



**TFU-TYPE TOP MOUNTED
PYLON ANTENNAS
INSTRUCTION MANUAL**

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WARNING

- NEVER CLIMB OR WORK ON THE ANTENNA WHILE RF POWER IS BEING FED TO IT. ARRANGEMENTS SHOULD BE MADE WHICH WILL GUARANTEE THAT RF POWER WILL NOT BE APPLIED WITHOUT SPECIFIC INSTRUCTIONS FROM PERSONNEL ON THE TOWER.
- FAILURE TO COMPLY WITH THESE INSTRUCTIONS MAY RESULT IN A SERIOUS ACCIDENT.
- CAUTION: Under no conditions are the spoke short bolts or the spoke short locking plate bolts to be loosened! Do not paint the bottom of the base flange at the tee contact surface!
- PLEASE HEED ALL WARNING LABELS ATTACHED TO THE ANTENNA.

INTRODUCTION

Many issues need to be considered during the planning, purchase and installation of a new Dielectric TFU UHF television antenna. The purpose of this book is to assist the station with the final phase of their project; the delivery, inspection, assembly, and installation of their new antenna. The general features of the Dielectric type TFU UHF Pylon television top mounted antennas are discussed herein as well as proper installation, handling, storage, and assembly procedures. It is essential for the customer and his representatives to become familiar with this information and follow its contents. Each TFU antenna is designed to meet the requirements of a particular installation therefore exact dimensions are not provided in this book. Drawings containing dimensional specifications and other pertinent data are furnished with the antenna. These drawings should be referred to during assembly, erection and testing. And as always, please contact Dielectric when questions arise.

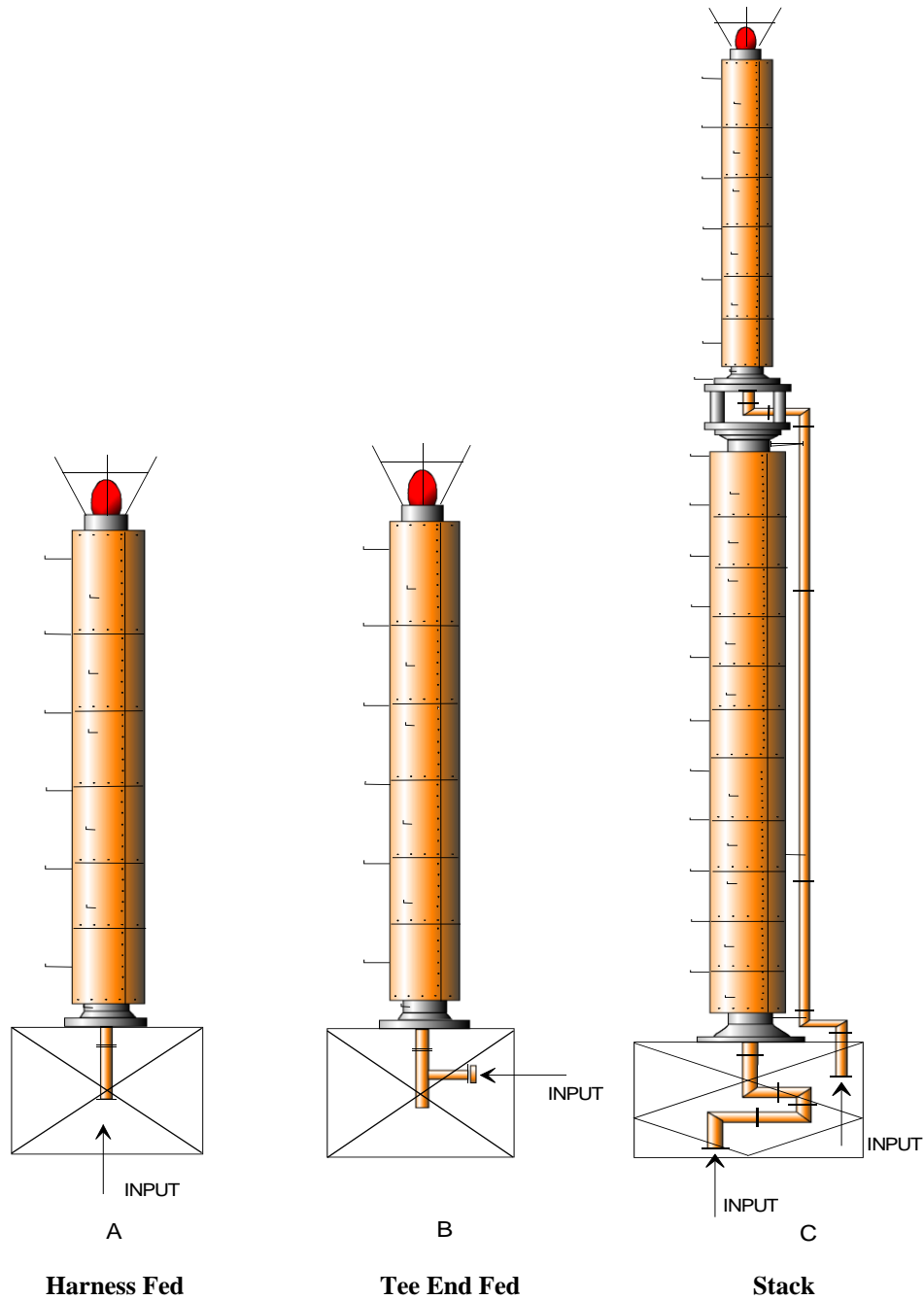


Figure 1 Pylon Antenna Configurations

DESCRIPTION

General

Dielectric Communications UHF Pylon Television Antennas (TFU) consist of slotted galvanized steel pipes with diameters and wall thickness of proper size to provide the specified electrical and mechanical requirements. There are three basic antenna designs. All three have feed systems connected through a clearance hole in the tower top plate. Figure 1 (A) shows a typical center fed harness antenna, Figure 1 (B) an end fed antenna with input tee and Figure 1 (C) shows a stacked

configuration. Slot arrangements on each form vary widely as do the number of layers and the number of slots per layer. This is dependent on the type of radiation pattern desired.

The single section center fed antenna has an assembled feed system consisting of pressurized inner conductor harness assembly and an input transmission line adapter section. A portion of the feed harness that protrudes below the base flange of the antenna is inserted in the tower top clearance hole at installation. The adapter section is located between the harness and the elbow complex at the top of the vertical transmission line run.

The end fed antenna is fed by an input tee attached to the base flange through the clearance hole in the tower top plate. The gas stop is located at the input of the tee.

DELIVERY AND INSPECTION

Delivery

The TFU antennas are shipped on shipping deck saddles on a flat bed trailer. In Figure 2 a typical single section antenna is shown ready for delivery. The antenna and saddles are chained and strapped to the bed of the trailer. The spare parts and other accessories are packed in cartons and are usually shipped along with the antenna on the trailer. One of the boxes contains a shipping list and information to be used during installation of the antenna. Preparations should be made at the site to unload a box weighing up to 1000lbs. The measured shipping weight is stenciled on the outside of the box.



Figure 2 Antenna Loaded on a Truck

Inspection

Upon arrival at the site and prior to unloading, the antenna should be inspected and checked for any damage resulting from shipping or handling. The contents of all cartons should be examined. The number of all items should agree with the quantities shown on the bill of lading and shipping list. After checking, replace all parts in their respective cartons until ready for use. Be careful not to lose or destroy any identifying tags attached to the various parts or items. The parts that were removed to facilitate the shipping are located in the cartons and can be installed prior to or after the antenna is installed. If any parts are damaged or missing please advise Dielectric Communications immediately.

ANTENNA UNLOADING AND ASSEMBLY

Unloading

Appropriate equipment should be used to safely unload and handle the antenna, components and cartons. Refer to the antenna mechanical specification sheet found in the shipping documentation for the antenna weight and dimensions.

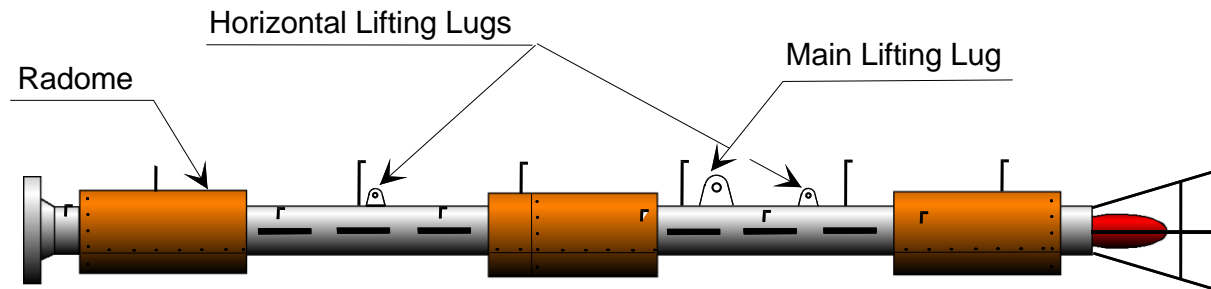


Figure 3 Antenna Lifting Lug

As shown on Figure 3, each antenna has lifting lugs for handling and installation of the antenna. Dielectric antennas typically have one main lug used for lifting the antenna to the tower top and two horizontal handling lugs. Care must be exercised when removing the antenna from the trailer to avoid damaging any parts such as heaters, clamps, beacon cable, vertical dipoles, radomes, trim strips or slot covers.

Storage

The shipping deck saddles are not returnable and can be used for short term storage (*up to 10 days*) of the antenna. The saddles are too low to prevent the incursion of dirt, moisture, insects, and small animals for a prolonged period of time. No parts of the antenna should be in contact with the ground during storage. It is recommended for most instances that the antenna be covered and stored a minimum of 2 feet off the ground.

The antenna shall be stored on level ground large enough to accommodate the antenna. The location should be prepared prior to the delivery of the antenna. The antenna should be protected, kept clean and dry. The pressure of the inner conductor in a harness fed antenna should be maintained between 5-10 lbs/in². The antenna should be pressurized with dry air or nitrogen.

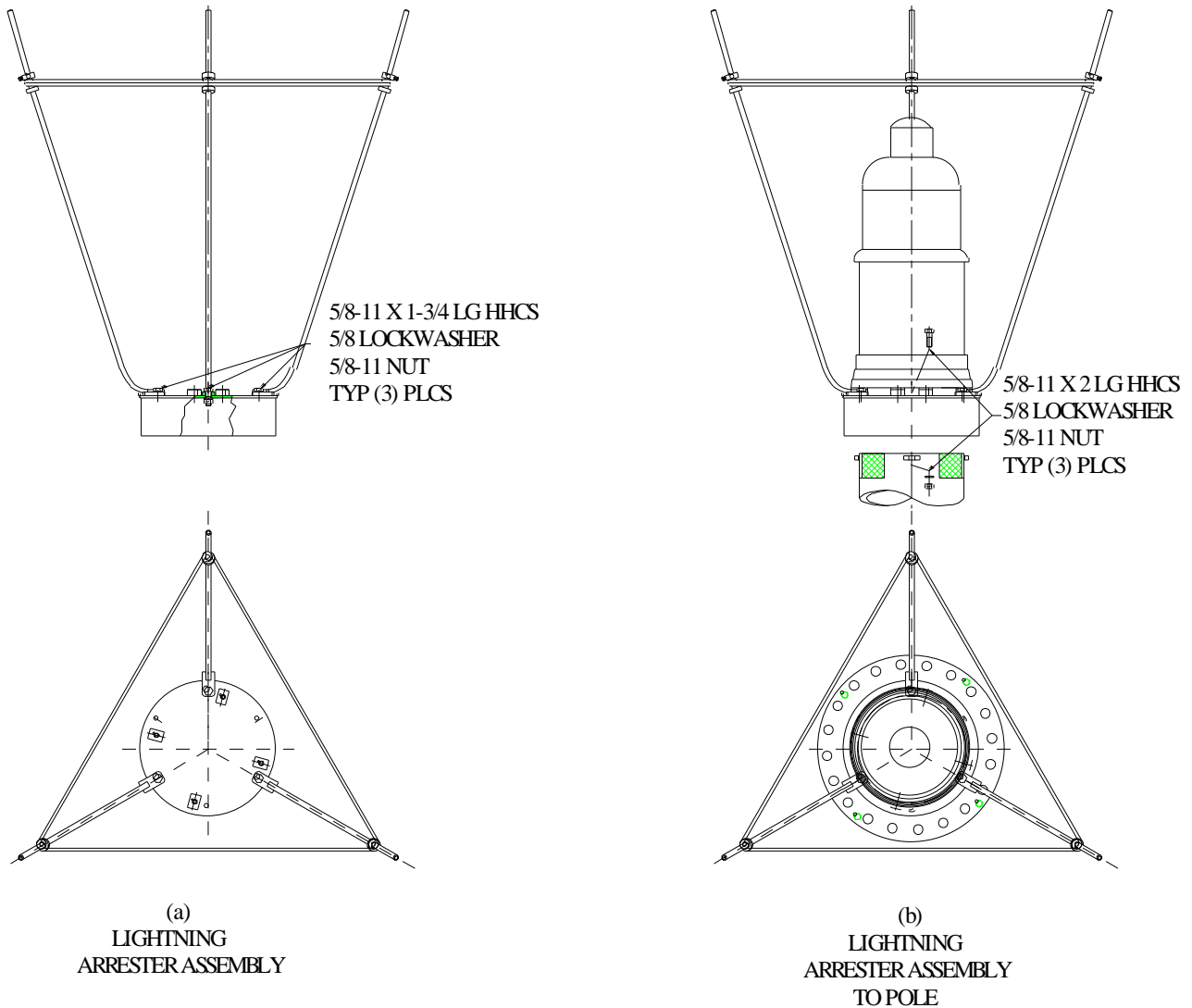


Figure 4. Lightning Protector Assembly

Assembly

Dielectric TFU Antennas require minimal assembly at the tower site. The working components of the single section center fed antenna are supplied completely assembled. The end fed antenna requires attachment of the input tee after installation. The minor assembly work that will need to be done prior to installation are mounting the lightning arrester, routing the beacon or strobe cable (often this done at the factory), and reinstalling any radome panels and pole steps that may have been removed for shipping. The bolts, nuts, lockwashers and leveling shims that are required for connecting the antenna to the tower top are supplied with the antenna. In addition, a spare parts kit is supplied which includes spare radome panels, radome brackets, mounting bolts, pole steps, and miscellaneous hardware.

Lightning Protector Assembly And Mounting

A top cap cover with six equally spaced clearance holes for 5/8 inch diameter bolts and three threaded holes for mounting the beacon light are supplied for poles 9-5/8 inch diameter and greater. Mount the vertical lightning rods 120° apart as shown in Figure 4a using the 5/8-11x1-3/4 inch long bolts, nuts

and lock washers provided. Install the sleeve assemblies and tie rods and check all bolts for tightness. Refer to Dielectric Torque Specifications A88212 for proper assembly torque.

For poles 8-5/8 inch diameter and less the top cap cover will have threaded holes for mounting the vertical supports and the beacon. Three 5/8 inch diameter bolt clearance holes are also provided to mount the assembly to the lug on the pole. Use bolts and lock washers to attach the vertical supports then install the sleeve assemblies and tie rods and check all bolts for tightness.

Attach the lightning protector assembly to the three lugs at the top of the pole using 2 inch long, 5/8 inch diameter bolts, lock washers and nuts.

Top Aircraft Obstruction Lighting (AOL) Mounting (Beacon or Strobe)

Beacon cable (12/3 cable is standard) is typically factory installed in the conduit attached to the antenna for incandescent top mounted AOL. *Interconnecting cable to **strobe** AOL is not provided by Dielectric Communications. The standard factory-installed conduit inner diameter is ϕ 3/4 inch.* Two conduits can be supplied at the customer's request if dual lighting is to be used.

Orient the beacon/strobe light housing so that the hinge will be on the side opposite the pole steps. This will make it more convenient to service the lamp. Use bolts and lockwashers provided to attach the housing to the tapped holes in the top cover. Lamps should be installed and the wiring checked before raising the antenna.

Pole Step Installation

Pole steps may have been removed for shipping purposes. There are two common sizes of galvanized steel pole steps used by Dielectric. These are ϕ 1-1/8 and ϕ 3/4 inch. In rare cases when extra length is required a ϕ 1-3/8 in size may be used. The pole steps thread directly into the pole and are locked into place with a jam nut. The jam nut is supplied on the pole step. Refer to other pole steps as a guide for proper installation.

Fin Installation

Pattern shaping fins are common on many directional antennas. Not all antennas have fins. Fins may be removed for shipping purposes. Refer to the adjacent fins already installed on the pole for their correct location and orientation. Dielectric pattern shapers are typically made up of two pieces; a 1/2 inch thick base, and a 1/8 inch thick fin. The fin and base are supplied fully assembled. The assembly is attached to the pole using the 1/4-20 SCHS supplied. It is important to verify that the pattern shaper is seated properly. A .188 Allen® wrench will be necessary for assembly. Refer to Dielectric Torque Specifications A88212 for proper assembly torque.

Dipole Installation

Dipoles are surface mounted electrical elements used to customize the polarity of the antenna signal. These are often referred to as "Z" dipoles as a portion of the element parallel to the surface of the pole usually has a z shape. Dipoles are located over the slots. Please refer to the other dipoles attached to the pole surface as a guide for proper installation. The dipole is attached to the pole surface with two #10-32 SHCS. These should be torqued to 50 inch-lbs. The hardware is provided with the dipole.

Radome Installation

Layers of radome panels and radome studs may have been removed for shipping purposes. A 9/16 and 7/16 inch wrench will be required for assembly. Radome studs are fastened to the antenna pole with 3/8-16 threaded rod protruding from the stud. The removed radome studs are labeled and shipped together. The radome studs should be started by hand and then tightened to a snug tight condition with a strap wrench. Caution, over tightening can cause damage to the stud or the antenna pole. The length of the radome studs may vary around the circumference of the pole. Refer to the adjacent antenna studs as a reference for the proper locations.

Radome panels are formed as half cylinders from lightweight .094 inch thick Lexan®. Along one vertical edge of a panel there are slotted clearance holes and along the opposite edge there are 1/4-20 cinch nuts. Cinch nuts are preinstalled threaded inserts. In each panel there are cut outs for pole steps and for attachment to the radome brackets. The layers of panels are installed in two halves. It is usually best to install one panel at a time. Refer to the panels that have already been installed as guide. Be sure that any missing pole steps and Lexan® pole step sealing washers have been installed before installing the panel. The circumferential location of the vertical seams can be located by looking at the adjacent panels. Each panel shingles (1.75 inch) up under the layer above and (1.75inch) over the panel below to produce a weather tight seal. Attach the panel to the radome stud using the 1/4-20 bolt with lock washer and Lexan® washer provided. The halves are fastened together along the vertical seam using the 1/4-20 bolts, lock washers, and Lexan® washers provided.

Transmission/Dummy Line Installation

Transmission or dummy lines are often present on antennas that are on the bottom of a stack or where a special pattern is required. The lines are held a set distance off the pole surface by saddle supports. The line is held in the saddles by two high torque hose clamps. Please refer to the installation drawing for the correct placement of the line and hangers. The correct torque and installation of the hose clamps is found on the drawing Dielectric Torque Specifications A88212.

FINAL PRE-INSTALLATION PROCEDURES

Resistance Checks

On antennas supplied with deicers open the electrical junction box at the bottom of the antenna and take resistance readings across the terminals. Also take insulation resistance readings on the deicer system between the antenna pole and any terminals. Compare these readings with those supplied on the Antenna Specification Supplement that is packed with the antenna. Should there be any discrepancy advise Dielectric.

Inspection

On harness fed antennas check the harness locator to assure that the notch is aligned with the harness flanges as shown in Figure 5.

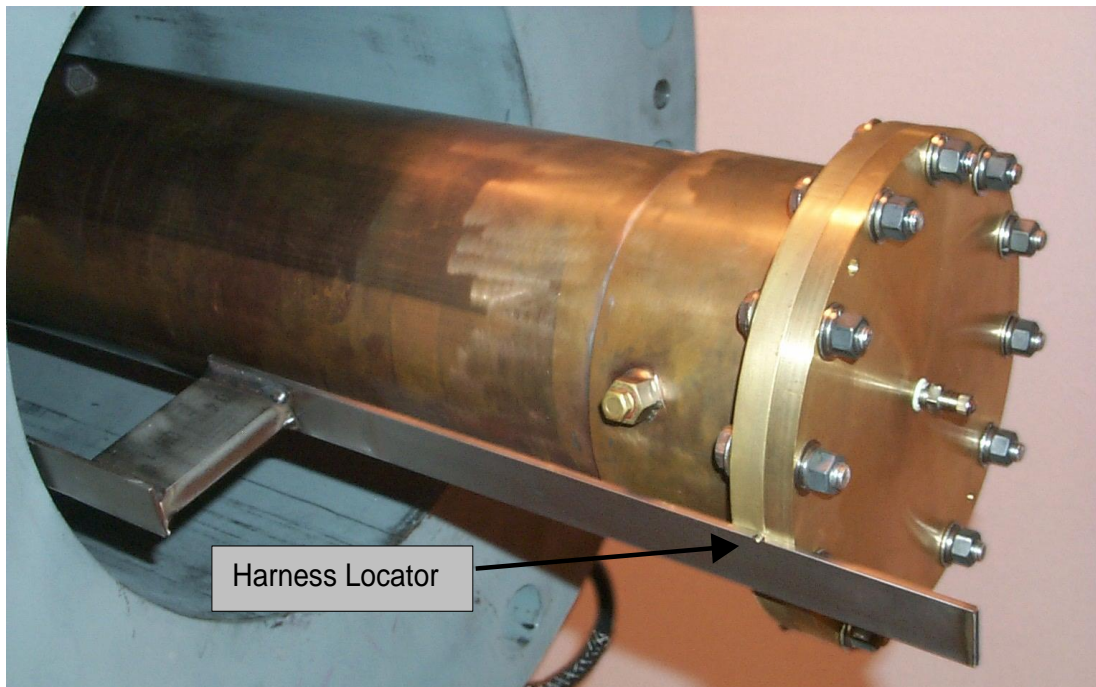


Figure 4 Harness Locator

On end fed antennas the inner conductor supporting brace or plate (as shown in Figure 5) should not be removed until the antenna is in place on the tower top. When the supporting plate is removed the inner conductor will most likely slip down and stop (there is a retaining disk at the top to limit the travel). In some cases the inner conductor can move up to 5 inches. This is a normal feature of this design. It will be pushed back up during the installation of the tee on the tower top.

Other important checks prior to raising the antenna are as follows:

- The tower top should be properly oriented and have the proper drilling for attachment of the antenna base flange.
- The tower top plate hole should have sufficient clearance for the bolt flange of the input tee and retaining brace or harness.
- The tower top mounting bolt size and length should be verified. Sufficient quantities of bolts, hard washers and nuts should be on hand.
- Verify the proper orientation of the antenna with respect to the tower prior to raising of the antenna. This is especially critical for directional antennas. Refer to antenna orientation drawing provided in the shipping documents for the proper antenna orientation.
- All radomes should be inspected for cracks and alignment. Make sure all hardware holding the radome panels removed for shipping is replaced and is tight.

In the unlikely event there is a problem with any of the above contact Dielectric Communications immediately.



Figure 5 Inner Conductor Supporting Plate

ANTENNA INSTALLATION

The following are the recommended guidelines for lifting and installing Dielectric top mounted antennas. If questions arise regarding deviations from the proceeding recommendations please notify Dielectric and seek written approval. :

- Attach the hoisting line to the main lifting lug on the antenna only. The main lifting lug is shown in Figure 3 and is clearly labeled on the pole.
- The use of a choker around the antenna for lifting is not recommended because it may slip and damage items attached to the antenna. In cases where choking becomes desirable please contact Dielectric for written approval.
- No additional weight should be attached to the antenna during lifting.
- Do not hoist end fed antennas with the tee attached.
- In order to ensure that the inner conductor on end fed antennas is not damaged during the lifting operation do not remove the inner conductor brace or plate until the antenna is mounted on to the tower top.
- Place the base flange at the desired orientation and install the mounting bolts, hard washers and nuts. Recheck antenna orientation prior to lowering the gin pole.
- Bolt installation and tightening procedures are based on the AISC's (American Institute of Steel Construction) *Specification for Structural Joints using ASTM A325 or A490 Bolts*. Summary of

the “Turn of the Nut” method is on the drawing number 89251 in the Appendix 1. Other acceptable methods are available on AISC’s specification.

- After the tower is de-rigged, the guy wires tensioned and the tower plumbed, recheck the plumbness of the antenna and make corrections using shims provided with the antenna. Follow the antenna plumbing specifications on drawing number 78014 in the Appendix 2.
- Before connecting antenna deicers (if supplied) to electrical service to the antenna re-measure the resistance. If readings similar to those taken prior to lifting cannot be obtained, be sure to contact Dielectric Communications immediately.
- The deicer system operation should also be verified as soon as possible.
- The antenna system should be closed and pressurized as soon as possible after installation to prevent moisture from entering the system. The system should be purged at least once to expel any moist air trapped inside.

POST INSTALLATION

Check Out

Dielectric personnel and/or representatives are available to test the antenna and the antenna system. This is usually an item on the order. If this was omitted from the order, please contact your Dielectric Sales representative if this service is desired. Dielectric will recommend a qualified outside contractor if the customer wishes to hire their own consultant. The technician will determine that the system meets the specifications and will guide the gradual power up procedure

Maintenance

The antenna and transmission lines do not require any periodic maintenance, however they should be inspected annually. Inspection should include visual inspection of the slot covers and radomes for loose hardware and the condition of the deicers. Antennas and transmission lines should be inspected more often in areas that experience extreme weather conditions. In short, it is a good practice to inspect the system soon after any extreme weather conditions.

If the antenna has to be repainted do not paint the slot covers or radome. Replacement parts for Dielectric TFU Antennas may be purchased through your Dielectric Sales representative.

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APPENDIX 1

Antenna Plumbness Specification

REVISIONS		
SYM	DESCRIPTION	DATE
	- REDRAWN ON CAD MAC	01/11/11

SPECIFICATION FOR PLUMBNESS OF ERECTED ANTENNA

- A. Consult customer to determine if mechanical tilt is required.
- B. At erection the antenna should be checked for plumbness under no-sun and no-wind conditions.
- C. Readings are to be taken from two locations 90° apart.
- D. The antenna must be plumbed so that the top is within 1.0" of vertical (with no mechanical tilt). Shims should be placed at the base of antenna between the tower top and the antenna base flange.

Do not place any shims between mating flanges of the sections of multiple-section antennas.
- E. Triangular stainless steel shims are provided in four thickness (.016", .025", .050", and .125") Select combinations of shims to fit snugly between the tower top plate and the antenna base flange.
- F. Install shims of appropriate thickness at every space between flange bolts that is .016" and larger. This is most important, as damaging bending stresses could be induced in the base flange if it is insufficiently supported.
- G. When mechanical tilt is required calculate antenna top offset from vertical as (ant. length) X sin(tilt).

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APPENDIX 2

Mounting Bolt Specification

REVISIONS		
SYM	DESCRIPTION	DATE
	REDRAWN ON CAD NEW DRAWING NUMBER ASSIGNED SEE VOID FILE A8000403	MAC 01/14

INSTALLATION OF ANTENNA MOUNTING BOLTS.

- 1 - Antenna mounting bolts & studs shall be tightened to provide, when all fasteners in the joint are tight, at least the minimum bolt tension show in the table below.

BOLT SIZE (IN.)	MINIMUM BOLT TENSION (LB.)
1 1/8	56,500
1 1/4	71,700
1 3/8	85,500
1 1/2	104,000

- 2 - The turn of the nut method is to be used to provide the above tension. There shall first be enough bolts brought to a "snug tight" condition to insure that the parts of the joint are properly compacted, i.e., brought into full contact with each other. Snug tight shall be defined as the full effort of a man using an ordinary spud wrench. Following the initial step, bolts shall be placed in any remaining holes in the connection & brought to snug tightness. Then a chalk mark is to be made to reference the bolt head positions on the flange or tower top. All bolts in the joint shall then be tightened additionally by 1/2 turn or more. Be sure to check the chalk marks to insure that all bolts have been properly tightened. (See note #1)

Note#1 - Final 1/2 turn can be achieved by extending spud wrench length using a long piece of pipe or by pounding on the end of the wrench handle.

Note#2 - Lubricate galvanized bolt threads with one of the following: 1.- Never-Seeze 2.- Oil or 3.- Grease.

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APPENDIX 3

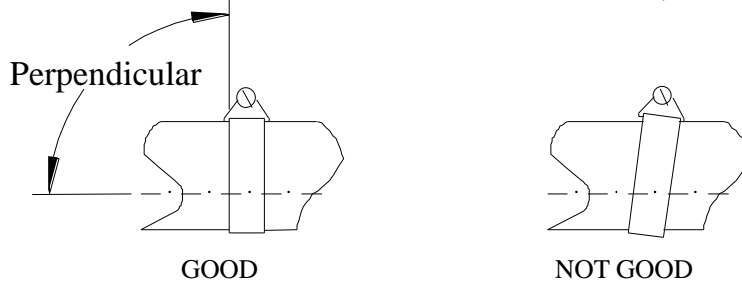
Hose Clamp and Stainless Steel Bolt Installation Specification

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED


HARDWARE TORQUE SPECIFICATIONS

HARDWARE DESCRIPTION	RECOMMENDED TORQUE	
	MATERIAL 18-8 SST.	MATERIAL CS. GRADE 5
1/4-20	70 IN/LB	96 IN/LB
5/16-18	130 IN/LB	204 IN/LB
3/8-16	210 IN/LB	360 IN/LB = 30 FT/LB
1/2-13	480 IN/LB = 40FT/LB	900 IN/LB = 75 FT/LB
5/8-11	1080 IN/LB = 90 FT/LB	1800 IN/LB = 150 FT/LB
3/4-10	1440 IN/LB = 120 FT/LB	260 FT/LB
1-8	285 FT/LB	640 FT/LB
1 1/8-7	413 FT/LB	800 FT/LB
1 1/4-7	523 FT/LB	1120 FT/LB
1 3/8-6	688 FT/LB	1460 FT/LB
1 1/2-6	888 FT/LB	1940 FT/LB
HOSE CLAMPS	40 - 50 IN/LB	-

NOTE:
 HOSE CLAMPS MUST BE ORIENTED PERPENDICULAR TO THE AXIS OF THE OBJECT ON WHICH THEY ARE TO BE MOUNTED.
 (HOSE CLAMP BAND, FLAT ON THE OBJECT SURFACE)



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DIMENSIONAL TOLERANCES (UNLESS OTHERWISE NOTED) 4 PLACE DIMENSIONS ± .0005 3 PLACE DIMENSIONS ± .005 2 PLACE DIMENSIONS ± .02 ANGULAR DIMENSIONS ± 0°-30° REFERENCE DIMENSIONS ARE NOT FOR MANUFACTURING OR INSPECTION USE WORKMANSHIP STDS DWG. No. D78691	PART NO:	 Dielectric A Unit of SPX Corporation		
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DATE STAMP 6-Oct-1999 11:18:53 A88212	FINISH:	DIELECTRIC TORQUE SPECIFICATIONS		
	DATE: 9-30-99 DR. BY: M. DAVISON CHKD BY: LDW ENG/MFG APPVL: CNP	CODE IDENT. NO. 08441	A	REV: 88212 -