HELIAX®
Coaxial Cable

Cable Type	Nominal diameter	Maximum diameter over jacket in. (mm)	Cable weight (lb/ft (kg/m)) Air dielectric	Foam dielectric	Minimum bend radius in. (mm)	Air dielectric volume ft³/ 1000 ft	liters/ 1000 m
FSJ1	1/4”	0.29 (7.4)	—	0.045 (0.067)	1 (25)	—	—
LDF1	1/4”	0.345 (8.8)	—	0.06 (0.09)	3 (76)	—	—
EFX2	3/8”	0.45 (11.3)	—	0.09(0.13)	1.75 (45)	—	—
FSJ2	3/8”	0.415 (10.5)	—	0.078 (0.12)	1 (25)	—	—
LDF2	3/8”	0.44 (11.2)	—	0.08 (0.12)	3.75 (95)	—	—
FSJ4	1/2”	0.52 (13.2)	—	0.14 (0.21)	1.25 (32)	—	—
HJ4	1/2”	0.58 (14.7)	0.25 (0.37)	—	5 (125)	0.68	63
LDF4	1/2”	0.63 (15.9)	—	0.15 (0.22)	5 (125)	—	—
HJ4.5	5/8”	0.87 (22)	0.40 (0.59)	—	7 (180)	1.92	178
LDF4.5	5/8”	0.87 (22)	—	0.27 (0.39)	8 (200)	—	—
HJ5+LDF5	7/8”	1.10 (28)	0.54 (0.8)	0.33 (0.49)	10 (250)	3.5	325
LDF6	1-1/4”	1.55 (39.4)	—	0.66 (0.98)	15 (380)	1.2*	112*
HJ7+LDF7	1-5/8”	1.98 (50)	1.04 (1.55)	0.92 (1.36)	20 (510)	14	1301
HJ12	2-1/4”	2.38 (60.4)	1.16 (1.73)	—	22 (560)	21.5	1997
LDF12	2-1/4”	2.35 (60)	—	1.29 (1.91)	24 (610)	—	—

*Foam dielectric cable that allows pressurization through inner conductor air

Note: *Air dielectric cable is supplied pressurized and includes an air inlet valve. Inner connectors, gaskets, silicone grease, connecting hardware, and installation instructions are packed with unattached connectors. UHF style connectors do not include gaskets at the mating interface and may require sealing or weatherproofing.*

1. Inspecting and Preparing the Cable

Inspect the cable for possible shipping damage.

Andrew pressure-tests all air-dielectric cable and connector assemblies at the factory; however, you should check them for possible pressure loss before installing them. Use a tire pressure gauge to check the pressure at the cable end. Connector assemblies are factory-pressurized with dry air to 10 lb/in² (70 kPa) prior to shipment.

The maximum allowable pressure loss for air-dielectric cable assemblies is 1 lb/in² (7 kPa) in 24 hours. If this value is exceeded, check all joints for possible leaks, especially at pipe threads. Refer to Part 7 of this bulletin for pressure information. If you cannot correct the leaky condition, contact the Andrew Customer Service (see page 8) for assistance. **Important:** *Do not install cable that has excessive pressure loss.*

Notice: *Verify the pressure-handling capability of all antenna system components before subjecting them to the system operating pressure. Andrew HELIAX cable can handle pressures up to 30 lb/in² (207 Kpa); however, some antenna components may be damaged at such high pressures.*

Factory-attached flange connectors have a blank flange attached to them to maintain cable pressure during shipment. The blank flange also protects the connector face and prevents the entry of foreign matter. *Do not remove this blank flange until after the cable is installed.*

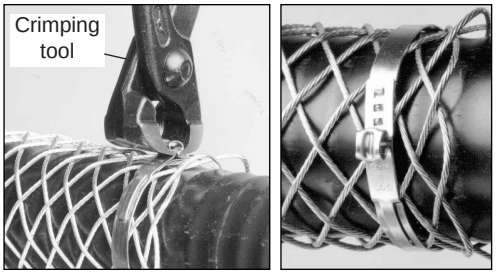
Cover all cut cable ends that are not immediately terminated to protect them from the weather and the entry of foreign matter. Seal and repressurize air-dielectric cable cable to prevent moisture from developing inside the cable. Use the cable end caps that were supplied with the cable shipment to cover the cable ends.

Before you hoist the cable, be sure to:

- Attach the connector at the antenna end of the cable using the instructions supplied with the connector.
- Pressure-test the assembly and apply a weatherproof covering for the assembly.

NOTICE

When the standard hoisting grip is completely laced to the cable, attach a support clamp (purchased separately) or add six wraps of two-inch plastic tape along the bottom portion of the grip. This prevents the grip from relaxing before tension is applied.

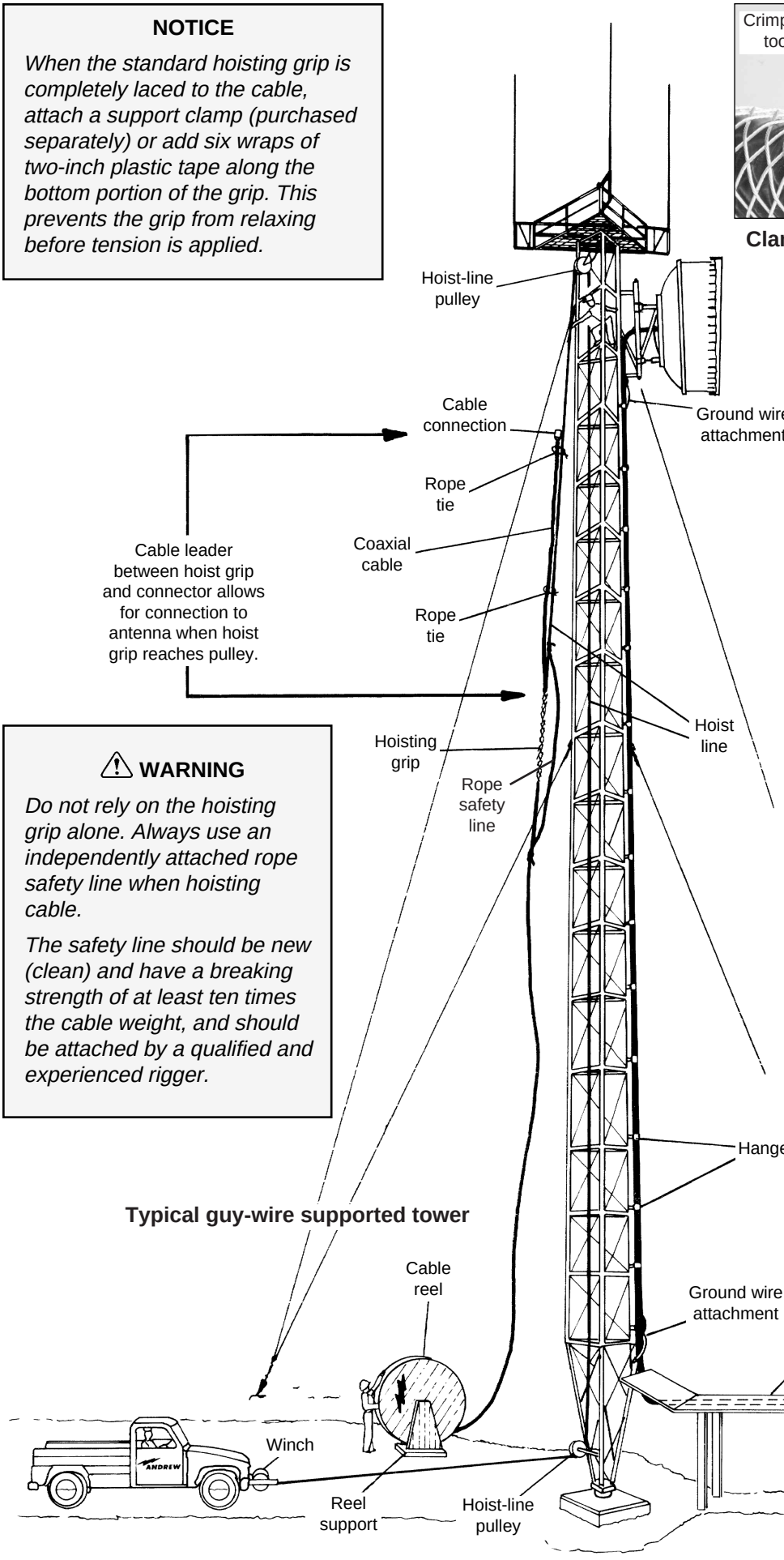


Clamping hoisting grip to cable with support clamp at heel of grip

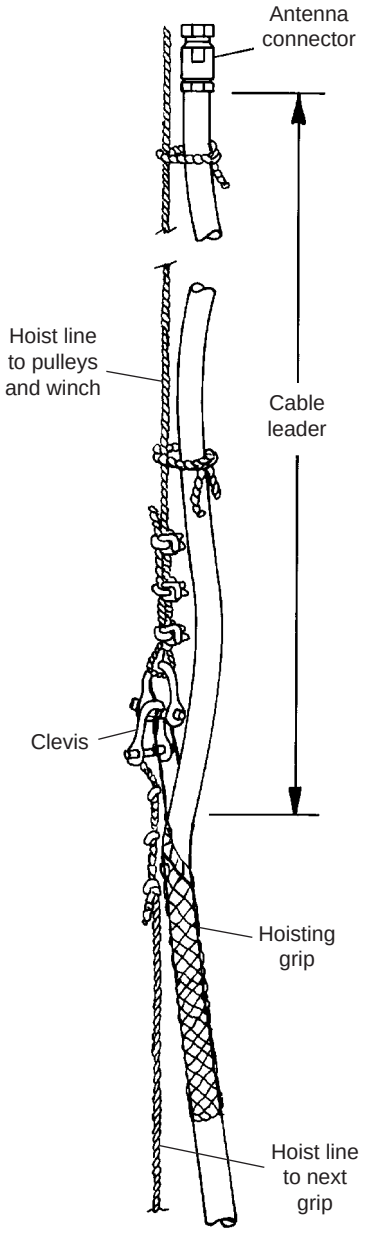
⚠ WARNING

Do not rely on the hoisting grip alone. Always use an independently attached rope safety line when hoisting cable.

The safety line should be new (clean) and have a breaking strength of at least ten times the cable weight, and should be attached by a qualified and experienced rigger.



Typical guy-wire supported tower



Hoisting grip rigging details

Note: *Avoid using pressurizable components in unpressurized systems, such as air-dielectric feeds used on antennas. Moisture can develop in these components and cause system performance problems.*

2. Hoisting the Cable

Hoist Line. Use a hoist line that supports the total weight of the cable. Refer to the table for approximate cable weights per foot and per meter to calculate total cable weight.

Pulleys. Use a strong pulley at both the top and bottom of the tower to guide the hoist line, as illustrated.

Cable Reel. Support the cable reel on an axle so that the reel can rotate freely as the cable is hoisted and the cable is pulled from the bottom. Have a crew member control the rotation of the reel.

Short lengths of cable are shipped coiled and tied. Uncoil these cables along the ground away from the tower before hoisting them.

Standard and Support type Hoisting Grips. Hoisting grips are interlaced wire that fit around the cable so that the looped handle at the upper end can be pulled to cause gripping of the cable. Grips are placed at intervals of 200 ft (60 m) along the cable.

The standard hoisting grip has open loops along its length. The grip is first wrapped around the cable and then the loops are laced together for hoisting. This type can be wrapped over cable that has a connector installed. (A support clamp, available separately, is used to clamp the hoisting grip to the cable so that grip handle can be placed on a support hook in a monopole tower.)

The support hoisting grip is designed to be compressed and slid onto the cut end of the cable before connector attachment. When positioned at the desired location after cable attachment, the heel of the grip is clamped to the cable with a support clamp (included). This is done so that the grip can be used to support the cable from a support hook in a monopole tower.

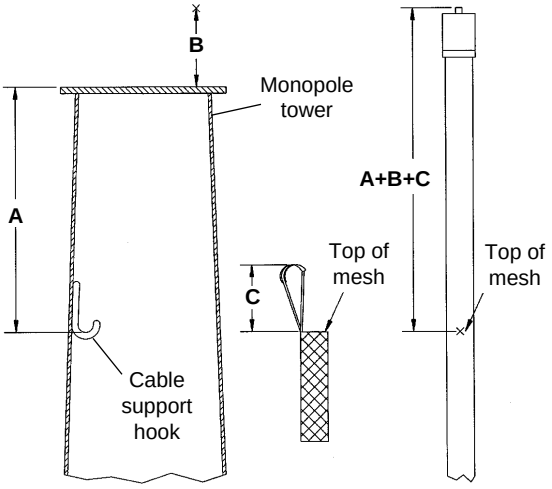
Clamping Cable for Hoisting in Monopole Tower. Some calculations need to be made before clamping the hoisting grip to the cable so that it can be hoisted to a support hook in a monopole tower. Three measurements need to be taken and added together.

First, the distance from the top exit of the monopole to the interior cable support hook should be measured, if not provided by the manufacturer. This is much easier when done on the ground before the tower is erected.

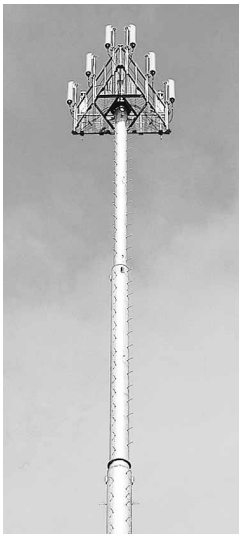
Second, measure the distance from the top mesh of the hoisting grip to the top of the handle.

Third, calculate the length of cable protruding from the top exit of the monopole.

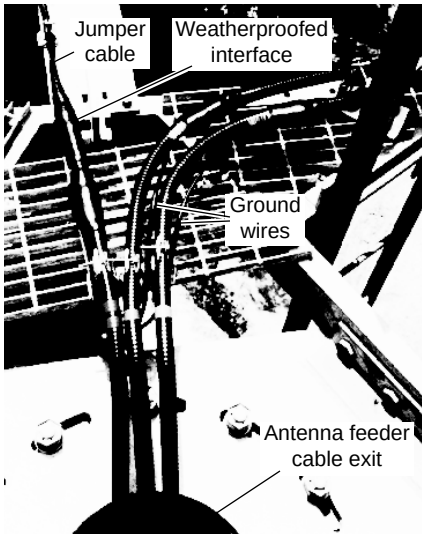
These three distances added together give the distance from the top of the cable connector to the point where the top of the hoisting grip's mesh should be located after attachment. When the location is found, the hoisting grip can then be clamped down with the support clamp, using the special crimping tool. If the calculation demonstrates an insufficient length of leader cable, an additional hoisting grip may be required lower on the cable being hoisted.



Interior hook and support measurements that must be made before clamping down the hoisting grip



Self-supporting monopole tower



Top of monopole showing cables anchored to platform

Cable run from monoplole to equipment building

Hoisting Procedure. Place a weatherproof protective covering over the connector on the cable end to prevent damage during hoisting. Attach a hoisting grip near the end of the cable, allowing a sufficient length, called a leader, of at least 5 ft (1.5 m) to reach the antenna input from the hoisted cable position. Tie the cable leader to the hoist line so that it does not dangle during hoisting.

When installing cable lengths more than 200 ft (60 m), add hoisting grips at intervals of 150 to 200 ft (45 to 60 m). When additional grips are used, tie the cable to the hoist line between the grips with fiber-reinforced tape at 50-ft (15-m) intervals. Make sure to allow slight slack in the cable - not in the hoist line - between grips and maintain that slack during hoisting. This slack in the cable indicates that the load is properly distributed.

Hoist the cable slowly and carefully. Prevent kinking by retarding rotation of the cable reel to control uncoiling of the cable. Avoid snags when hoisting or routing cable through and around tower members. Careless handling can cause kinks, dents, and scrapes in the cable.

Carefully apply an even pressure when bending the cable. Do not make a cable bend smaller than the minimum bending radius given in the table. If routing is so confined that a smaller bend is required, use a jumper cable.

3. Anchoring the Cable

After raising the cable to the correct height, anchor it to the support structure, starting at the top.

Cable attachment to tower lighting conduit is not recommended because this may result in damage to the conduit. Such damage may cause water entry into the conduit and eventual lighting performance problems.

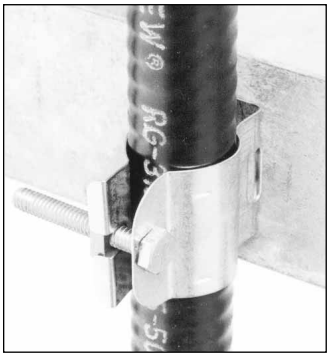
All cable should be supported within 1 to 2 feet (30 to 61 cm) of the antenna feed termination and of any cable connector. Otherwise, cable hanger spacing should be as recommended in the hanger literature for the cable type being installed. Allow enough cable at the antenna end to accommodate fine adjustments in antenna position and to prevent strain at the antenna input connection. Maintain cable support with the hoist line until anchoring is completed.

Note: *Connecting one cable hanger to another cable hanger for the purpose of anchoring one cable to another cable over the vertical run is not recommended.*

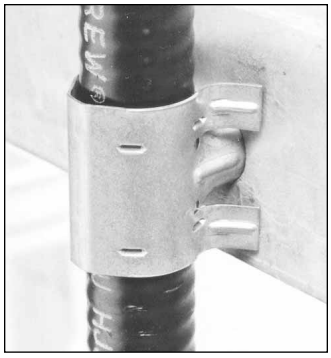
Standard and snap-in types of cable hangers are used for anchoring 1/2-inch and larger cables. Insulated hangers are required when cable is installed on a “hot” AM tower; that is, a tower used as an energy radiator.

The entire length of cable should be inspected for possible damage as it is being anchored. Dents or deformations can cause degradation in electrical performance. If the jacket has been cut, seal it with butyl and vinyl tapes (Andrew Kit 221213 is recommended).

When supporting the cable with standard or snap-in hangers is not possible (that is, cable sizes 1/2" and smaller, jumpers, or cable near the antenna), nylon cable ties may be used.



Standard hanger



Snap-in hanger

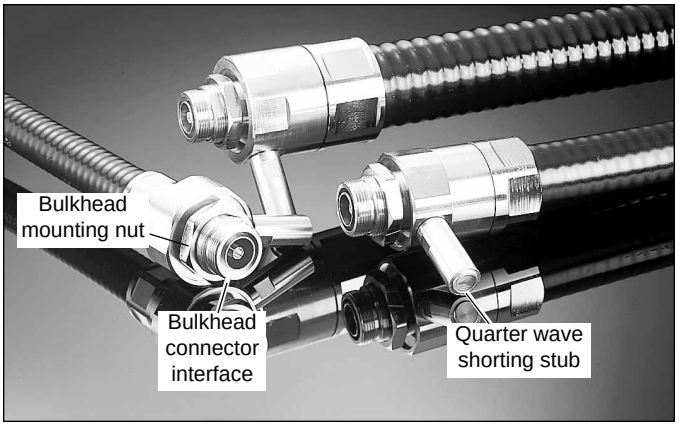
Note: *Metal strapping or hose clamps should not be used to attach cable directly to the tower. This is because they can easily crush or otherwise damage the cable, or they may cause generation of electrical noise in the system.*

4. Grounding

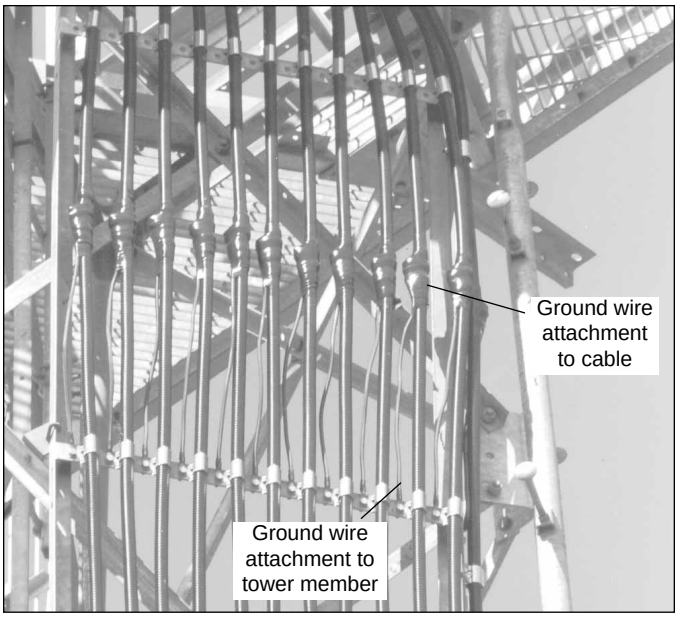
Grounding Cable. The top and bottom of the cable attached to the tower should be electrically grounded to the tower with Andrew grounding kits for lightning protection. *The antenna input connection cannot serve as the top ground point*. Also, ground the vertical cable run at midpoint if its height on the tower is greater than 200 feet (61 m).Local building codes should be followed, which may require grounding the cable outside, near the wall of the equipment building. The cable should also be grounded near the wall inside the building (per NEC Article 810-55 and 820-33 grounding requirements).

Surge Protectors. Surge protectors capable of withstanding multiple lightning strikes may be installed at the end of the cable that enters the equipment building. The surge protector is fitted to the cable end and includes a bulkhead connector interface that mounts to a ground plate with a washer and nut.

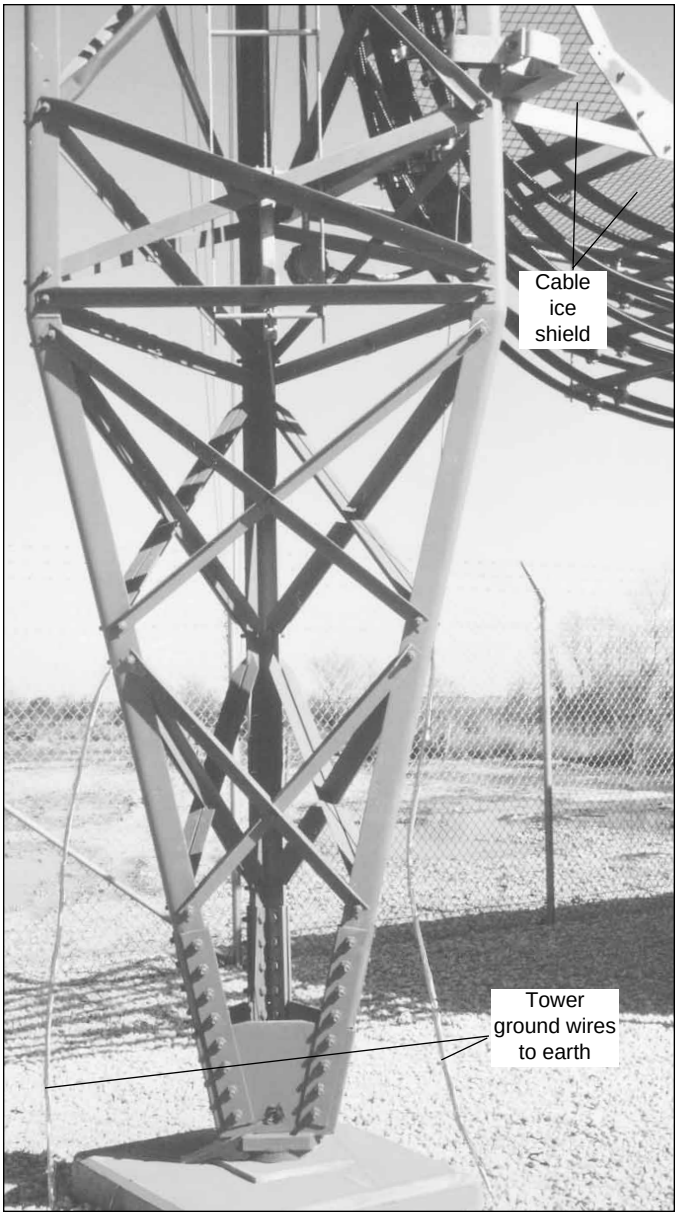
Grounding to Earth. Grounding should be continued from the tower and equipment building to an interconnected grounding system in the earth. Such a system generally consists of a group of buried ground rods welded to an underground loop of wire.



APTL surge protectors fitted to foam coaxial cables

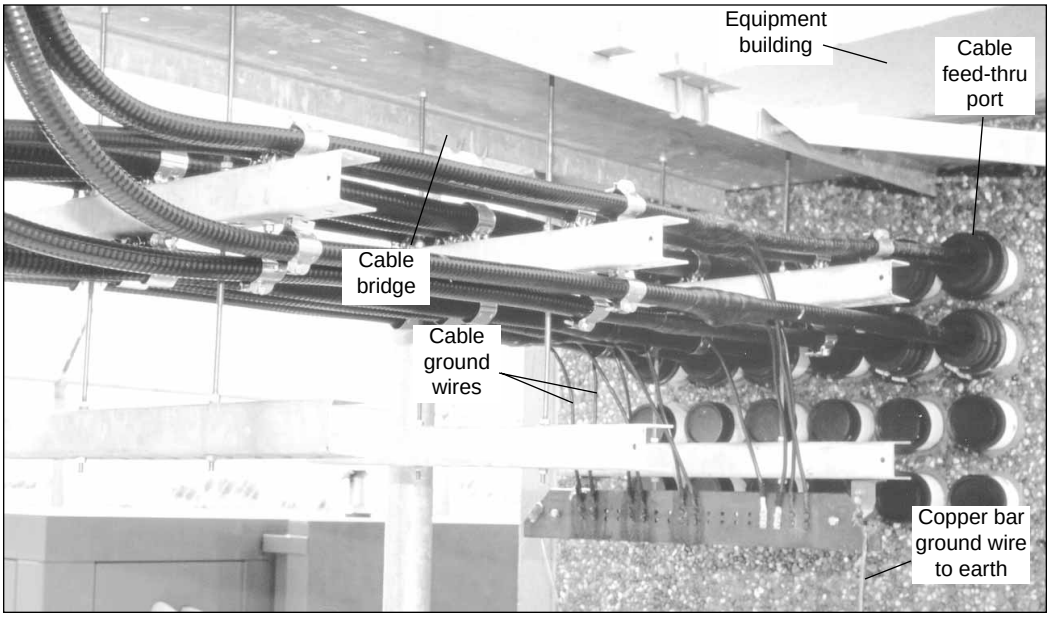


Ground wire attachment of vertical cable run



Tower ground wire attachment and view of cable ice shield

Ground wire attachment of horizontal cable run



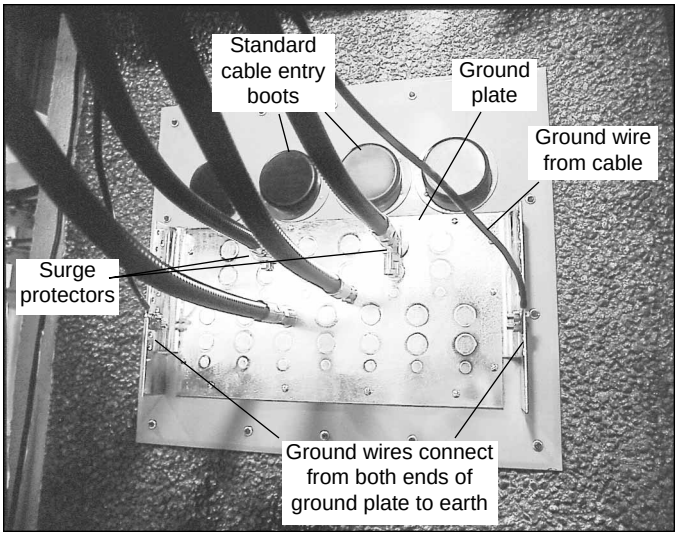
5. Horizontal Cable Runs

The cable may be routed horizontally from the base of the tower to the equipment building either above or below ground.

Above-ground Cable. Attach the above-ground cable to the horizontal support member, such as a cable bridge, with the same type hangers and spacings used in the vertical run. Exposed horizontal runs must be protected from the weight of accumulated ice and damage from falling ice or other objects by means of an ice shield.

Wall or Roof Feed-thru Ports. HELIAX® feed-thru ports are recommended when a cable must pass through a roof or wall of a building. Single ports or panels which contain groups of ports are available.The ArrestorPort™ II Integrated Cable Entry/Ground System is a panel with ports and a ground plate to accommodate the mounting of surge protectors.

Buried Cable. Buried cable should be located below the frost line (depth) of the area and at least 3 ft (1 m). This will protect the cable from damage by heavy vehicles. Surround the cable with a 4-inch (102-mm) layer of sand to protect the jacket from stones or other sharp objects. Place location markers at convenient intervals over buried cables, especially at the locations of cable splices.



ArrestorPort™ II integrated cable entry and ground system with APTL bulkhead surge protectors installed

6. Cable Connections

Connector Instructions. Step-by-step installation instructions are included with each connector. Clamping and coupling torque values are given to ensure that components are tightened within established mechanical tolerences. Also included are photographs and illustrations of the tools required. Tools for cutting and chamfering cable conductors are available from Andrew to shorten installation time and provide more precise fitting of connectors.

Connector Attachment Tips. The following tips are given as a general guide for connector attachment:

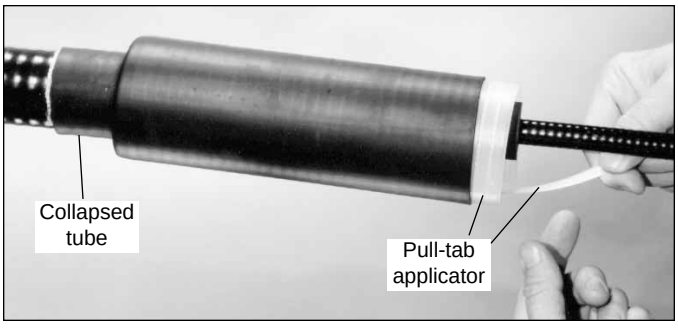
- Straighten the last 6 inches (150 mm) of 1/4” to 1/2” cables before starting connector attachment.
- Straighten the last 12 inches (300 mm) of 5/8” to 2-1/4” cables before starting connector attachment.
- Use an accurate scale for all measurements.
- Avoid scoring the outer conductor when removing the cable jacket with a knife.
- Deburr conductors with a knife or file.
- Ensure that foam and conductor surfaces are free of debris and grease.
- Make sure that if a self-tapping pin is used, it is fully screwed into the inner conductor.
- Make sure that if an inner stub is used, it is screwed into a corrugated inner conductor so that its end is flush with the conductor.
- Use only the wrench sizes given in the instructions.
- Use a pin depth gauge to measure pin depth of the assembled connector. Incorrect depth can cause connector damage during coupling.
- Make sure that if a soldered inner connector pin is used, it is parallel to the inner conductor axis; otherwise, connector damage could result during coupling.
- Use a coil of rosin-core flux type solder with 63% tin, 37% lead, and a flux weight of 2.4% for best results on solder version connectors. For small inner connector pins, use a solder diameter of 0.031” and 0.062” for larger pins.
- Make sure that O-rings and gaskets are placed in the correct locations.
- Apply a thin coat of silicone grease to O-rings and gaskets only where indicated in the instructions. Some interface gaskets, for example, do not require grease.
- Form the cable before coupling the connector to the mating connector for properly aligned entry.

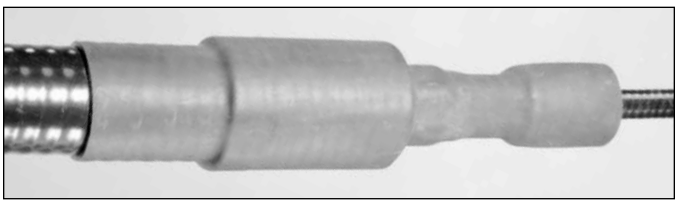
Connector Coupling Torque Values.

Type N lbf·in (N·m)	7-16 DIN lbf·in (N·m)
15-20 (1.7-2.3)	220-265 (25-30)

Connector Pin Depth.

Connector	Inches	Millimeters
N female	0.187/0.207	4.75/5.26
N male	0.208/0.230	5.28/5.84
7-16 DIN female	0.70/0.082	1.78/2.08
7-16 male	0.058/0.070	1.47/1.78
SMA female	0.000/-0.010	0.000/-0.25
SMA male	0.000/-0.010	0.000/-0.25
BNC female	0.196/0.206	4.89/5.23
BNC male	0.208/0.218	5.28/5.54
TNC female	0.190/0.206	4.83/5.23
TNC male	0.210/0.224	5.33/5.69
UHF female	0.063/0.103	1.60/2.62
UHF male	0.325/0.400	8.26/10.16
Mini UHF	Preset	Preset
7/8 EIA	0.469/0.500	11.91/12.70
1-5/8 EIA	0.594/0.625	15.09/15.88
3-1/8 EIA	0.906/0.937	23.01/23.80
F female	0.158/0.183	4.01/4.65
F male	0.142/0.152	3.61/3.86
HN female	0.341/0.371	8.66/9.42
HN male	0.355/0.385	9.02/9.78
LC female	0.030 max.	0.76 max.
LC male	0.531 max.	13.49 max.
SC female	0.273/0.303	6.93/7.70
SC male	0.307/0.337	7.80/8.56
CATV F male	Preset	Preset

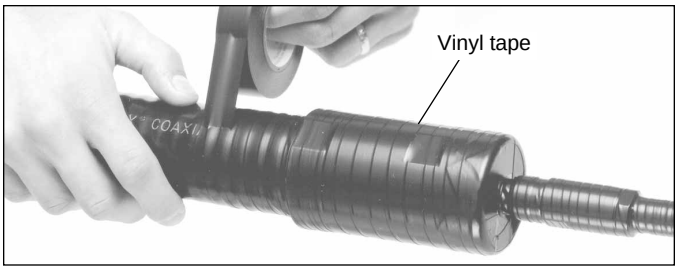


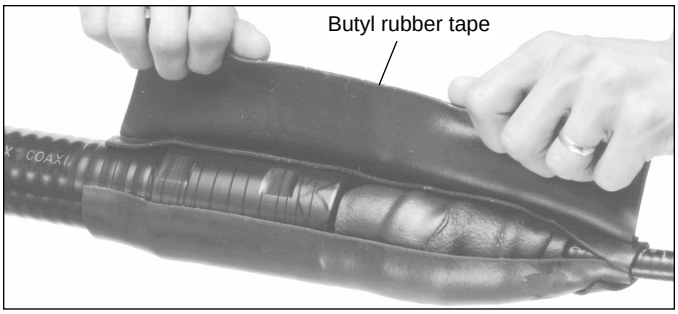


3M™ Cold Shrink™ Weatherproofing Kit

3M™ and Cold Shrink™ are trademarks of the Minnesota Mining Company.

Weatherproof Cable Connections. Protect cable connections that are exposed to wind and tower vibrations, such as a jumper connection from the main feeder to the antenna, with a weatherproofing kit. Use the 3M™ Cold Shrink™ Weatherproofing Kit or the standard Connector/Splice Weatherproofing Kit. Either kit will prevent the connection from loosening due to vibrations. The standard kit also provides moisture protection for buried cable connections.





Standard Connector/Splice Weatherproofing Kit

7. Pressurizing Air-dielectric Cable

Pressurization is needed in air-dielectric cables because changes in temperature can cause condensation of moisture from outside air that enters the cable. This moisture can seriously impair the efficiency of system operation. Connecting a pressure source of dry air or nitrogen (dehydrator) to the cable at slightly more than atmospheric pressure will correct this condition since the moisture will be removed and air will then leak from instead of into the cable.

Pressurization can be done either by manual or automatic means, depending on the amount of cable in use and whether or not the site is attended.

Note: *While Andrew HELIAX® cable can handle pressures to 30 lb/in^2 (207 kPa), some antenna components may not be able to handle such high pressures. Verify the pressure-handling capability of all components, including antenna feed windows, before subjecting them to the system line pressure.*

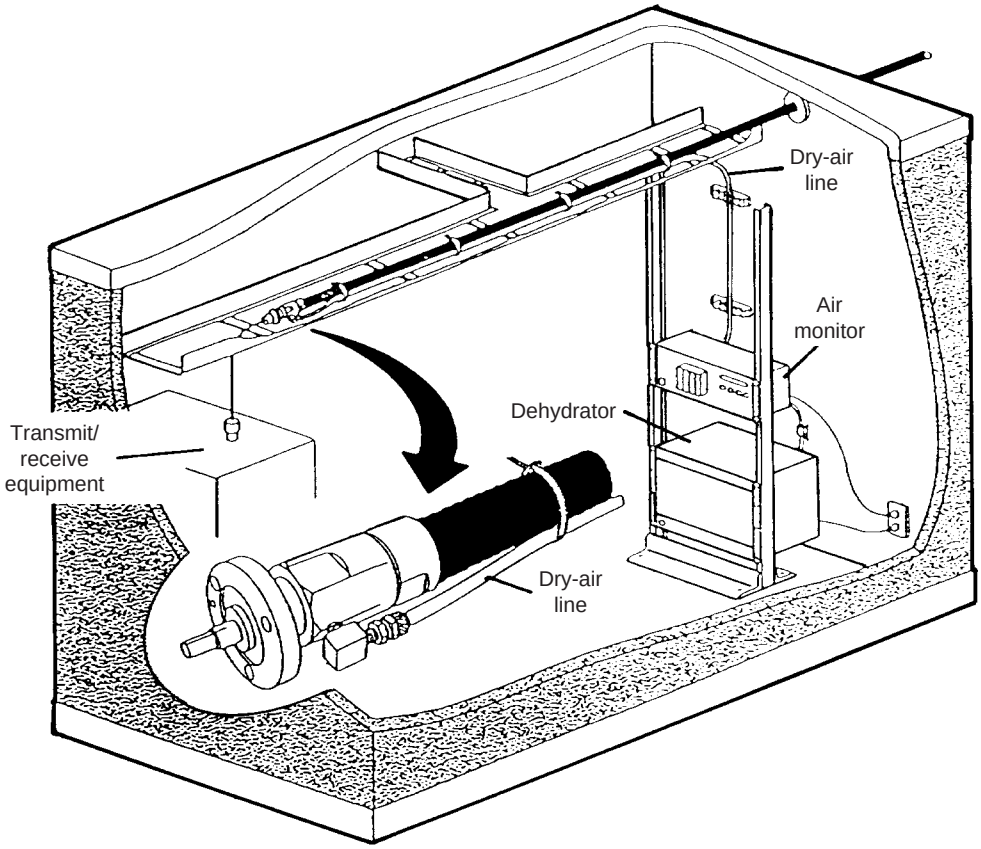
Purge the Cable. Purge cable that has been allowed to lose most or all of its pressure since shipment to ensure that only dry air is in the cable. After completing all cable connections, remove the gas-port plugs of the connectors at both ends of the cable. Connect the pressure source to the port at the transmitter end and purge the cable continuously until it is dry.

(In a dual-polarized system of Andrew antennas, purging can be done with both cable connectors at the transmitter end since there is a gas path through the feed from one input to the other.)

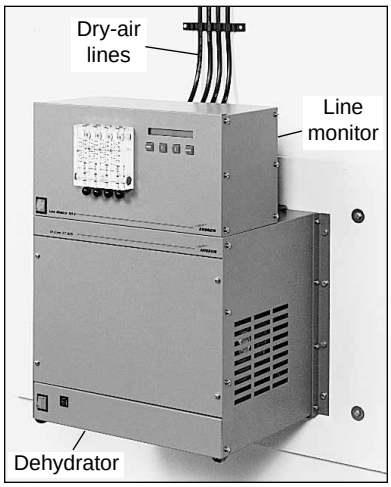
An alternative purging method is to pressurize the cable to 8 lb/in^2 (55 kPa) and, after one hour, let the air escape at transmitter end of the cable. Repeat this procedure several times, allowing one hour each time for mosit air and dry air to mix.

Pressurize the System. After purging, replace one gas port plug and pressurize the cable at the other gas port. When connecting pressurizing equipment to a connector gas port or reassembling pipe fittings, first cover the threads with sealing tape to ensure a leak-proof connection.

Check for System Leaks. After installation, check the cable connections for leaks. Apply a commercial leak detector or a liquid detergent over the joints. Bubbling indicates leakage.



Equipment building showing pressurization components



Wall-mounted dehydrator and line monitor

Notice

The installation, maintenance, and removal of antenna systems requires qualified, experienced personnel. Andrew installation instructions are written for such personnel. Antenna systems should be inspected once a year by qualified personnel to verify proper installation, maintenance, and coondition of equipment.

Andrew disclaims any liability or responsibility for the results of improper or unsafe installation practices.

ANDREW®
Andrew Corporation
10500 West 153rd Street
Orland Park, IL U.S.A. 60462
Telephone: 708-349-3300
FAX (U.S.A.): 1-800-349-5444
Internet: http://www.andrew.com
Customer Service, 24 hours: U.S.A. • Canada • Mexico: 1-800-255-1479
U.K.: 0800 250055 • Republic of Ireland: 1 800 535358
Other Europe: +44 1592 782612
Printed in U.S.A.6/98