR	3/C w/ 3 neut.	28 kV	48	42
012099	350 Al CCR	1/C Flat Strap	28 kV	26	19
613615	500 Cu CCR	1/C Drain wire	28 kV	26	22
012100	500 Cu CCR	1/C Flat Strap	28 kV	26	22
613618	750 Cu CCR	1/C Drain wire	28 kV	29	24
012101	750 Cu CCR	1/C Flat Strap	28 kV	29	24
613619	1000 Cu CCR	1/C Drain wire	28 kV	31	26
012102	1000 Cu CCR	1/C Flat Strap	28 kV	31	26
623655	1000 Al CCR	1/C Tape Shield	35 KV, 420 mil	33	28
EPR CABLES					
623640	500 Cu CCR	1/C Tape Shield	15 kV	40	35
010128	500 Cu CCR	1/C Tape Shield	15 kV	40	35
623670	1000 Cu CR	3/C Flat Strap Triplex	15 kV	42	36

Minimum cable drum diameters shall be 14 times the cable diameter per ICEA A-9-428 (NEMA WE-6).

Minimum bending radius shall be 12 times the cable diameter per Okonite Engineering Bulletin EHB-81.

CR = Concentric Round (3% compressed)

CCR = Compact Concentric Round

CS = Compact Sector

Reference Standards: U4-3.5/NCI-130, "Creepage of Cable"
U1-4.11/NCI-60, "Cable Pulling, Installing Electrical Cables in Underground Conduit"
U4-3.6/NCI-70, "Duct Edge Protection"