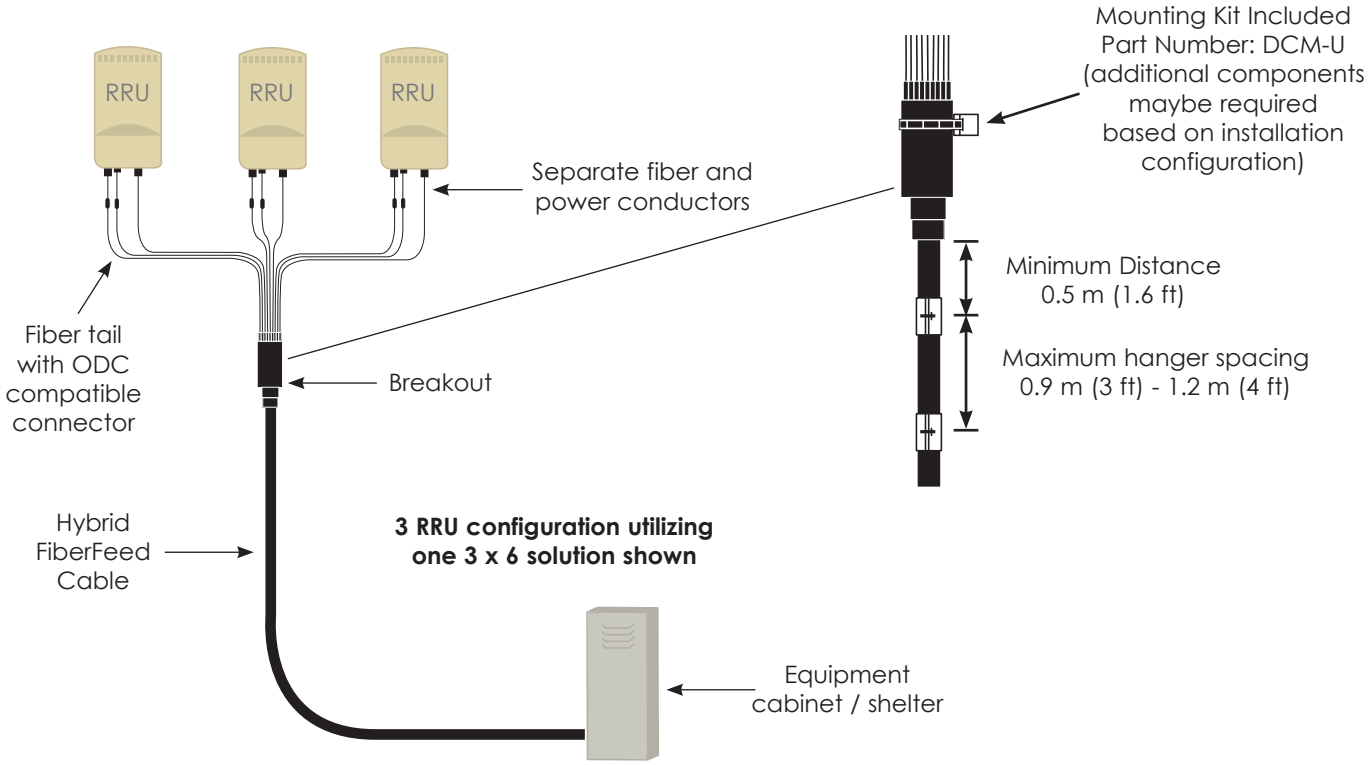
Installation Guidelines – HELIAX®

Solution: Hybrid Direct Fiber

Related Support and Learning Opportunities Offered by the CommScope Infrastructure Academy

The insights and expertise contained in this manual represent just one small part of CommScope's global learning initiative. Few industries are evolving as quickly as wireless communications. Every technological innovation impacts what happens in the field. Our customers look to the CommScope Infrastructure Academy to make sure their technicians and installers are well trained, well-prepared, and well-educated to take advantage of opportunities as they evolve. To access a course, go to www.commscopetraining.com/coursecatalog.php, course #6107

Section 1: HELIAX® Direct Components



Accessories

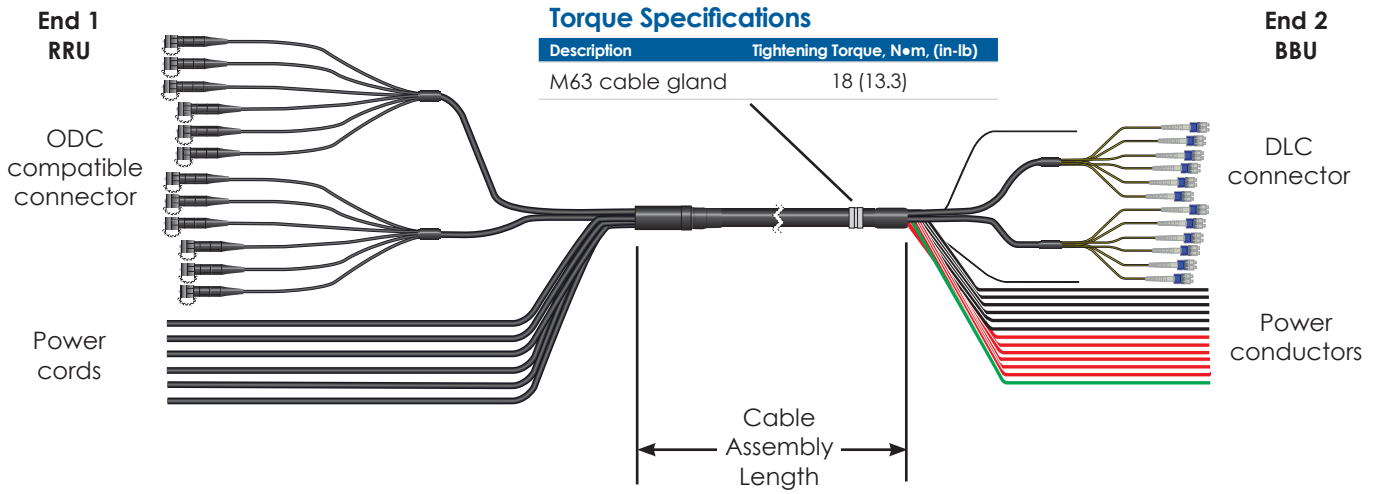
CABLE SERIES	HOISTING GRIP	SnapStak® PLUS	STANDAR HANGER
FDH1210-24SE2	19256B-C	SSH-L	42396A-1 (add grommet HG-24-114)
FDH1206-24SE2	19256B-C	SSH-XL	42396A-1 (add grommet HG-33-114)
FDH1204-24SE2	29961-C	SSH-XL	42396A-2 (add grommet HG-44-158)
FDH1204-48SE2	29961-C	SSH-XL	42396A-2 (add grommet HG-44-158)
Power breakout tail	NA	SSH-1014	43211A (add grommet HG-10MM-12)
Fiber breakout tail	NA	SSH-47	43211A (add grommet HG-5MM-12)

PART NUMBER	DESCRIPTION
UG12158-15B4-T	Universal grounding kit
FCCT-L	LC interface cleaner
FCCT-ODC	ODC compatible interface cleaner

WARNING: CommScope cables require the use of approved installation accessories.

Section 2: General Specifications 6x12 Configuration

	FDH1210-24SE2-XXX	FDH1206-24SE2-XXX	FDH1204-24SE2-XXX	FDH1204-48SE2-XXX
Cable Type	UL Type TC-OF-ER	UL Type TC-OF-ER	UL Type TC-OF-ER	UL Type TC-OF-ER
Center Conductor Gauge	10 AWG	6 AWG	4 AWG	4 AWG
Conductors, quantity	12	12	12	12
Total Fiber Quantity	24	24	24	48
Fiber Type	Single mode fiber	Single mode fiber	Single mode fiber	Single mode fiber
Dimensions				
Cable Weight	1050.0 kg/km | 705.5 lb/kft	2370 kg/km | 1590 lb/kft	3400 kg/m | 2285 lb/ft	3576 kg/km | 2403 lb/kft
Diameter Over Jacket	25.14 mm | 0.99 in	36.0 mm | 1.40 in	44.8 mm | 1.76 in	44.70 mm | 1.76 in
Breakout Length, Fiber end 1	1000 mm | 39 in	1000 mm | 39 in	1000 mm | 39 in	1000 mm | 39 in
Breakout Length, Power end 1	5000 mm | 196 in	5000 mm | 196 in	5000 mm | 196 in	5000 mm | 196 in
Breakout Length, Fiber end 2	1700 mm | 67 in	1700 mm | 67 in	1700 mm | 67 in	1110 mm | 44 in
Breakout Length, Power end 2	1700 mm | 67 in	1700 mm | 67 in	1700 mm | 67 in	1700 mm | 67 in
Physical Specifications				
Minimum Bend Radius	251.5 mm | 9.9 in	444.5 mm | 17.5 in	523.2 mm | 20.6 in	523.2 mm | 20.6 in



Color Coding Power: 24 and 48 fibers

End 1	Label Color	End 2	Label Color
1	RED	1	RED
		1	RED
2	BLUE	2	BLUE
		2	BLUE
3	GREEN	3	GREEN
		3	GREEN
4	YELLOW	4	YELLOW
		4	YELLOW
5	WHITE	5	WHITE
		5	WHITE
6	BLACK	6	BLACK
		6	BLACK

Color Coding Fiber: 24 fibers

End 1	Color	End 2	Color
1	RED	1	RED
2	GREEN	2	GREEN
3	BLUE	3	BLUE
4	YELLOW	4	YELLOW
5	WHITE	5	WHITE
6	BLACK	6	BLACK
7	RED (X2)	7	RED (X2)
8	GREEN (X2)	8	GREEN (X2)
9	BLUE (X2)	9	BLUE (X2)
10	YELLOW (X2)	10	YELLOW (X2)
11	WHITE (X2)	11	WHITE (X2)
12	BLACK (X2)	12	BLACK (X2)

Color Coding Fiber: 48 fibers

End 1	Color		End 2	Color	
1	RED	-	1	-	RED
2	GREEN	-	2	-	GREEN
3	BLUE	-	3	-	BLUE
4	YELLOW	-	4	-	YELLOW
5	WHITE	-	5	-	WHITE
6	BLACK	-	6	-	BLACK
7	RED	WHITE	7	WHITE	RED
8	GREEN	WHITE	8	WHITE	GREEN
9	BLUE	WHITE	9	WHITE	BLUE
10	YELLOW	WHITE	10	WHITE	YELLOW
11	WHITE	WHITE	11	WHITE	WHITE
12	BLACK	WHITE	12	WHITE	BLACK

End 1	Color		End 2	Color	
13	RED	GREEN	13	GREEN	RED
14	GREEN	GREEN	14	GREEN	GREEN
15	BLUE	GREEN	15	GREEN	BLUE
16	YELLOW	GREEN	16	GREEN	YELLOW
17	WHITE	GREEN	17	GREEN	WHITE
18	BLACK	GREEN	18	GREEN	BLACK
19	RED	BLUE	19	BLUE	RED
20	GREEN	BLUE	20	BLUE	GREEN
21	BLUE	BLUE	21	BLUE	BLUE
22	YELLOW	BLUE	22	BLUE	YELLOW
23	WHITE	BLUE	23	BLUE	WHITE
24	BLACK	BLUE	24	BLUE	BLACK

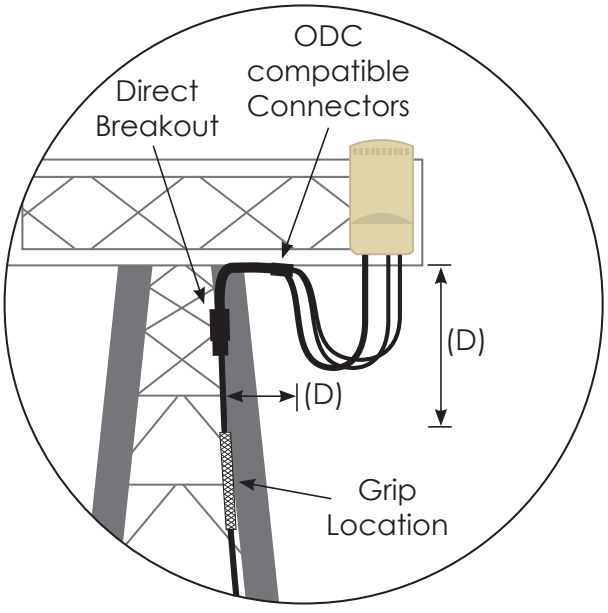
Section 3: Hoisting Considerations

- Be sure that the Direct breakout is not damaged by attachment of a hoisting grip or during the hoisting process. Attach a hoisting grip on the jacketed cable no less than .3 m (1 ft) below the fibre breakout point. Prevent the fibre tails and power conductors from undue movement during hoisting by securing with tie ropes every 1 m (3 ft) to the hoisting line.
- Installation temperature range is -20°C to +60°C (-4°F to +140°F).
- Minimum cable bend radii and tensile load can be found on-line in our eCatalog section at commscope.com.
- **CommScope Lace-Up Hoisting Grip 19256B-C required for 1210 and 1206 series. Hoisting Grip 29961-C required for 1204 series.**
- **Hoisting Grips are the primary support for the cable weight and must be anchored to the support structure with tension applied, then the cable hangers are fastened to the support structure in 0.9 m (3 ft) intervals.**
- During final connections to RRU, do not bend the fibre ends tighter than 30 mm (1.2 in) bend radius or you take the risk of breaking the glass fibres.

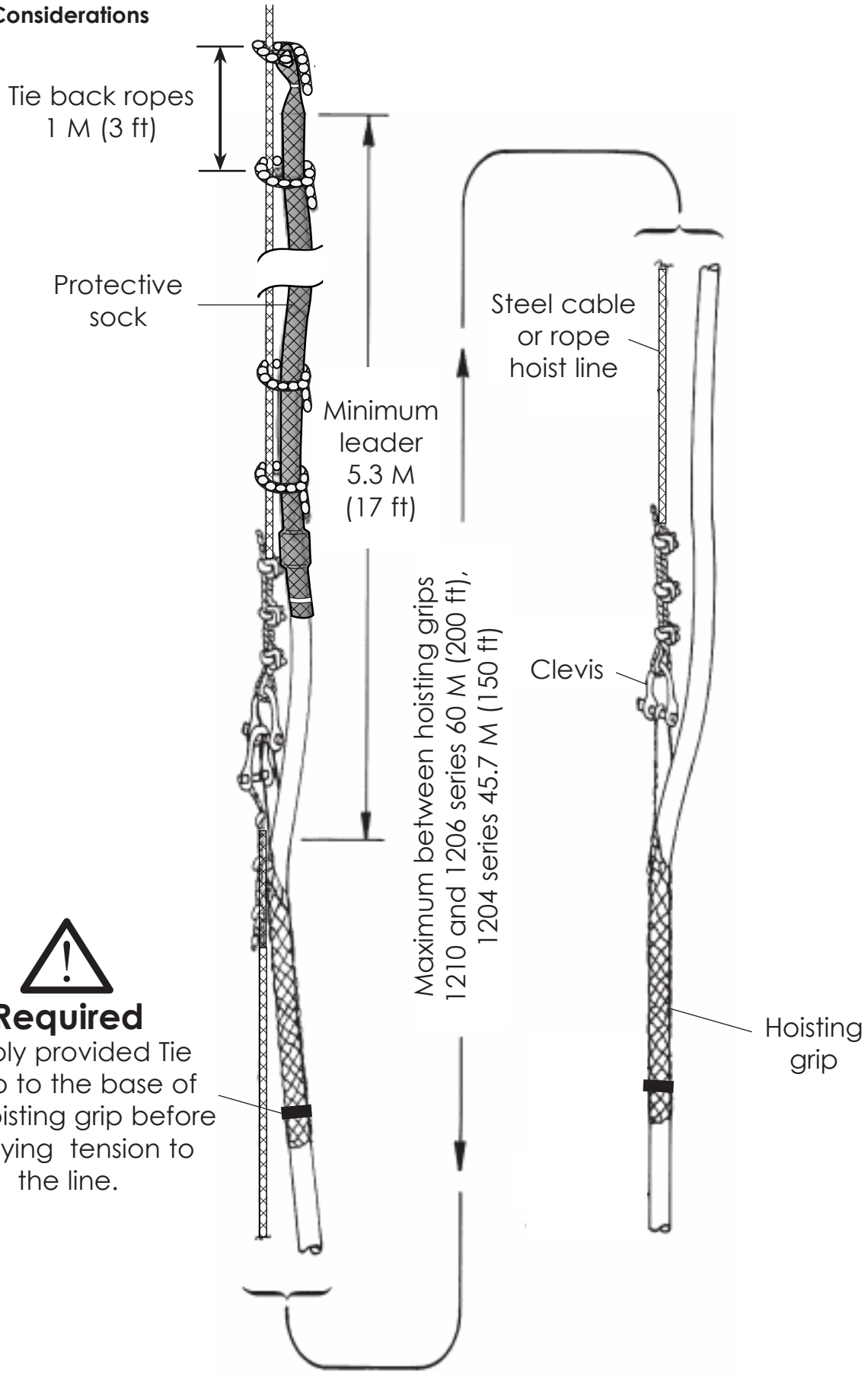
⚠ **Hybrid Fiber Cables weigh more than traditional coaxial cables. Be sure to follow proper hoisting and attachment procedures.**

Hoisting Recommendations

Reminder:
Plan grip location by measuring distance (D) from ODC compatible connector to tower support member.



Hoisting Considerations



Section 4: General Specifications Tails

- The terminated fiber ends however are fragile and must be protected during installation. Leave the packaging around the fiber ends in place until ready to make final connect of the jumper at the RRU or BBU.
- DO NOT BEND THE FIBER ENDS TIGHTER THAN 30 mm (1.2 in) BEND RADIUS ELSE THERE IS A RISK OF BREAKING THE GLASS FIBERS.
- Attach the main cable securely to the structure or equipment using hangers to prevent strain on connections from movement in wind or snow/ice conditions.
- Ensure the fiber and power connections and seated firmly in the RRU.
- Installation temperature range is -20°C to +60°C (-4°F to +140°F).

General Specifications

Cable Type	DFJ-2S109N-xxM
Brand	HELIAX®
Total Fiber Quantity	2
Fiber Type	Bend insensitive single mode fiber (G.657.A2)
Jacket Color	Black

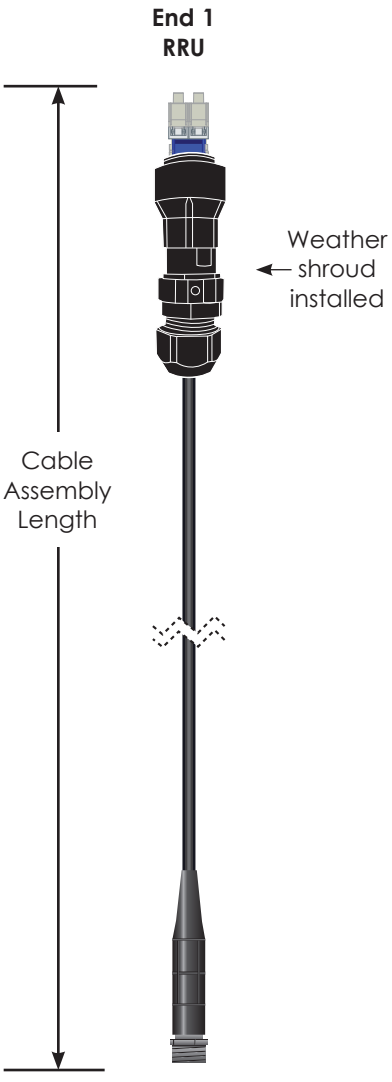
Dimensions

Cable Weight	48.0 kg/km | 105.8 lb/kft
Diameter Over Jacket	6 mm | .24 in

Physical Specifications

Minimum Bend Radius, unloaded	6 cm | 2.4 in
Tensile Load, short term, maximum	1110 N | 250 lbf

Lengths Available	1	2	3	5	10	30

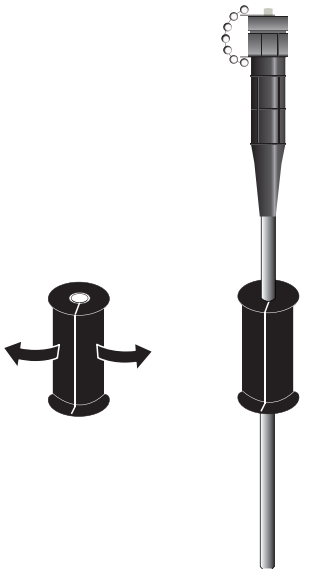


Torque Specifications

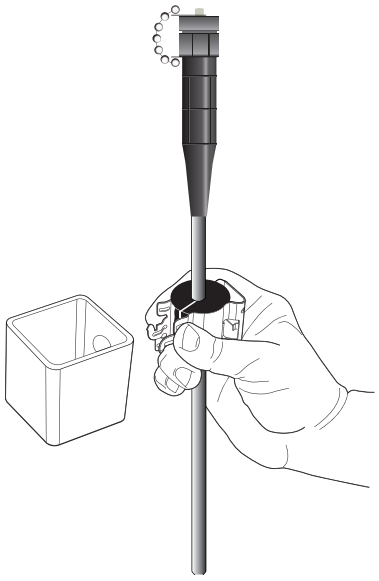
Interface Type	Tightening Torque, N•m, (in-lb)
ODC compatible connector	1 (8.8)

Section 5: Supporting Fiber Tails

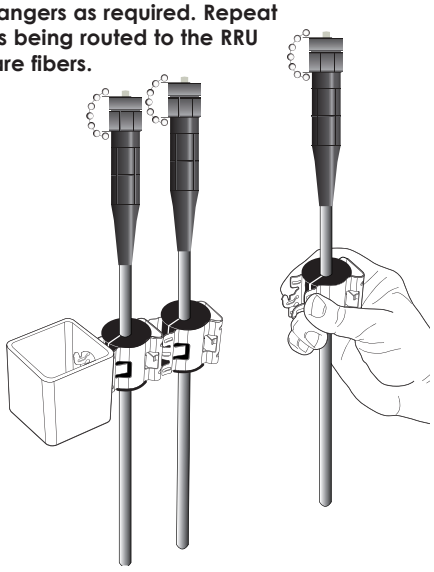
1 Open grommet and place it over the fiber tail.



2 Place the hanger over the grommet and place in support structure.

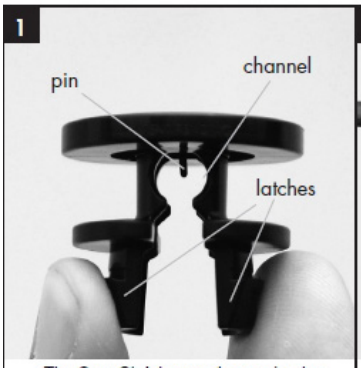


3 Stack hangers as required. Repeat with tails being routed to the RRU and spare fibers.



Connectors are fully weather sealed and do not require additional weatherizing. Unused power conductors should be left with the protective cap in place.

Option 2



The SnapStak hanger has a circular support channel and multiple support members to engage the cable.

Place the open end of hanger under the cable.

Push cable into the support channel with finger or thumb while expanding hanger latches.

Push SnapStak hanger in tower member or mounting adapter with ¾" hole.

Plastic SnapStak hangers may be snapped into any other CommScope metal or plastic SnapStak hanger size.

⚠ WARNING

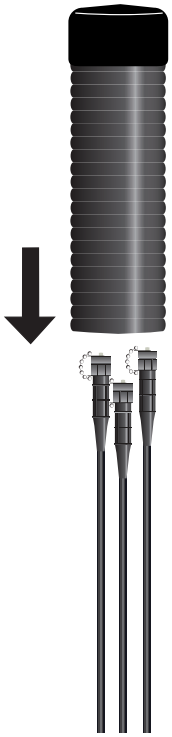
This product is to be used for horizontal cable runs between devices (i.e., RRUs, Antennas) for cable management/organization on the top of the tower for the smaller cables. It is not to be used to support the weight of the cable for vertical cable runs up the tower.

Part Information

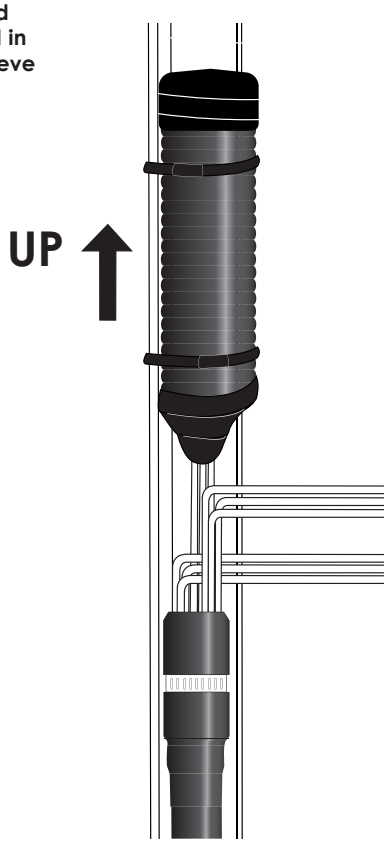
Part Number	Stackability	D.O.J Range (mm)
SSH-47	3	4.0 min to 7.0 max
SSH-710	3	7.0 min to 10.0 max
SSH-1014	3	10.0 min to 14.0 max

Spare Fiber Handling

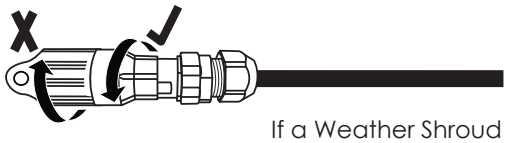
1 **If additional hangers are not available slide the protection sleeve from the BBU end over any spare fibers to protect them.**



2 **Place tape over fiber tails and protective sleeve end to hold in place. Support protection sleeve using tie wraps.**



Section 6: FA-FWS-E-1 Weatherproofing Shroud Installation



If a Weather Shroud is pre-installed carefully remove the end cap by holding it stationary and turning the top nut counter-clock wise. Skip to step #6.

Scan to view installation video

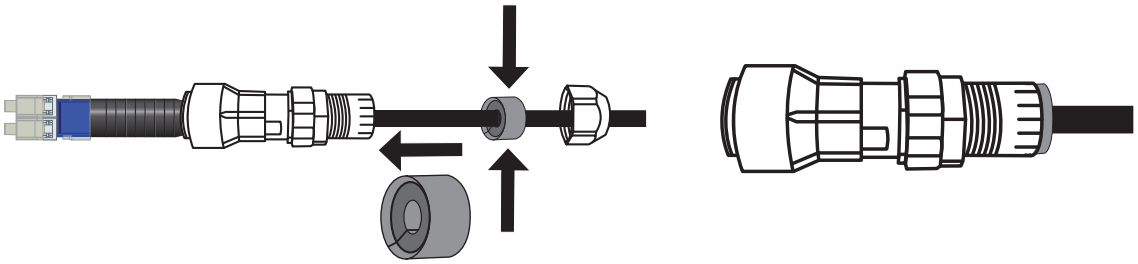
1

Carefully feed compression nut over DLC connector and slide onto jacketing.
Do not twist or bend the DLC connector or fiber. Excessive force or bending may break the fiber.

2

Carefully feed weather shroud body over DLC connector.

3

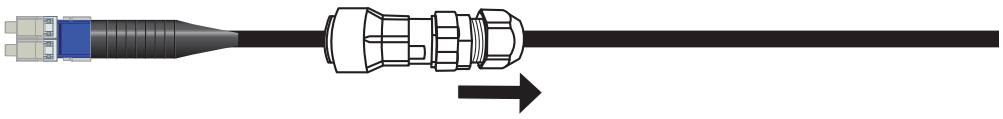


Wrap the rubber split grommet around the jacketing with the stepped end towards shroud body. Push gasket into the clamping tynes. Approximately 0.9 mm will protrude from the tynes when fully installed.

4

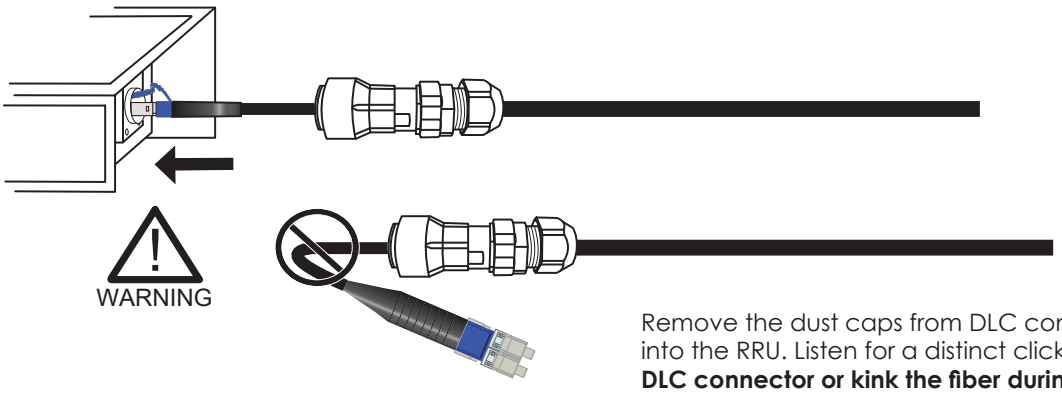
Engage the compression nut one full revolution to keep the grommet in place but **do not tighten** fully to allow for adjustment during RRU connection.

5



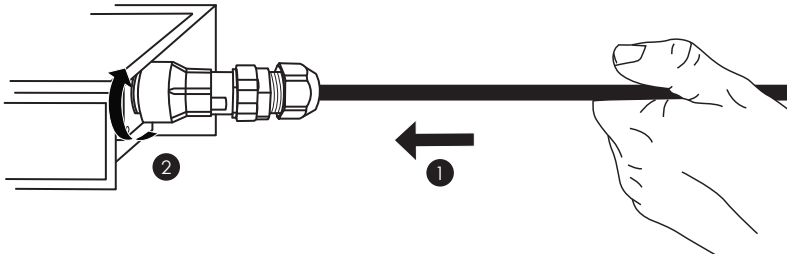
Slide weather shroud down jacketing to allow full access to the DLC connector during the RRU connection.

6



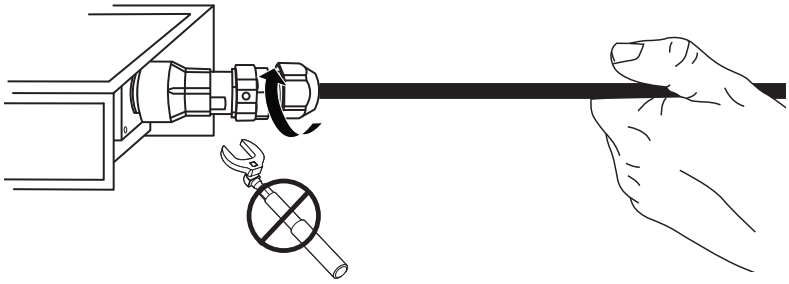
Remove the dust caps from DLC connector and seat into the RRU. Listen for a distinct click. **Do not twist DLC connector or kink the fiber during installation.**

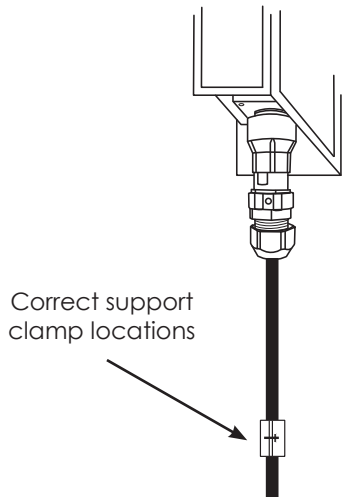
7



Slide the weather shroud up to the RRU. ❶ Turn top nut clockwise to secure to RRU bulkhead connector. ❷

8





Finish hand tightening the compression nut onto jacketing to complete installation. The compression nut must be tightened until it is completely against the cable gland body. The grommet will protrude slightly from the compression nut.

Reverse steps 7 and 8 to remove sleeve for maintenance.

Section 7: Breakout Procedure

After the trunk cable has been installed and you are ready to make the final connection to the RRU or BBU follow these steps for the removal of fiber protection tube.

1

Remove electrical tape from the trunk cable and corrugated protection tube

2

While holding the protection tube straight pull the tube away from cable.

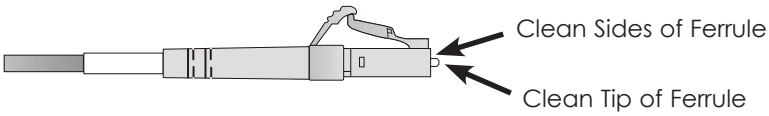
3

After you have pulled the fiber and power conductors remove electrical tape from the trunk cable and remove clear tube for access to all optical connectors.

Connectors and Adapter cleaning

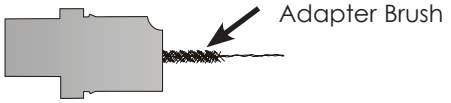
Clean exposed connector ferrule by lightly moistening lint-free wipe with fiber optic cleaning solution (or >91% isopropyl alcohol), and by applying medium pressure, first wipe against wet area and then onto dry area to clean potential residue from end face. Clean connector ferrule inside adapter by inserting lightly moistened cleaning stick with fiber optic cleaning solution (or >91% isopropyl alcohol) inside the adapter until contact is made with connector on opposite end. Rotate cleaning stick with medium pressure in one circular motion as it is pulled away from the adapter. Repeat process using dry cleaning stick.

Caution: Signal strength will be affected if end and sides of ferrule are not thoroughly cleaned. Discard cleaning sticks after each use. Do not turn cleaning sticks back and forth pressing against connector end face. This may cause scratches if large contamination is present. Always inspect connector end face for contamination after each cleaning.



Clean adapter by inserting adapter cleaning stick (or fiber adapter sleeve brush) moistened with fiber optic cleaning solution (or >91% isopropyl alcohol) inside the adapter and gently pull out with twisting motion. Repeat process with a dry cleaning stick.

Caution: Do not try to clean adapter with a standard pipe cleaner. The sleeve inner diameter of adapters could be too small. Do not try to clean the adapter with cleaning stick if a connector is mounted in one side. Discard cleaning sticks after each use.

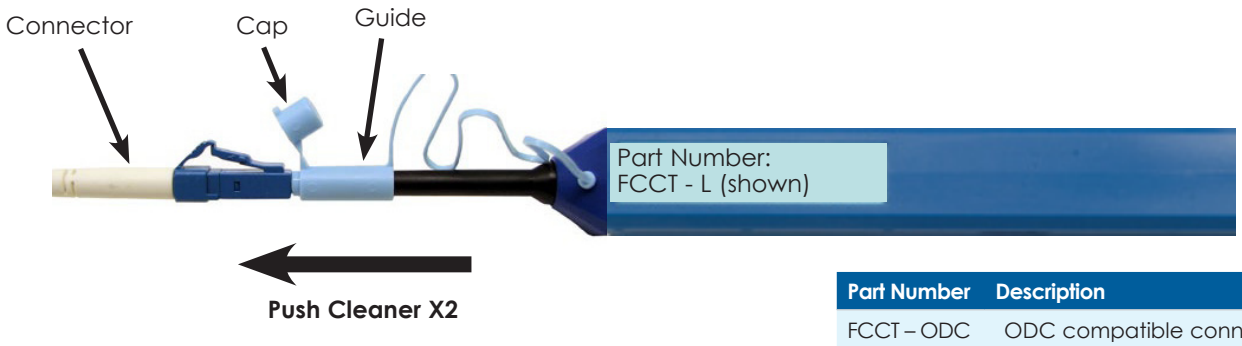


Section 8: All in one cleaners

Designed for cleaning the ferrule end faces of connectors

Open guide cap, insert connector into guide, push the outer shell to start cleaning the connector interface, a "click" sound indicates end of a cleaning process, repeat, close cap immediately after use.

Caution: Be careful not to slant the connector while inserting into the Guide cap. Do not overly exert force during insertion as this may cause damage to both the connector and the cleaner.



Part Number	Description
FCCT – ODC	ODC compatible connector
FCCT – L	DLC & LC Connectors

Inspecting

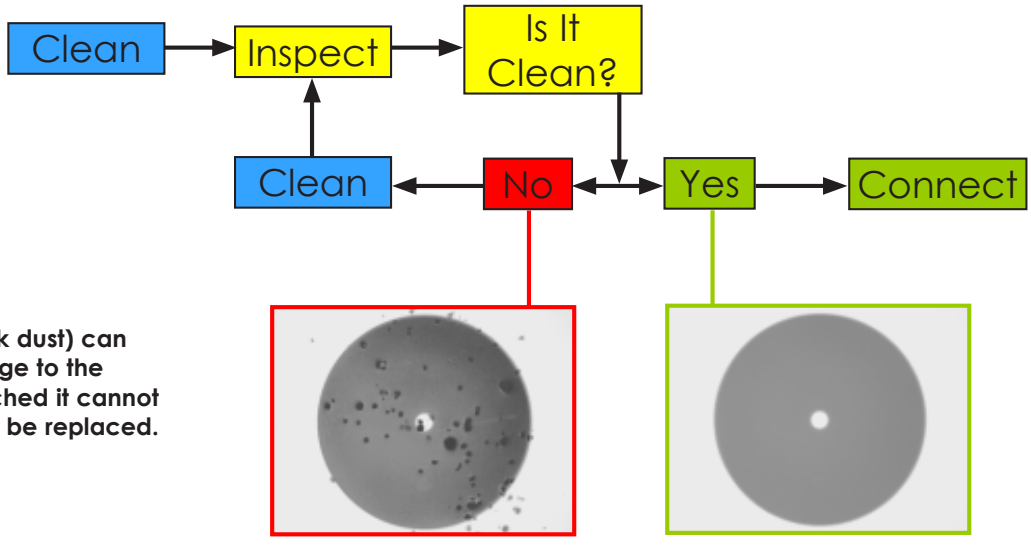
Scan to view video

There are 3 basic principles that are critical to achieving an efficient fiber optic connection:

1. Perfect Core Alignment
2. Physical Contact
3. Pristine Connector Interface

Today's connector design and production techniques have eliminated most of the challenges to achieving core alignment and physical contact. What remains challenging is maintaining a pristine end-face. As a result, CONTAMINATION is the #1 reason for troubleshooting optical networks.

Implementing the process of cleaning and inspecting before mating can reduce the time spent troubleshooting, optimize signal performance and prevent damage.



Abrasive particles (i.e. rock dust) can cause permanent damage to the interface. If interface is scratched it cannot be repaired, it would need to be replaced.

Section 9: Excess Cable Management

If length of cable installed needs to be adjusted you can split the cable at the BBU end using the process below and then coiling the excess fiber subunits in a storage box. Patch Panel Kits are available to manage any excess fiber length in the breakouts at the BBU.

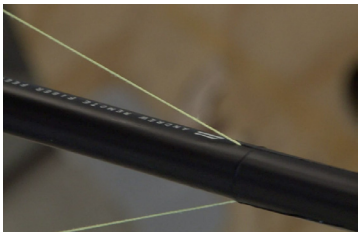
1 Mark cutback length

2 Notch Armor using flush cutter in-line with Kevlar strings

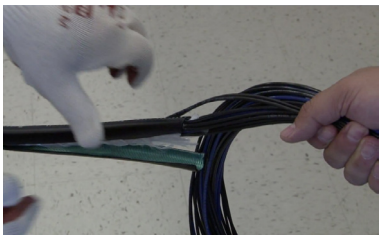
3 Place Rip Cord in Notches'

4 Pull Rip Cord Parallel to Cable (while supporting breakout)

5 Stop at Length Marker



6 Separate Armor



7 Cut Armor Using Side Cutter

8 Remove Water Blocking Tape

NOTE:
Step can be expedited by using a sewing seam ripper that can be purchased at local hobby stores

9 Remove Excess Rip Cord

10 Apply Electrical Tape to Protect Breakout

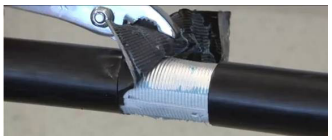
NOTE:
Remember to slide identifier labels down the power conductors before trimming the cable to it's final length

Excess Fiber storage Box
Part Number:
FE-14126-E

Cable Splitter tool
Part Number:
FA-RCRT-PD

Seam Ripper

Section 10: Jacketing Removal Procedure for Grounding Kit Installation



1. Score the jacketing 360°
2. Measure 51 mm (2 in) and repeat
3. Identify where the aluminum shielding overlaps, this will feel like a flat spot in the cable
4. With a knife flat on the cable remove a section of jacketing between score marks
5. Lift edge of jacketing with knife tip
6. Grab lifted edge of jacketing with a pair of pliers and roll on the cable
7. Remove excess adhesive with a piece of emery cloth

Installation Check List

- ☐ Tails are properly supported to prevent strain on fiber during severe weather
- ☐ Bend radius minimums haven't been exceeded
- ☐ CommScope approved installation accessories are used
- ☐ Maximum hanger spacing of 0.9 m (3 ft) - 1.2 m (4 ft) is maintained
- ☐ Visually inspected end face for residual dirt and damage
- ☐ Avoid migration of contaminations from one connector to another
- ☐ Check continuity by using LED or lazer light source from one end face and look for light from other end to identify any broken fiber (Do not look directly at cable with lazer source)
- ☐ Fiber connections are engaged and the sectors are consistent with requirements
- ☐ Cable serial number has been documented in the closeout paperwork and a copy has been left on-site

CommScope
1100 CommScope Place SE P.O. Box 339, Hickory, NC 28603-0339
(828) 324-2200 (800) 982-1708
www.commscope.com

Technical Support
+1 888 297 6433, Option 3 (Toll Free US and Canada)
+1 828 323 4220, Option 3 (local)
https://www.commscope.com/wisupport (open a ticket)