Terrestrial Microwave Antenna System Products

Index

Terrestrial Microwave Antenna Nomenclature

Prefix	Antenna Type or Description
KP_F, KPR_F	**K**nockdown GRIDPAK® **P**arabolic
MKP	**M**ini **K**nockdown GRIDPAK **P**arabolic
P, PX, P_F	Standard **P**arabolic-Unshielded
PL, PL_F, PXL, PXL_F	Standard **P**arabolic, **L**ow VSWR-Unshielded
FP, FP_F, FPX	Standard **F**ocal Plane **P**arabolic-Unshielded
FPHP	Focal Plane High Performance
HP, HP_F, HPX	**H**igh **P**erformance Parabolic-Shielded
HSX	**H**igh Performance **S**uper High Cross Polarization Discrimination-Parabolic
UHP, UHX, UHP_F	**U**ltra **H**igh **P**erformance Parabolic
UMX	**U**ltra High Performance **M**ultiband Parabolic
HDX, HDH, HDV	**H**igh Performance **D**ual Beam-Parabolic
PDV, PDH	Standard Dual Beam Angle Diversity
KPR	**K**nockdown GRIDPAK **P**arabolic-**R**ural Telephony
PAR, PARX	**P**arabolic **A**ntenna for **R**elocation-Category A
LB, LBX	**L**ow **B**ack Lobe

Andrew uses an alphanumeric numbering system for identification and ordering of terrestrial microwave antennas. Andrew type numbers describe antenna type, size and operating frequency band. The system is known worldwide, and many governments, PTTs and OEMs use Andrew terminology such as “HSX type performance” to specify antennas within their equipment procurement documents.

Example:

1	2	3		4	5
HSX	10		-	59	
PL	8		-	71	W
KP	6	F	-	19	

1. **Antenna Type**. The prefix is one, two, three or four letters that describe the antenna type. “X” within the prefix indicates dual-polarized operation.

   For Standard Antennas, “L” indicates low VSWR antennas operating with:

   Coaxial feed systems of 1.10 (26.4) RL or better

   Waveguide feed systems of 1.06 (30.7) RL or better.

2. **Antenna Size**. The number indicates antenna diameter in feet.

3. **Pressurization**. Antennas having an “F” following the antenna size include a foam-dielectric feed and do not require pressurization. All other antennas have air-dielectric feeds and require pressurization. See pages 242-271 for pressurization equipment.

4. **Frequency Band**. The numbers following the hyphen are an abbreviated designation for the operating frequency band. For example:

Abbreviation	Frequency Band
19	**1.9** - 2.3 GHz
59	**5.9**25 - 6.425 GHz
107	**10.7**0 - 11.70

5. **Wide band**. A “W” following the frequency band designator indicates wide band operation for special applications. For example:

   PL12-71 indicates the frequency band 7.125-7.750 GHz
   PL12-71W indicates the frequency band 7.100-8.500 GHz

Shielded Antennas

Shielded antennas include a low-VSWR feed, painted reflector and shield with RF absorber, a planar radome and a mount for attachment to a vertical pipe. This series of antennas provides excellent radiation characteristics, rugged construction and high environmental survivability. Special environmental versions are available for the most difficult system locations. Many are also available with one or two-piece reflectors for efficient and less costly shipping.

Ultra Series

Ultra High Performance Antennas

UHX® and UHP® Series antennas provide high gain, low VSWR and superior radiation pattern performance for easier frequency coordination. They minimize frequency congestion problems because of a highly efficient beam-forming feed and superior pattern performance. UHX Series feature dual polarization. UHP Series are a single polarized version.

Ultra Multiband Antennas

UMX® Series antennas provide simultaneous dual-band, dual-polarized (4-port) operation in various frequency bands. These antennas can save considerable cost by reducing the installation expense and the amount of equipment required on systems with multiple frequency requirements. UMX antennas allow easy single to multi-band transition without compromising high performance.

High Performance Series

High Performance Antennas

HP and HPX Series antennas feature high performance at low lifetime cost. They are mechanically similar to the UHX ultra high performance antennas, except most models have feeds which do not include the beam-forming feature. HPX Series feature dual polarization; HP Series are a single polarized version.

Antenna Types

HSX Series Antennas - High XPD Microwave Antennas

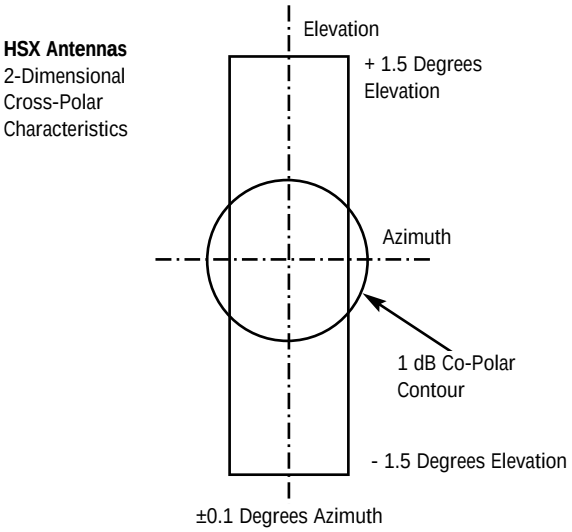
HSX Series antennas are high performance antennas which feature very high cross polarization discrimination (XPD) in both the azimuth and elevation planes. The guaranteed XPD for these antennas is 40 dB. These antennas are suitable for high capacity digital systems, utilizing transmission schemes such as Synchronous Digital Hierarchy (SDH).

This performance is achieved through the use of an antenna feed horn with a unique illuminator ring design and strict quality control measures in the manufacture of these feeds.

The cross polarization characteristics close to the boresight of the antenna are shown in the figure below. These values apply for antennas up to the 11 GHz frequency band.

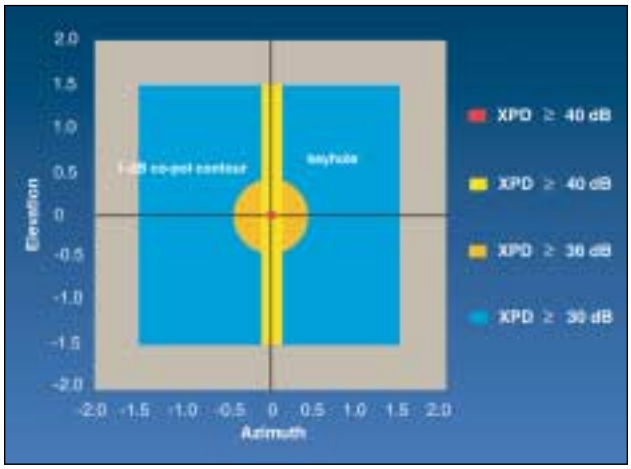
For antennas at frequency bands higher than 11 GHz, the XPD is greater than 36 dB within the circular -1 dB co-polar contour and greater than 30 dB elsewhere.

The HSX Series antennas are available for frequency bands from 3.4 to 18 GHz.



- *40 dB XPD at antenna boresight*
- *40 dB* XPD inside rectangle (±0.1 degrees Azimuth, ±1.5 degrees elevation)*
- *36 dB XPD inside the 1dB co-polar contour*
- *30 dB XPD elsewhere*

* 36 dB for 15 ft antennas



Keyhole specifications for XPD

Low Back Lobe Antenna

Focal Plane High Performance Antenna

Dual Beam Angle Diversity Antenna

LB and LBX Antennas

LB and LBX antennas are special low back lobe antennas with performance similar to that of focal plane antennas. These antennas are ANATEL Brazilian Telecommunications Agency approved and shipped from the manufacturing facility in Sorocaba, Brazil.

FPHP Antennas

FPHP antennas combine the traditional focal plane reflector with the added electrical performance of narrow shielded antennas. The added performance is obtained through the use of an integrated shield located within the molded radome, included with the antenna. These antennas are available in the 1.3 GHz band and are ETSI-type approved.

Dual Beam Angle Diversity Antennas

Angle Diversity antennas are special solution antennas that provide a dual beam in either a single or dual polarized version. They can help overcome multipath fading issues when installation of two antennas is impractical due to tower space availability or wind loading.

NOTE:
See page 120 for default packing options.

Antenna Types

Standard Parabolic Antenna

Standard Focal Plane Antenna

Flat Panel Array Antenna

Standard Parabolic Antennas

P, PL, PX and PXL Series Standard Parabolic antennas are unshielded parabolic antennas that provide economical and reliable service where a high degree of back and side radiation suppression is not necessary.

- *Low-VSWR versions minimize echo distortion for less noise on the system*
- *A vertical tower mount is included. Optional mounts and radomes can be ordered separately for versatility of installation*
- *Single and dual-polarized options are available in most applicable frequencies*
- *Spun aluminum reflectors provide long term reliability and minimize environmental distortion to protect system investments*
- *Rugged, high-quality performance at low initial costs*

Standard Focal Plane Antennas

FP and FPX Series Standard Focal Plane antennas are ideal for use in higher capacity systems where improved front-to-back ratios are required.

- *Special deep reflectors and a unique beam-shaping feed or special edge geometry achieve efficient pattern performance. The antennas combine reasonable initial cost with very long-life performance, thus assuring long term economy.*
- *Single and dual-polarization options are available*
- *Includes a vertical tower mount for ease of tower interface*

NEW!

Flat Panel Array Antennas

The Flat Panel Array (FPA) Series antennas are designs that provide solutions for many applications including spread spectrum and UNII frequency band operation. The low profile has an aesthetically pleasing appearance and eases the planning and zoning process. The antennas incorporate a convenient rear mounted connector. The mount is easily assembled and readily attaches the antenna onto a vertical pipe.

The antennas are available at a variety of frequencies. Contact Andrew for more information.

NOTE:
See page 120 for default packing options.

Mini-GRIDPAK® Antenna (MKP Series)

GRIDPAK® Antenna (KP F- , KPR F-Series)

Unshielded Antenna (PAR Series)

Mini-GRIDPAK® Antennas

MKP Series Mini-GRIDPAK antennas are small, rectangular aperture antennas for low frequency applications (below 900 MHz).

GRIDPAK and Mini-GRIDPAK antennas should be considered when low wind loads onto supporting structures are required and/or when low shipping cost is important.

NOTE:
See page 120 for default packing options.

NEW!

KP F-, KPR F-Series GRIDPAK® Antennas

The KP F- and KPR F-Series Parabolic GRIDPAK antennas are solutions for low wind loading situations. Grid antennas are single polarized, either horizontal or vertical, depending on assembly configuration. Operating bands for grids are typically below 3.7 GHz. The feeds for these are foam-filled, eliminating pressurization requirements. In addition, these feeds act as a gas barrier when air dielectric transmission line is used.

The KPR F-Series antennas are suitable for low to medium capacity systems such as Rural Telephony Multi-Access Radio Systems (MARS) and incorporate a HELIAX® foam cable jumper assembly in the feed design. This jumper assembly can be terminated with any connector that can be fit onto our LDF4-50A HELIAX coaxial cable.

NEW!

PAR Series Unshielded Antennas

The PAR Series antennas are unshielded designs that meet the FCC rules for Category A under Part 101 (which has replaced Parts 21 and 94). They provide an economic solution for microwave links requiring Category A compliance. Some antennas feature a deeper reflector design than our standard P-Series antennas and exhibit a higher front-to-back ratio than the P-Series antennas, thus reducing the likelihood of adjacent system interference. To reduce wind loading, they can also be fitted with optional molded radomes.

These antennas meet the FCC requirements for the following frequency bands: 5.925-6.425 GHz, 6.425-7.125 GHz, 10.5-10.7 GHz, and 10.7-11.7 GHz.

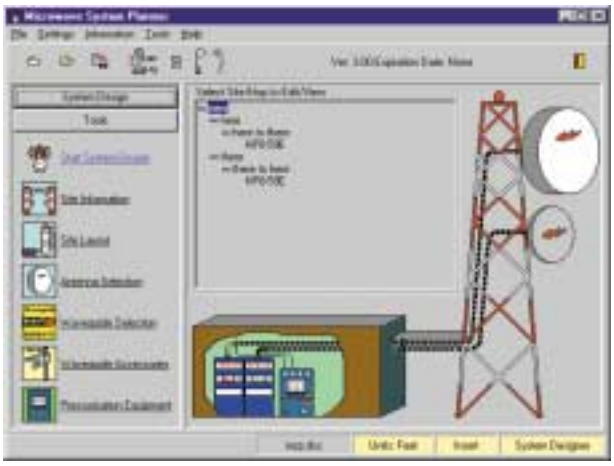
System Planning Software

Powertools System Planning Software

The Andrew Powertools system planning CD-ROM contains an easy-to-use suite of system planning tools. These programs are especially useful for the design of terrestrial microwave antenna systems:

- *Andrew Microwave System Planner (AMSP)*
- *ezGuide™*
- *PSI Select Pressurization Planner*

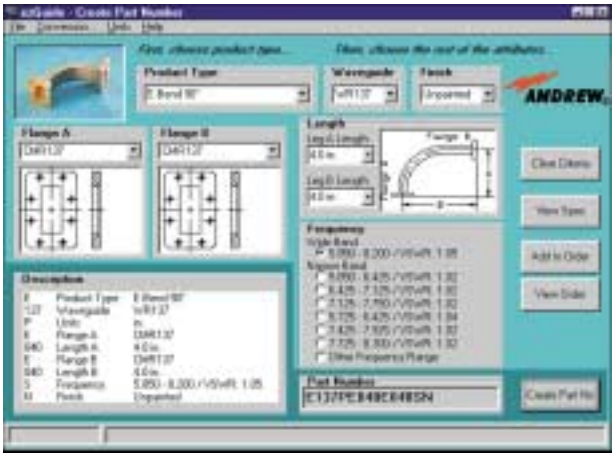
You can request the Powertools CD-ROM (Bulletin M400) or download individual software tools from the Andrew web site, www.andrew.com.



AMSP

AMSP

The AMSP is a complete terrestrial microwave system design tool. AMSP helps you with equipment selection and system planning, including choices of terrestrial microwave antennas, waveguide, flex twists, accessories, and pressurization. The program generates custom solutions with standard Andrew products, automatically checking component compatibility and preventing the design of an incompatible system. After you complete the system design, AMSP provides you with a customized bill of materials.



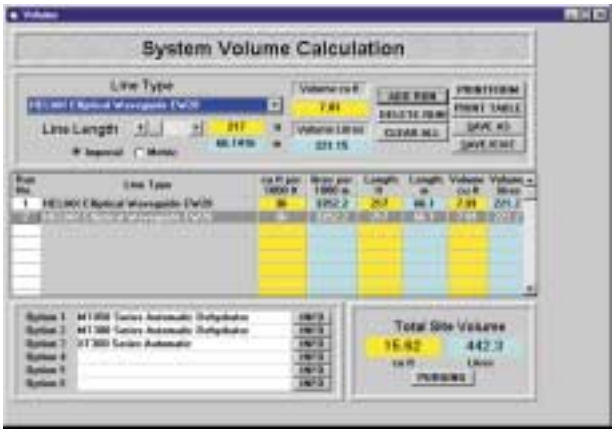
ezGuide

ezGuide

ezGuide software guides the design and ordering process for microwave transmission lines. The exact component type, waveguide size, flange types, component dimensions, operating frequency band, and finish can be specified with point-and-click options. Each product is pictured on the screen and diagrammed for your reference.

PSI Select Pressurization Planner

The PSI Select Pressurization Planner offers complete information on Andrew pressurization products and accessories. The program performs system calculations and dehydrator selection for either a new site or for modifying an existing site. PSI Select Pressurization Planner also provides catalog information and several pressurization presentations in Microsoft® PowerPoint®.



PSI Select Pressurization Planner

Reflectors

Antennas are supplied with either one-piece reflectors or two-piece reflectors for on-site assembly. All 2-10 ft reflectors are one-piece; 12 and 15 ft reflectors are two-piece. Split (two-piece) reflectors are available as an option for 8 and 10 ft antennas. Solid (one-piece) reflectors are available as an option for 12 ft antennas. KP Series GRIDPAK® antennas are supplied completely disassembled.

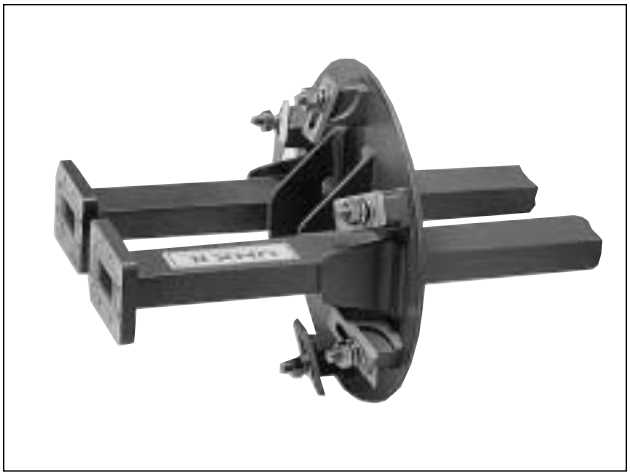
Microwave Antenna Feeds

Product improvement research has produced an innovative feed hub which provides several important advantages over previous designs. Solid reflector hubs are fully compatible with previous reflectors manufactured since 1975 and other versions having an 8.5 in (216 mm) center mounting hole in the reflector.

- ***Simplified installation***. The unique hub design allows most feeds to be installed from either side of the reflector. This feature permits easy initial installation from the front of the reflector and makes it possible to change or inspect most feeds from the rear of the antenna.
- ***Smooth, accurate polarization adjustment***. A conductive compound is used at the reflector/hub interface. The lubricating properties of this compound ensure smooth, accurate feed rotation.
- ***Enhanced electrical performance***. Positive RF seals at all critical interfaces reduce RF leakage to negligible levels and result in enhanced antenna electrical performance.
- ***Improved resistance to corrosion***. Potential corrosion in all areas critical to antenna system performance is effectively eliminated through the use of electro-chemically compatible materials and corrosion inhibiting compounds. The hub interface has been salt spray tested for more than 7500 hours and meets the corrosion resistance requirements of U.S. Military Specifications MIL-F-14072C, MIL-STD-889B and MSFC-SPEC-250A.

Feed Types

Coaxial feeds are used below 3 GHz and are air- or foam-dielectric type. F-series antennas have foam-filled feeds that are designed for use with HELIAX® foam-dielectric cable. Guy lines or rods are included with all feeds except some antennas smaller than 12 ft (3.7 m), where they are unnecessary. Most feeds above 3 GHz are terminated with rectangular waveguide flanges. Guy lines are used with all waveguide feeds.



Feed hub used on Ultra High Performance, HIgh Performance, Focal Plane and Standard Antennas, 4-ft (1.2 m) and larger, with waveguide feeds.

Standard Antenna Construction

Radomes

Radomes are used to protect microwave antennas against accumulation of ice, snow, and dirt and to reduce wind loading. All Andrew shielded antennas include a planar radome. Antennas which include a radome are indicated in the antenna specification tables on pages 116-119. Optional molded radomes, listed on page 118, are available for most other solid reflector, standard unshielded parabolic antennas.

Radomes for shielded antennas. All Andrew shielded antennas, except ValuLine® include a flexible planar radome. The radome is stretched across the opening of the shield (through tensioning springs) flexing slightly in the wind to shed ice and snow in most environments.

Two types of flexible planar radomes are used, TEGLAR® and Hypalon. Hypalon is a rubber coated nylon and is provided with HP and HPX series antennas. TEGLAR is a polymer-coated fiberglass material and is provided with HSX, UHX and UMX type antennas.

In addition, TEGLAR radomes are extremely durable, and excel in resistance to heat, rain, snow, fungus, ice accumulation, corrosive atmosphere and ultraviolet light. Upgrades to TEGLAR on HP and HPX series is optional.

Pre-tensioned radomes. Some high performance antennas are supplied with a pre-tensioned radome. Pre-tensioned radomes are made from TEGLAR® material bonded to a support ring. They replace the previously offered spring tensioned design.

Radomes for standard antennas. Molded radomes are manufactured of ABS plastic or fiberglass. They help reduce tower wind loading and are optional for most antennas.

Mounts

All microwave antennas are supplied with a vertical tower mount. Roof, vertical tilt and horizontal tilt mounts are available as options.

Shields

Cylindrical shields, attached to the reflector rim, improve the radiation pattern performance of parabolic antennas. RF absorbing material is placed at critical locations inside the shield to reduce RF energy reflections.

Antenna Finish

Standard colors for microwave antennas and radomes are listed in the table below. Other colors in compliance with U.S. FCC and U.S. FAA regulations or special applications are available on request. Unless otherwise specified, radomes supplied with special color antennas will be the standard color.

For optional TEGLAR radome colors, see page 116.

Microwave Antenna and Radome Standard Colors

Description	Standard Color
Shielded Antennas	Gray
Radomes for Shielded Antennas 4-15 ft (1.2-4.6 m)	White
Standard Antennas	Gray
Molded Radomes for Standard Antennas	Gray
GRIDPAK® and Mini-GRIDPAK® Antennas	Unpainted aluminum

Microwave Antenna Selection Criteria

Andrew offers the industry's most comprehensive line of antennas for point-to-point microwave communication. The extremely wide range of available antennas permits you to choose an antenna that is optimized for your requirements. Nearly 6000 different configurations are available from this catalog. In choosing an antenna, the following basic parameters should be considered:

Operating frequency band. The antennas on pages 51-91 are listed in order of ascending operating frequency. Antennas for simultaneous operation in two or more bands are offered on pages 93 and 94.

Radiation patterns determine an antenna's ability to discriminate against unwanted signals under conditions of radio congestion. Radiation patterns are dependent on antenna series, size, and frequency. A Radiation Pattern Envelope (RPE) comparison of various antenna series is shown at the right. For more information, see page 48.

Gain. For a given frequency band, gain is primarily a function of antenna size.

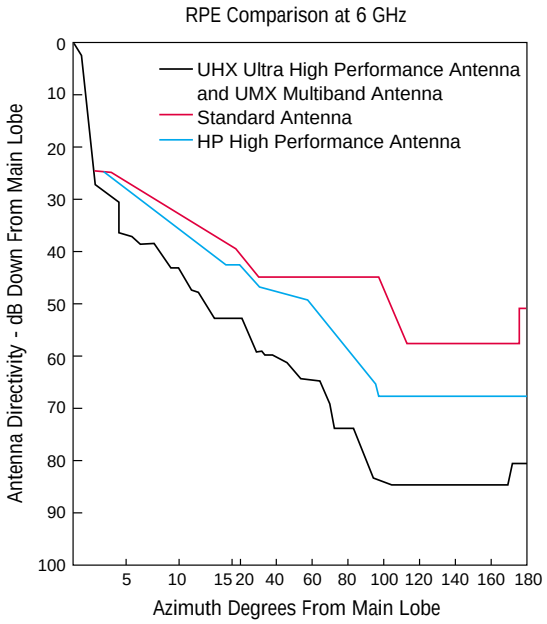
The gain of Andrew antennas is determined by either gain by comparison or by computer integration of the measured antenna patterns. The gain by integration method makes allowance for any additional signal losses such as ohmic, VSWR and cross-polarized losses. Both methods follow the recommended procedures as stated in EIA Standard 195C.

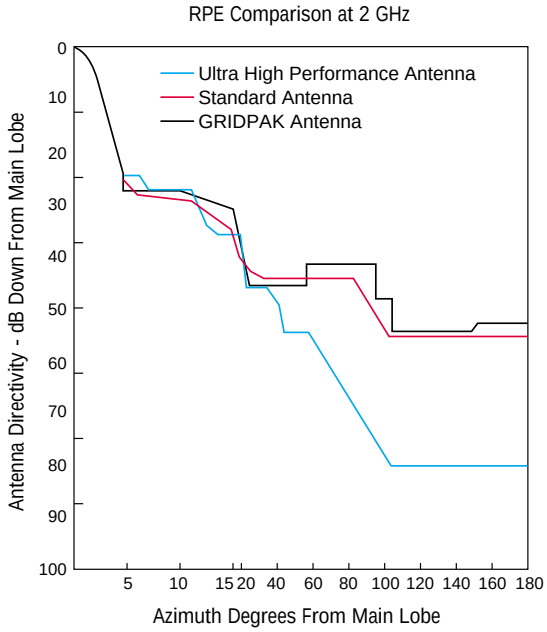
Polarization. Most antennas are available in both single- and dual-polarized versions. All can be used horizontally or vertically polarized and most have continuous polarization adjustment.

Pressurization. All antennas with air-dielectric coaxial or waveguide feeds should be pressurized. F-Series antennas eliminate the need for pressurization equipment, since the foam-filled feeds are void free and sealed to preclude the presence of moisture.

Wind load. Survival ratings are specified on page 49. Wind forces for various antenna types and sizes are tabulated on pages 111-113. GRIDPAK® antennas, available below 3.7 GHz, have significantly lower wind load than solid antenna types.

Shipping considerations. KP Series GRIDPAK® antennas are shipped disassembled, which results in very small shipping volume. Most 8 ft (2.4 m) and larger solid antennas are available in two piece versions to reduce shipping volume. Refer to the table on page 122.





Antenna Electrical Specifications

Radiation Pattern Envelopes

Radiation pattern envelopes (RPEs) published by Andrew present radiation pattern information in a form that is easy to use for planning radio systems. RPEs are available for all catalog microwave antennas. Copies are on file at the U.S. FCC, Industry Canada, BT, Telecom Australia, French CNET, and many other administrations throughout the world. U. S. FCC code numbers are assigned to Andrew antennas where applicable. Curves are presented in both rectangular coordinate graph and tabulated digital formats.

Andrew software, included on the Powertools CD-ROM and downloadable from www.andrew.com, allows you to view RPEs for the antennas listed in the catalog. See page 44 for more information.

Andrew RPEs represent the "worst peaks" envelope of radiation patterns, measured on selected units, which accurately represent the antenna type. Parallel and cross-polar patterns are measured for both horizontal and vertical polarizations. Close manufacturing control ensures this performance is maintained.

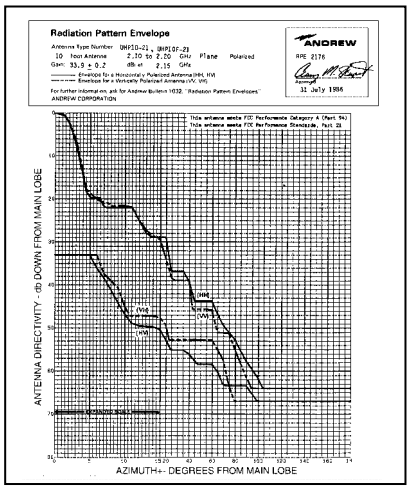
Parallel and cross-polar response are represented for both horizontal and vertical polarizations. The curves are identified as follows:

HH – Response of a horizontally polarized port to a horizontally polarized signal.

HV – Response of a horizontally polarized port to a vertically polarized signal.

VV – Response of a vertically polarized port to a vertically polarized signal.

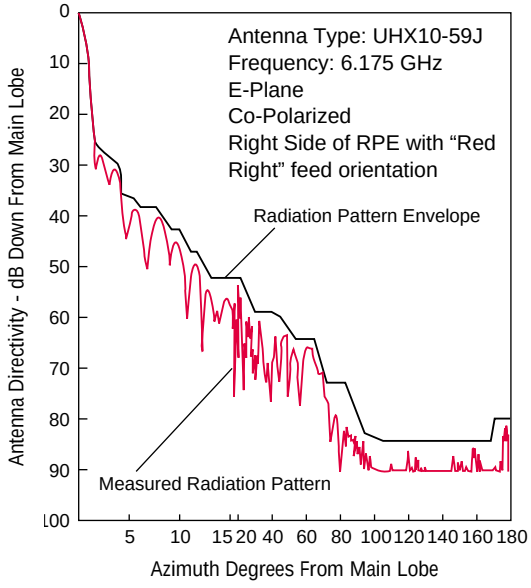
VH – Response of a vertically polarized port to a horizontally polarized signal.



Preparation of RPEs. A complete set of radiation patterns comprises twelve measurements over the full 360° of azimuth rotation measured under still, dry conditions. These cover horizontal and vertical polarizations for each of three frequencies (bottom, middle and top) in the band, each of these in turn being measured for parallel polarized as well as cross polarized responses. Each of the four curves on the RPE is derived by superimposing the right and left side patterns for all three frequencies and then drawing an envelope composed of simple straight lines so as to encompass all peaks. The probability is high that an installed antenna will have better actual response at a specific angle and frequency than indicated on the RPE.

Asymmetrical radiation patterns. HSX and UHX® high performance antennas have asymmetrical patterns with lower sidelobe levels on one side. For these antennas, RPEs are prepared for the full 360°. The superior half of the radiation pattern on either the right or left side of the antenna boresight can be used for interference evaluation to reduce potential interference. The UHX and HSX feed hubs are marked red to identify the superior side, and the hub can be rotated so as to place this side either right or left of boresight.

Guaranteed RPEs for parabolic antennas. Actual radiation patterns for production antennas, under still, dry conditions, will not have any peak exceeding the current RPE by more than 3 dB. An angular accuracy of ±1° is maintained throughout. This guarantee applies to all Andrew parabolic microwave antennas unless otherwise stated on the RPE.



Electrical Definitions

The following terms describe the electrical characteristics for Andrew microwave antennas. All rated electrical characteristics listed in the tables are guaranteed to be within the tolerances stated below. Factory measurements of these electrical characteristics are made under still, dry conditions using state-of-the art equipment and techniques ensuring high accuracy.

Frequency refers to the operating frequency band. These bands correspond with CCIR recommendations or common allocations used throughout the world. It is usually possible to tune antennas for slightly different frequency ranges while retaining the same electrical characteristics. Other ranges can be accommodated on special order.

VSWR. Maximum, is the guaranteed peak Voltage-Standing-Wave-Ratio within the operating band.

Isolation between inputs of single-band, dual-polarized antennas is 35 dB minimum unless otherwise specified.

Gain is stated in dBi (decibels over an isotropic radiator) at three frequencies: bottom, middle and top of band. Manufacturing tolerance for antenna gain is 0.2 dB unless otherwise specified. In the case of two-port, dual-polarized antennas, the specified gain refers to the average gain of the two ports, the gain of each port differing from the average gain by not more than 0.3 dB.

Front-to-back ratio in decibels. Denotes highest radiation relative to the main beam, at 180° ±40°, across the band. Production antennas do not exceed rated values by more than 2 dB unless stated otherwise.

Half-power beamwidth is the nominal total width of the main beam at the -3 dB points.

Cross-polarization discrimination, in dB, is the difference between the peak of the co-polarized main beam and the maximum cross-polarized signal over an angle twice the 3 dB beamwidth of the co-polarized main beam.

Power rating. All microwave antenna feeds are rated at 150 watts.

Antenna Environmental Ratings

Standard ratings. Microwave antennas, including mounts and radomes, where applicable, will withstand the simultaneous wind and ice conditions specified in the table below. Except where noted otherwise in the antenna listings, all antennas will remain operational within a temperature range of -50°C to 70°C (-58°F to 158°F), and meet all other requirements of EIA/TIA Standards 222E and 195C.

High wind survival. Special antenna designs with wind survival ratings up to 200 mph (320 km/h) are available. See pages 114-115.

Corrosive environments. Antennas designed for corrosive environments are also available. See pages 114-115.

Wind Survival and Deflection Characteristics

Antenna Types	Survival Ratings Wind Velocity mph (km/h)	Radial Ice, in (mm)	Max. Deflection in 70 mph (110 km/h) Wind, degrees
Standard Antennas			
Without Radome	125 (200)	1 (25)	0.1
With Standard Radome	125 (200)	1 (25)	0.1
UHX®, UMX®, UHP, HSX and HP Antennas	125 (200)	1 (25)	0.1
GRIDPAK® Antennas	125 (200)	–	–

Antenna Specifications and Ordering Information

Antenna Ordering Tables

Our line of terrestrial microwave antennas is presented in the tables on pages 51-94. The tables are arranged by operating frequency band, in ascending order. Within the tables, antennas are grouped by antenna type, and by diameter.

Basic Antenna

The type numbers listed in the tables define the basic antenna, less options and accessories. The tables also include RPE numbers and define important electrical performance parameters of the antennas.

All of the antennas in this section include a feed, reflector and vertical tower mount. Refer to the "Antenna Types" and "Antenna Construction" sections, pages 39-46 for details.

Antenna Inputs

Connector and flange options for each antenna are listed within the ordering tables. Other flanges, available as options, may effect VSWR performance where noted. Contact Andrew for more details.

Flange options are discussed in detail on pages 114 and 115.

Radomes

All shielded antennas include either a TEGLAR® long-life radome, a Hypalon coated nylon radome or a molded thermoplastic planar radome, as specified in the tables. The TEGLAR long-life radome is optional for antennas which are normally supplied with the Hypalon radome.

Molded radomes are also available as an option for most standard (non-shielded, solid reflector) antennas. Radomes are not applicable for any grid types.

Radomes are discussed in detail on pages 116-119.

Regulatory Information

Any regulatory compliance pertaining to an antenna is noted in its catalog entry.

Antenna Options

Andrew offers a variety of antenna options which allow you to choose additional features or change features from the basic antenna offerings. Options are described in detail on pages 114-122.

- *Input connectors and flanges*
- *Antenna colors*
- *Radomes*
- *Radome colors*
- *High wind survival antennas*
- *Corrosive environment antennas*
- *Packing type*
- *Packing quantity*
- *Reflector type*
- *Special purpose mounts*

Accessories

In addition to the above options, Andrew offers the following accessories to enhance your antenna selection. Accessories are described in detail on pages 119, 123-126.

- *Edge protection kits for TEGLAR® radome*
- *Port termination loads*
- *Additional side or bottom mounting struts*

Replacement Components

Contact Andrew for information on replacement components.

- *Reflectors*
- *Feeds*
- *Radomes and radome clip kits (page 119)*
- *Shield absorber kits*
- *Major hardware kits*
- *Mounts (page 96)*
- *Universal guy wire kits*
- *Shields*
- *Struts (page 96)*

335 - 365 MHz

Antenna Inputs. All antenna VSWR values are specified with 7/8" EIA connectors. Other optional inputs may result in equal or slightly higher VSWR. Contact Andrew for details.

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Horizontal	Vertical	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
KP 	**GRIDPAK® Antennas** – Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female														
KP6F-335	6 (2.0)	2978	–	–	–	–	–	15.0	15.2	15.4	30.5	24.2	23	19	1.3 (17.7)
KP8F-335	8 (2.4)	2119	–	–	–	–	–	15.6	15.7	15.8	21.4	19.6	17	16	1.3 (17.7)
KP10F-335	10 (3.0)	2933	–	–	–	–	–	17.7	18.1	18.5	20.6	15.5	23	22	1.3 (17.7)
KP13F-335	13 (4.0)	2952	–	–	–	–	–	20.1	20.1	20.4	15.2	13.5	25	23	1.3 (17.7)
MKP 	**Mini-GRIDPAK Antennas** – Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female														
MKP-335	6.6 x 3.3 (2 x 1)	3439	–	–	–	–	–	11.0	11.0	11.0	37	28	15	9	1.5 (14.0)

365 - 403 MHz

Antenna Inputs. All antenna VSWR values are specified with 7/8" EIA connectors. Other optional inputs may result in equal or slightly higher VSWR. Contact Andrew for details.

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Horizontal	Vertical	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
KP 	**GRIDPAK® Antennas** – Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female														
KP6F-365	6 (2.0)	3005	–	–	–	–	–	15.8	16.3	16.3	28.4	21.6	29	20	1.3 (17.7)
KP8F-365	8 (2.4)	2120	–	–	–	–	–	16.7	17.4	17.8	22.1	17.5	22	18	1.3 (17.7)
KP10F-365	10 (3.0)	2938	–	–	–	–	–	18.7	19.4	19.6	18.5	13.9	33	24	1.3 (17.7)
KP13F-365	13 (4.0)	2954	–	–	–	–	–	21.0	21.5	22.0	13.4	10.6	33	24	1.3 (17.7)

403 - 470 MHz

Antenna Inputs. All antenna VSWR values are specified with 7/8" EIA connectors. Other optional inputs may result in equal or slightly higher VSWR. Contact Andrew for details.

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Horizontal	Vertical	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
KP 	**GRIDPAK® Antennas** – Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female														
KP6F-403	6 (2.0)	3008	–	–	–	–	–	16.4	16.3	16.6	22.9	19.3	27	20	1.35 (16.5)
KP8F-403	8 (2.4)	2123	–	–	–	–	–	17.7	17.5	18.0	19.7	16.3	28	20	1.35 (16.5)
KP10F-403	10 (3.0)	2944	–	–	–	–	–	20.0	19.6	20.4	16.8	12.6	30	22	1.35 (16.5)
KP13F-403	13 (4.0)	2958	–	–	–	–	–	22.0	22.2	22.6	13.0	13.0	30	24	1.35 (16.5)
MKP 	**Mini-GRIDPAK Antennas** – Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female														
MKP-403	6.6 x 3.3 (2 x 1)	3441	–	–	–	–	–	13.5	13.5	13.5	29	22	17	19	1.35 (16.5)

820 - 960 MHz

Antenna Inputs. All antenna VSWR values are specified with 7/8" EIA connectors. Other optional inputs may result in equal or slightly higher VSWR. Contact Andrew for details.

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	U.S. FCC 74	U.S. FCC 78	ETSI Class	ETSI Gain	Gain, dBi Low	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth Horizontal	Beamwidth Vertical	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
KP 	**GRIDPAK® Antennas** – Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female														
KP4F-820	4 (1.2)	3733	–	–	–	–	–	17.5	18.2	18.8	17.2	15.9	28	24	1.4 (15.5)
KP6F-820	6 (2.0)	2994	B	–	–	–	–	21.8	22.6	23.2	10.8	9.5	30	28	1.4 (15.5)
KP8F-820	8 (2.4)	3613	A	–	–	–	–	23.4	24.1	24.7	9.0	8.0	34	25	1.35 (16.5)
KP10F-820	10 (3.0)	2996	A	–	–	–	–	25.2	25.9	26.5	8.0	6.7	30	25	1.35 (16.5)
KP13F-820	13 (4.0)	2998	A	–	–	–	–	27.3	28.0	28.6	5.8	4.9	36	30	1.35 (16.5)
MKP 	**Mini-GRIDPAK Antennas** – Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female														
MKP-820	6.6 x 3.3 (2 x 1)	3470	–	–	–	–	–	18.0	18.2	18.5	20.0	10.0	20	15	1.5 (14.0)

890 - 960 MHz

Antenna Inputs. All antenna VSWR values are specified with 7/8" EIA connectors. Other optional inputs may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa).

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	U.S. FCC 74	U.S. FCC 78	ETSI Class	ETSI Gain	Gain, dBi Low	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth Horizontal	Beamwidth Vertical	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
P 	**Standard Antennas** – Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female														
P4F-9	4 (1.2)	2311	B	–	–	–	–	18.1	18.4	18.7	19.5	19.5	8	21	1.3 (17.7)
P6F-9	6 (1.8)	2302	A	–	–	–	–	21.5	21.9	22.2	13.0	13.0	12	24	1.3 (17.7)
P8F-9	8 (2.4)	2306	A	–	–	–	–	24.0	24.3	24.7	9.2	9.2	15	27	1.3 (17.7)
P10F-9	10 (3.0)	2308	A	–	–	–	–	26.0	26.3	26.6	7.8	7.8	15	29	1.3 (17.7)
P12F-9	12 (3.7)	2319	A	–	–	–	–	27.7	28.0	28.3	6.7	6.7	15	30	1.3 (17.7)
P15F-9	15 (4.6)	2321	A	–	–	–	–	29.6	29.9	30.2	5.3	5.3	16	32	1.3 (17.7)

1.35 - 1.535 GHz

Antenna Inputs. All antenna VSWR values are specified with 7/8" EIA connectors. Other optional inputs may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa).

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
FPHP 	**Focal Plane High Performance Antennas** – Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female													
FPHP4F-13	4 (1.2)	2590	–	–	–	3	–	21.7	22.3	22.7	11.1	30	41	1.3 (17.7)
FPHP6F-13	6 (1.8)	2592	–	–	–	3	–	25.2	25.8	26.2	7.7	30	44	1.3 (17.7)
FPHP8F-13	8 (2.4)	2827	–	–	–	3	–	28.2	28.7	29.3	6.1	30	48	1.3 (17.7)
FP 	**Focal Plane Antennas** – Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female													
FP4F-13	4 (1.2)	3032	–	–	–	–	–	21.8	22.4	22.8	11.5	30	36	1.3 (17.7)
FP6F-13	6 (1.8)	3034	–	–	–	–	–	25.3	25.9	26.3	8.1	30	41	1.3 (17.7)
FP8F-13	8 (2.4)	2594	–	–	–	2	–	28.3	28.8	29.4	6.1	30	48	1.3 (17.7)
FP10F-13	10 (3.0)	2596	–	–	–	–	–	29.6	30.3	30.9	4.7	30	49	1.3 (17.7)
FP12F-13	12 (3.7)	–	–	–	–	–	–	31.0	31.8	32.1	4.2	30	50	1.3 (17.7)
KP 	**GRIDPAK® Antennas** – Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female													
KP3F-13	3 (0.9)	4365	–	–	–	2	–	19.6	21.4	21.2	12.1	33	30	1.5 (14.0)
KP4F-13	4 (1.2)	4366	–	–	–	–	–	21.8	23.8	22.0	10.5	31	30	1.3 (17.7)
KP6F-13	6 (2.0)	4367	–	–	–	2	–	26.3	27.2	27.4	6.4	34	35	1.2 (20.8)
KP8F-13	8 (2.4)	4368	–	–	–	–	–	27.4	29.4	28.9	5.6	30	35	1.2 (20.8)
KP10F-13	10 (3.0)	4369	–	–	–	–	–	29.6	30.7	30.8	4.7	32	38	1.2 (20.8)
KPR 	**GRIDPAK® Antennas - Rural Telephony** – Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female													
KPR3F-13	3 (0.9)	3482	–	–	–	–	–	20.1	20.1	20.1	13.0*	28	23	1.35 (16.5)
KPR4F-13	4 (1.2)	3484	–	–	–	–	–	22.4	23.6	23.6	10.1	30	24	1.35 (16.5)
KPR6F-13	6 (2.0)	3486	–	–	–	2	–	25.9	27.0	27.0	6.6	30	30	1.35 (16.5)
KPR8F-13	8 (2.4)	3488	–	–	–	–	–	28.2	28.8	29.3	5.4	30	32	1.30 (17.7)
KPR10F-13	10 (3.0)	3012	–	–	–	–	–	29.9	30.5	31.0	4.7	30	32	1.30 (17.7)
KPR13F-13	13 (4.0)	3490	–	–	–	2	–	32.4	32.9	33.5	3.6	30	35	1.30 (17.7)

Reference ETSI Document EN300631 for 1 to 3 GHz.

* Horizontal = 14.9 degrees

1.427 - 1.535 GHz

Antenna Inputs. All antenna VSWR values are specified with 7/8" EIA connectors. Other optional inputs may result in equal or slightly higher VSWR. Contact Andrew for details.

Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa).

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
PL, P 	**Standard Antennas** – Standard and Low VSWR, Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female													
P4F-15	4 (1.2)	1514	–	–	–	–	–	22.6	23.0	23.3	11.6	30	30	1.15 (23.1)
PL6F-15	6 (1.8)	1513	–	–	–	2	–	26.1	26.5	26.8	7.8	30	32	1.10 (26.4)
PL8F-15	8 (2.4)	1515	–	–	–	–	–	28.6	29.0	29.3	5.8	30	34	1.10 (26.4)
PL10F-15	10 (3.0)	1517	–	–	–	–	–	30.6	31.0	31.3	4.7	30	36	1.10 (26.4)
KP 	**GRIDPAK® Antennas** – F Series Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female													
KP4F-15	4 (1.2)	3826	–	–	–	–	–	23.1	23.4	23.7	11.0	31	28	1.30 (17.7)
KP6F-15	6 (2.0)	3978	–	–	–	2	–	26.8	27.1	27.4	7.2	32	31	1.20 (20.8)
KP8F-15	8 (2.4)	4096	–	–	–	–	–	28.4	28.7	29.0	6.2	30	32	1.20 (20.8)
KP10F-15	10 (3.0)	2969	–	–	–	2	–	30.4	30.7	31.0	4.7	34	33	1.15 (23.1)
KP13F-15	13 (4.0)	2980	–	–	–	2	–	32.8	33.1	33.4	3.8	30	40	1.15 (23.1)

1.7 - 2.11 GHz

Antenna Inputs. All antenna VSWR values are specified with 7/8" EIA connectors. Other optional inputs may result in equal or slightly higher VSWR. Contact Andrew for details.

Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa), except FPX Series 3 lb/in^2 (20 kPa).

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
HP 	**High Performance Antennas** – Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA and "F" Flange Female													
HP6F-17	6 (1.8)	1370	–	–	–	2	–	27.7	28.6	29.6	6.0	25	44	1.10 (26.4)
HP8F-17	8 (2.4)	2252	A	A	–	2	–	30.2	31.1	32.0	4.5	30	50	1.10 (26.4)
HP10F-17	10 (3.0)	2254	A	A	–	2	–	32.1	33.1	34.1	3.7	34	52	1.10 (26.4)
HP12F-17	12 (3.7)	2256	A	A	–	2	–	33.7	34.6	35.6	3.0	30	56	1.10 (26.4)
HP15F-17	15 (4.6)	1381	A	A	–	2	–	35.7	36.6	37.5	2.4	30	58	1.10 (26.4)
PL, P 	**Standard Antennas** – Standard and Low VSWR, Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female													
P2F-17	2 (1.8)	4344	–	–	–	–	–	18.2	19.7	19.9	15.3*	21	22	1.50 (14.0)
P4F-17	4 (1.2)	2298	–	–	–	2	–	23.9	24.8	25.7	9.0	30	30	1.20 (20.8)
PL6F-17	6 (1.8)	2274	B	B	–	2	–	27.7	28.6	29.5	6.0	30	36	1.10 (26.4)
PL8F-17	8 (2.4)	2276	A	A	–	2	–	30.2	31.1	32.0	4.5	30	39	1.10 (26.4)
PL10F-17	10 (3.0)	2278	A	A	–	2	–	32.1	33.1	34.0	3.7	34	42	1.10 (26.4)
PL12F-17	12 (3.7)	2280	A	A	–	2	–	33.7	34.6	35.5	3.0	30	45	1.10 (26.4)
PL15F-17	15 (4.6)	1377	A	A	–	2	–	35.7	36.6	37.5	2.4	30	48	1.10 (26.4)

Reference ETSI Document EN300631 for 1 to 3 GHz

*Horizontal = 16.9 degrees

Continued from previous page

1.7 - 2.11 GHz

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
FP 	**Focal Plane Antennas** – Dual Polarized **Antenna Inputs:** 7/8" EIA and "F" Flange Female													
FPX8-17*	8 (2.4)	6210	–	–	–	–	–	29.4	30.4	31.2	4.6	28	45	1.10 (26.4)
FPX10-17*	10 (3.0)	6209	–	–	–	–	–	31.5	32.3	33.1	3.7	30	50	1.10 (26.4)
FPX12-17*	12 (3.7)	6211	–	–	–	–	–	33.3	34.0	34.8	3.2	29	52	1.10 (26.4)
	Focal Plane Antennas – Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female													
FP8F-17	8 (2.4)	6219	B	B	–	2	–	29.9	30.8	31.9	4.6	30	49	1.10 (26.4)
FP10F-17	10 (3.0)	6221	A	A	–	2	–	31.9	32.8	33.8	3.7	30	51	1.10 (26.4)
FP12F-17	12 (3.7)	6223	A	A	–	2	–	33.6	34.3	35.3	3.1	30	54	1.10 (26.4)
KP 	**GRIDPAK® Antennas** – F-Series Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female													
KP4F-17	4 (1.2)	3830	–	–	–	2	–	24.6	25.5	26.4	8.6	31	32	1.20 (20.8)
KP6F-17	6 (2.0)	4077	B	B	–	–	–	28.3	29.3	30.2	5.5	33	36	1.10 (26.4)
KP8F-17	8 (2.4)	4098	B	B	–	–	–	30.1	31.1	31.7	4.8	32	36	1.10 (26.4)
KP10F-17	10 (3.0)	2971	A	A	–	2	–	31.9	32.8	33.7	3.7	38	42	1.10 (26.4)
KP13F-17	12 (3.7)	2982	A	A	–	–	–	34.3	35.3	36.2	3.0	30	40	1.10 (26.4)

1.85 - 1.99 GHz **

Antenna Inputs. All antenna VSWR values are specified with 7/8" EIA connectors. Other optional inputs may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa), except PXL Series 3 lb/in^2 (20 kPa).

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
UHP 	**Ultra High Performance Antennas** – Single Polarized **Antenna Input:** 7/8" EIA													
UHP8-18	8 (2.4)	2168	A	A	–	2	–	30.8	31.1	31.4	4.8	33	62	1.08 (28.3)
UHP10-18	10 (3.0)	2169	A	A	–	2	–	32.6	33.0	33.3	4.2	32	62	1.08 (28.3)
UHP12-18	12 (3.7)	2170	A	A	–	2	–	34.4	34.7	35.0	3.3	32	66	1.08 (28.3)
	Ultra High Performance Antennas – Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA and "F" Flange Female													
UHP8F-18	8 (2.4)	2168	A	A	–	2	–	30.8	31.1	31.4	4.8	33	62	1.10 (26.4)
UHP10F-18	10 (3.0)	2169	A	A	–	2	–	32.6	33.0	33.3	4.2	32	62	1.10 (26.4)
UHP12F-18	12 (3.7)	2170	A	A	–	2	–	34.4	34.7	35.0	3.3	32	66	1.10 (26.4)
PXL 	**Standard Antennas** – Dual Polarized **Antenna Input:** 7/8" EIA													
PXL8-18*	8 (2.4)	2286	B	B	–	2	–	31.0	31.2	31.5	4.6	28	43	1.10 (26.4)
PXL10-18*	10 (3.0)	2288	A	A	–	2	–	32.9	33.1	33.6	3.7	28	46	1.10 (26.4)
PXL12-18*	12 (3.7)	2290	A	A	–	2	–	34.5	34.7	35.2	3.0	28	48	1.10 (26.4)

Reference ETSI Documents EN300631 for 1 to 3 GHz

* 3 lb/in^2 (20 kPa) maximum

** Multiband antennas are available in this frequency band. See page 94.

1.9 - 2.3 GHz

Antenna Inputs. All antenna VSWR values are specified with 7/8" EIA connectors. Other optional inputs may result in equal or slightly higher VSWR. Contact Andrew for details.

Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa), except HPX, FPX, and PXL Series 3 lb/in^2 (20 kPa).

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
UHP 	**Ultra High Performance Antennas** – Single Polarized **Antenna Input:** 7/8" EIA													
UHP8-19	8 (2.4)	1444	A	A	–	2	–	31.1	31.9	32.7	4.2	30	57	1.20 (20.8)
UHP10-19	10 (3.0)	1445	A	A	–	2	–	32.9	33.7	34.5	3.6	30	60	1.20 (20.8)
UHP12-19	12 (3.7)	1446	A	A	–	2	–	34.6	35.4	36.2	2.9	30	64	1.20 (20.8)
	Ultra High Performance Antennas – F-Series Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA and "F" Flange Female													
UHP8F-19	8 (2.4)	1447	A	A	–	2	–	31.1	31.9	32.7	4.2	30	57	1.20 (20.8)
UHP10F-19	10 (3.0)	1448	A	A	–	2	–	32.9	33.7	34.5	3.6	30	60	1.20 (20.8)
UHP12F-19	12 (3.7)	1449	A	A	–	2	–	34.6	35.4	36.2	2.9	30	64	1.20 (20.8)
HPX, HP 	**High Performance Antennas** – Dual Polarized **Antenna Input:** 7/8" EIA													
HPX8-19*	8 (2.4)	1430	A	A	–	2	–	31.1	32.0	32.9	4.1	28	48	1.10 (26.4)
HPX10-19*	10 (3.0)	1431	A	A	–	2	–	33.0	33.9	34.8	3.3	28	53	1.10 (26.4)
HPX12-19*	12 (3.7)	1432	A	A	–	2	–	34.6	35.5	36.4	2.8	30	55	1.10 (26.4)
HPX15-19*	15 (4.6)	1441	A	A	–	2	–	36.5	37.4	38.3	2.2	28	56	1.10 (26.4)
	High Performance Antennas – F-Series Unpressurized Dual Polarized **Antenna Inputs:** 7/8" EIA and "F" Flange Female													
HPX8F-19	8 (2.4)	2573	A	A	–	2	–	31.1	32.0	32.9	4.1	28	48	1.20 (20.8)
HPX10F-19	10 (3.0)	2575	A	A	–	2	–	33.0	33.9	34.8	3.3	28	43	1.20 (20.8)
	High Performance Antennas – F-Series Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA and "F" Flange Female													
HP6F-19	6 (1.8)	1450	B	B	–	2	–	28.5	29.4	30.3	5.5	25	46	1.10 (26.4)
HP8F-19	8 (2.4)	2262	A	A	–	2	–	31.0	31.9	32.8	4.1	30	50	1.10 (26.4)
HP10F-19	10 (3.0)	2264	A	A	–	2	–	32.9	33.8	34.7	3.3	30	53	1.10 (26.4)
HP12F-19	12 (3.7)	2267	A	A	–	2	–	34.5	35.4	36.3	2.8	30	57	1.10 (26.4)
HP15F-19	15 (4.6)	1409	A	A	–	2	–	36.5	37.4	38.3	2.2	30	59	1.10 (26.4)
PXL, PL 	**Standard Antennas** – Dual Polarized Low VSWR **Antenna Inputs:** 7/8" EIA													
PXL8-19*	8 (2.4)	1426	A	A	–	2	–	31.1	32.0	32.9	4.1	28	43	1.10 (26.4)
PXL10-19*	10 (3.0)	1427	A	A	–	2	–	33.0	33.9	34.8	3.3	28	45	1.10 (26.4)
PXL12-19*	12 (3.7)	1428	A	A	–	2	–	34.6	35.5	36.4	2.8	28	48	1.10 (26.4)
PXL15-19*	15 (4.6)	1429	A	A	–	2	–	36.5	37.4	38.3	2.2	28	48	1.10 (26.4)
	Standard Antennas – Unpressurized Dual Polarized Low VSWR **Antenna Inputs:** 7/8" EIA and "F" Flange Female													
PXL8F-19	8 (2.4)	2563	A	A	–	2	–	31.1	32.0	32.9	4.1	28	43	1.20 (20.8)
PXL10F-19	10 (3.0)	2565	A	A	–	2	–	33.0	33.9	34.8	3.3	28	45	1.20 (20.8)
	Standard Antennas – Unpressurized Single Polarized Standard and Low VSWR **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female													
P2F-19	2 (0.6)	4390	–	–	–	–	–	19.3	20.5	21.3	13.8	30	25	1.50 (14.0)
P4F-19	4 (1.2)	1863	–	–	–	2	–	24.8	25.7	26.6	8.2	30	33	1.20 (20.8)
PL6F-19	6 (1.8)	2202	B	B	–	2	–	28.5	29.4	30.3	5.5	30	37	1.10 (26.4)
PL8F-19	8 (2.4)	2204	A	A	–	2	–	31.0	31.9	32.8	4.1	30	40	1.10 (26.4)
PL10F-19	10 (3.0)	1403	A	A	–	2	–	32.9	33.8	34.7	3.3	30	44	1.10 (26.4)
PL12F-19	12 (3.7)	1404	A	A	–	2	–	34.5	35.4	36.3	2.8	30	46	1.10 (26.4)
PL15F-19	15 (4.6)	1405	A	A	–	2	–	36.5	37.4	38.3	2.2	30	50	1.10 (26.4)

Reference ETSI Document EN300631 for 1 to 3 GHz * 3 lb/in^2 (20 kPa) maximum

Continued from previous page

1.9 - 2.3 GHz

Antenna Inputs. All antenna VSWR values are specified with 7/8" EIA connectors. Other optional inputs may result in equal or slightly higher VSWR. Contact Andrew for details.

Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa), except HPX, FPX, and PXL Series 3 lb/in^2 (20 kPa).

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
FPX, FP 		**Focal Plane Antennas** – Dual Polarized **Antenna Inputs:** 7/8" EIA												
FPX8-19*	8 (2.4)	6410	–	–	–	–	–	30.4	31.2	32.0	41	25	47	1.10 (26.4)
FPX10-19*	10 (3.0)	6413	A	A	–	2	–	32.3	33.1	33.9	3.3	29	52	1.10 (26.4)
FPX12-19*	12 (3.7)	6415	A	A	–	2	–	34.0	34.8	34.9	2.8	29	52	1.10 (26.4)
		Focal Plane Antennas – Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA and "F" Flange Female												
FP8F-19	8 (2.4)	6408	A	A	–	2	–	30.5	31.4	32.2	4.1	30	50	1.10 (26.4)
FP10F-19	10 (3.0)	6409	A	A	–	2	–	32.2	33.1	34.0	3.3	30	53	1.10 (26.4)
FP12F-19	12 (3.7)	6406	A	A	–	2	–	33.8	34.7	35.6	2.8	30	55	1.10 (26.4)
KP 		**GRIDPAK® Antennas** – Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female												
KP3F-19	3 (0.9)	4391	–	–	–	2	–	23.2	24.1	24.8	10.2 **	30	30	1.30 (17.7)
KP4F-19	4 (1.2)	3834	–	–	–	2	–	25.5	26.4	27.2	7.7	29	32	1.20 (20.8)
KP6F-19	6 (2.0)	4076	B	B	–	2	–	29.3	30.2	31.0	5.0	32	36	1.10 (26.4)
KP8F-19	8 (2.4)	4100	A	A	–	2	–	31.0	31.8	32.6	4.6	32	39	1.10 (26.4)
KP10F-19	10 (3.0)	2973	A	A	–	2	–	32.8	33.7	34.5	3.3	35	41	1.10 (26.4)
KP13F-19	13 (4.0)	2984	A	A	–	–	–	35.3	36.2	37.0	2.8	30	40	1.10 (26.4)

2.1 - 2.2 GHz

Antenna Inputs. All antenna VSWR values are specified with 7/8" EIA connectors. Other optional inputs may result in equal or slightly higher VSWR. Contact Andrew for details

Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa), except UHX Series 3 lb/in^2 (20 kPa).

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
UHX 		**Ultra High Performance Antennas** – Dual Polarized **Antenna Inputs:** 7/8" EIA												
UHX8-21*	8 (2.4)	2148 2149	A	A	-	-	-	31.9	32.1	32.3	4.2	30	58	1.10 (26.4)
UHX10-21*	10 (3.0)	2144 2145	A	A	-	2	-	33.8	34.0	34.2	3.6	32	62	1.10 (26.4)
UHX12-21*	12 (3.7)	2147 2146	A	A	-	2	-	35.4	35.6	35.8	2.8	32	67	1.10 (26.4)
		Ultra High Performance Antennas – F-Series Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA and "F" Flange Female												
UHX8F-21	8 (2.4)	2148 2149	A	A	-	-	-	31.9	32.1	32.3	4.2	30	58	1.20 (20.8)
UHX10F-21	10 (3.0)	2145 2144	A	A	-	-	-	33.8	34.0	34.2	3.6	32	62	1.20 (20.8)
UHX12F-21	12 (3.7)	2147 2146	A	A	-	-	-	35.4	35.6	35.8	2.8	32	67	1.20 (20.8)

Reference ETSI Document EN300631 for 1 to 3 GHz

* 3 lb/in^2 (20 kPa) maximum **Horizontal = 8.9 degrees

2.3 - 2.5 GHz

Antenna Inputs. All antenna VSWR values are specified with 7/8" EIA connectors. Other optional inputs may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (20 kPa), except FPX Series 3 lb/in^2 (20 kPa).

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	U.S. FCC 74	U.S. FCC 78	ETSI Class	ETSI Gain	Gain, dBi Low	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
PL, P 	**Standard Antennas** – Unpressurized Single Polarized Standard and Low VSWR **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female													
P2F-23	2 (0.6)	3014	–	–	–	2	–	20.8	21.6	22.0	12.0**	21	24	1.50 (14.0)
P4F-23	4 (1.2)	2198	B	–	–	2	–	26.9	27.3	27.6	6.9	32	36	1.20 (20.8)
PL6F-23	6 (1.8)	2188	B	–	–	2	–	30.4	30.8	31.2	4.7	32	36	1.10 (26.4)
PL8F-23	8 (2.4)	2190	A	–	–	2	–	33.0	33.4	33.8	3.5	30	39	1.08 (28.3)
PL10F-23	10 (3.0)	2192	A	–	–	2	–	34.9	35.3	35.6	3.0	30	44	1.08 (28.3)
PL12F-23	12 (3.7)	2194	A	–	–	2	–	36.5	36.9	37.2	2.5	32	47	1.08 (28.3)
FPX, FP 	**Focal Plane Antennas** – Single Polarized **Antenna Input:** 7/8" EIA													
FPX6-23*	6 (1.8)	6945	–	–	–	–	–	28.9	29.2	29.6	5.5	27	41	1.15 (23.1)
FPX8-23*	8 (2.4)	6949	–	–	–	2	–	31.5	31.8	32.3	4.1	28	52	1.10 (26.4)
FPX10-23*	10 (3.0)	6917	B	–	–	2	–	33.8	33.9	34.2	3.3	29	54	1.08 (28.3)
FPX12-23*	12 (3.7)	6919	B	–	–	2	–	35.5	35.6	35.9	2.7	30	56	1.08 (28.3)
	Focal Plane Antennas – Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA and "F" Flange Female													
FP4F-23	4 (1.2)	6954	–	–	–	–	–	26.1	26.4	26.8	7.7	30	40	1.20 (20.8)
FP6F-23	6 (1.8)	6938	A	–	–	–	–	29.7	30.3	30.5	5.3	28	41	1.10 (26.4)
FP8F-23	8 (2.4)	6942	A	–	–	–	–	32.5	32.6	32.9	4.1	30	52	1.08 (28.3)
FP10F-23	10 (3.0)	6914	A	–	–	–	–	34.6	34.7	35.2	3.4	30	53	1.08 (28.3)
FP12F-23	12 (3.7)	6916	A	–	–	–	–	35.7	36.3	36.5	2.8	30	57	1.08 (28.3)
KP 	**GRIDPAK® Antennas** – F-Series Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female													
KP3F-23	3 (0.9)	3394	–	–	–	–	–	24.7	25.1	25.3	8.1	38	30	1.20 (20.8)
KP4F-23	4 (1.2)	3837	–	–	–	–	–	27.2	27.5	27.8	6.9	30	30	1.20 (20.8)
KP6F-23	6 (2.0)	4082	B	–	–	–	–	31.0	31.3	31.6	4.5	30	36	1.10 (26.4)
KP8F-23	8 (2.4)	4126	B	–	–	–	–	32.6	32.9	33.1	3.4	30	35	1.08 (28.3)
KP10F-23	10 (3.0)	2975	B	–	–	–	–	34.5	34.8	35.1	3.0	30	38	1.08 (28.3)
KP13F-23	13 (4.0)	2986	B	–	–	–	–	37.0	37.2	37.5	2.4	30	38	1.08 (28.3)
KPR 	**GRIDPAK® Antennas** – F-Series Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female													
KPR3F-23	2 (0.6)	2345	–	–	–	–	–	24.2	23.6	23.6	7.9***	25	24	1.35 (16.5)
KPR4F-23	4 (1.2)	2348	–	–	–	–	–	26.9	27.3	27.6	6.2****	28	30	1.35 (16.5)
KPR6F-23	6 (2.0)	2349	–	–	–	–	–	30.8	31.3	31.2	4.2	30	35	1.35 (16.5)
KPR8F-23	8 (2.4)	2350	–	–	–	–	–	32.3	32.4	32.7	3.1*****	30	36	1.30 (17.7)
KPR10F-23	10 (3.0)	2351	–	–	–	–	–	33.5	33.7	34.0	2.9	30	38	1.30 (17.7)
KPR13F-23	13 (4.0)	2352	A	–	–	–	–	36.5	36.8	37.0	2.3	30	40	1.30 (17.7)

2.3 - 2.7 GHz

KP 	**GRIDPAK®/Antennas/Wide Band** – Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female													
KP4F-23W	4 (1.2)	6230	–	–	–	–	–	27.1	27.7	28.5	6.5	30	30	1.30 (17.7)
KP6F-23W	6 (2.0)	6231	–	–	–	–	–	30.9	31.5	32.3	4.2	30	35	1.25 (19.0)
KP8F-23W	8 (2.4)	6232	–	–	–	–	–	32.5	33.0	33.7	3.3	30	35	1.20 (20.8)
KP10F-23W	10 (3.0)	6233	–	–	–	–	–	34.4	35.0	35.8	2.8	30	38	1.20 (20.8)
KP13F-23W	13 (4.0)	6234	–	–	–	–	–	36.9	37.4	37.9	2.3	30	38	1.20 (20.8)

Reference ETSI Document EN300631 for 1 to 3 GHz
* 3 lb/in^2 (20 kPa) maximum ** Horizontal = 13.3 degrees *** Horizontal = 8.7 degrees **** Horizontal = 6.7 degrees ***** Horizontal = 3.4 degrees

2.45 - 2.5 GHz

Antenna Inputs. All antenna VSWR values are specified with 7/8" EIA connectors. Other optional inputs may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa).

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
P 	**Standard Antennas** – Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female													
P6F-24	6 (1.8)	2205	B	–	–	2	–	30.9	31.0	31.1	4.3	28	36	1.30 (17.7)
P8F-24	8 (2.4)	2207	A	–	–	2	–	33.4	33.5	33.6	3.2	28	39	1.30 (17.7)

2.48 - 2.7 GHz

Antenna Inputs. All antenna VSWR values are specified with 7/8" EIA connectors. Other optional inputs may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa) except FPX Series 3 lb/in^2 (20 kPa).

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
HP 	**High Performance Antennas** – Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA and "F" Flange Female													
HP4F-25	4 (1.2)	1038	–	–	–	–	–	27	27.3	27.6	6.7	30	43	1.20 (20.8)
HP6F-25	6 (1.8)	3778	A	–	–	2	–	31.1	31.4	31.7	4.6	28	50	1.10 (26.4)
HP8F-25	8 (2.4)	1314	A	–	–	2	–	33.7	34	34.3	3.1	30	52	1.08 (28.3)
HP10F-25	10 (3.0)	3780	A	–	–	2	–	35.6	35.9	36.2	2.7	30	55	1.08 (28.3)
HP12F-25	12 (3.7)	1318	A	–	–	2	–	37.2	37.5	37.8	2.3	30	54	1.08 (28.3)
PL,P 	**Standard Antennas** – Unpressurized Single Polarized Standard and Low VSWR **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female													
P4F-25	4 (1.2)	1268	–	–	–	–	–	27.6	27.9	28.2	6.3	30	32	1.20 (20.8)
PL6F-25	6 (1.8)	1308	B	–	–	–	–	31.1	31.4	31.7	4.2	28	36	1.10 (26.4)
PL8F-25	8 (2.4)	1309	A	–	–	2	–	33.6	33.9	34.2	3.1	30	39	1.08 (28.3)
PL10F-25	10 (3.0)	1310	A	–	–	2	–	35.6	35.9	36.2	2.7	30	42	1.08 (28.3)
PL12F-25	12 (3.7)	1320	A	–	–	2	–	37.1	37.4	37.7	2.2	30	44	1.08 (28.3)
FPX, FP 	**Focal Plane Antennas** – Dual Polarized **Antenna Inputs:** 7/8" EIA													
FPX6-25*	6 (1.8)	6947	–	–	–	–	–	29.6	30.0	30.3	5.0	27	42	1.15 (23.1)
FPX8-25*	8 (2.4)	6951	–	–	–	–	–	32.3	32.6	32.7	5.0	27	52	1.15 (26.4)
FPX10-25*	10 (3.0)	6909	B	–	–	2	–	34.2	34.6	34.9	3.1	30	54	1.08 (28.3)
FPX12-25*	12 (3.7)	6911	B	–	–	2	–	35.9	36.3	36.8	2.6	30	56	1.08 (28.3)
	Focal Plane Antennas – F-Series Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female													
FP4F-25	4 (1.2)	6956	–	–	–	2	–	26.8	27.1	27.5	7.2	30	41	1.20 (20.8)
FP6F-25	6 (1.8)	6940	A	–	–	2	–	30.5	30.6	31.0	4.9	28	44	1.10 (26.4)
FP8F-25	8 (2.4)	6944	A	–	–	2	–	32.9	33.4	33.5	3.9	30	52	1.08 (26.4)
FP10F-25	10 (3.0)	6905	A	–	–	2	–	35.2	35.5	35.8	3.2	30	55	1.08 (28.3)
FP12F-25	12 (3.7)	6908	A	–	–	2	–	36.5	36.9	37.3	2.6	30	57	1.08 (28.3)
KP 	**GRIDPAK® Antennas** – Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female													
KP3F-25	3 (0.9)	3395	–	–	–	–	–	25.3	25.2	25.4	7.7 **	32	30	1.20 (20.8)
KP4F-25	4 (1.2)	3841	–	–	–	–	–	27.8	28.2	28.6	6.1	30	31	1.20 (20.8)
KP6F-25	6 (2.0)	4084	B	–	–	–	–	31.6	32.0	32.4	4.0	30	35	1.10 (26.4)
KP8F-25	8 (2.4)	4128	B	–	–	–	–	33.1	33.6	33.8	3.2	30	37	1.08 (28.3)
KP10F-25	10 (3.0)	2977	A	–	–	–	–	35.1	35.5	35.9	2.7	31	38	1.08 (28.3)
KP13F-25	13 (4.0)	2988	B	–	–	–	–	37.5	37.8	38.0	2.3	30	38	1.08 (28.3)

Reference ETSI Document EN300631 for 1 to 3 GHz
* 3 lb/in^2 (20 kPa) maximum **Horizontal = 6.9 degrees

3.4 - 3.7 GHz

Antenna Inputs. All antenna VSWR values are specified with 7/8" EIA connectors. Other optional inputs may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa).

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
KP		**GRIDPAK® Antennas**– Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female												
KP2F-34	2 (0.6)	4423	–	–	–	–	–	23.6	23.7	23.6	8.7	28	22	1.35 (16.5)
KP3F-34	3 (0.9)	4424	–	–	–	–	–	27.2	27.7	27.3	6.2	28	25	1.30 (17.7)
KP4F-34	4 (1.2)	4425	–	–	–	–	–	29.2	29.8	29.7	4.3	32	26.5	1.30 (17.7)
KP6F-34	6 (2.0)	4426	–	–	–	–	–	33.8	34.2	34.5	2.9	30	31	1.35 (16.5)
KP8F-34	8 (2.4)	786	–	–	–	–	–	35.1	35.5	35.8	2.6	30	35	1.30 (17.7)

3.4 - 3.7 GHz with Coaxial Feeds*

Antenna Inputs. All antenna VSWR values are specified with 7/8" EIA connectors. Other optional inputs may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa).

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
HP		**High Performance Antennas** – Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female												
HP2F-34	2 (0.6)	4416	–	–	–	–	–	22.7	23	23	10.7	30	34	1.35 (16.5)
HP4F-34	4 (1.2)	4418	–	–	–	–	–	29.1	29.5	29.8	4.7	30	41	1.30 (17.7)
HP6F-34	6 (1.8)	4420	–	–	–	–	–	32.9	33.3	33.6	3.5	30	44	1.20 (20.8)
HP8F-34	8 (2.4)	4422	–	–	–	–	–	35	35.4	35.7	2.5	30	48	1.20 (20.8)
P		**Standard Antennas** – Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female												
P2F-34	2 (0.6)	4415	–	–	–	–	–	24.3	24.5	25	9	30	26.5	1.35 (16.5)
P4F-34	4 (1.2)	4417	–	–	–	–	–	29.6	30	30.3	4.5	30	33	1.30 (17.7)
P6F-34	6 (1.8)	4419	–	–	–	–	–	33.7	33.6	33.6	3.3	30	36	1.20 (20.8)
P8F-34	8 (2.4)	4421	–	–	–	–	–	35.2	35.6	35.9	2.6	30	40	1.20 (20.8)

3.4 - 3.9 GHz with Waveguide Feeds*

Antenna Inputs. All antenna VSWR values are specified with CPR and PDR flanges. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 5 lb/in^2 (35 kPa), except FP Series 10 lb/in^2 (70 kPa).

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
UHX		**Ultra High Performance Antennas**– Dual Polarized **Antenna Inputs:** CPR229G and PDR40												
UHX8-34**	8 (2.4)	1469 1470	B	–	–	2	2	36.2	36.9	37.5	2.4	30	62	1.06 (30.7)
UHX10-34**	10 (3.0)	1472 1471	B	–	–	2	2	38.1	38.8	39.4	1.8	30	62	1.06 (30.7)
UHX12-34**	12 (3.7)	1473 1474	A	–	–	2	2	39.6	40.4	41.0	1.5	40	65	1.06 (30.7)
UHX15-34**	15 (4.6)	1485 1486	A	–	–	2	2	41.6	42.3	42.9	1.2	30	66	1.06 (30.7)
HSX		**High Performance Antennas** – Super High Cross Polarization Discrimination – Dual Polarized **Antenna Inputs:** CPR229G and PDR40												
HSX8-34**	8 (2.4)	1528 1530	B	–	–	3	2	36.1	36.6	37.1	2.4	40	67	1.06 (30.7)
HSX10-34**	10 (3.0)	1534 1532	B	–	–	3	2	37.7	38.2	38.7	1.8	40	69	1.06 (30.7)
HSX12-34**	12 (3.7)	1536 1538	A	–	–	3	2	39.6	40.1	40.6	1.5	40	70	1.06 (30.7)
HSX15-34**	15 (4.6)	1540 1542	A	–	–	3	2	41.6	42.1	42.6	1.2	40	72	1.06 (30.7)
FP		**Focal Plane Antennas** – Single Polarized **Antenna Inputs:** CPR229G and PDR40												
FP10-34	10 (3.0)	6605	–	–	–	1	2	37.0	38.3	38.8	1.9	28	60	1.06 (30.7)
FP12-34	12 (3.7)	6601	B	–	–	2	2	39.3	39.8	40.3	1.6	29	62	1.06 (30.7)

Reference ETSI Document EN300833 for 3 to 60 GHz *Multiband antennas are available in this frequency band. See page 93. **5 lb/in^2 (35 kPa) maximum

Ordering Information for Waveguide Assemblies

Frequency GHz*	Waveguide Type	Flange Type††	Connector† Tunable	Connector† Pre-Tuned	Pressure Window	Flex-Twist 2 ft (0.6 m)	VSWR, max.** (R.L. dB) Up to 300 ft (90 m)
Premium Waveguide Assemblies							
3.4-3.9	**EWP34-34**	CPR229G	**134DET**	–	**55001-229**	**F229PC0240CS**	1.10 (26.4)
3.54-4.2	**EWP34-35**	CPR229G	**134DET**	**134DEP-2**	**55001-229**	**F229PC0240CA**	1.08 (28.3)
		PDR40	**134DEMT**	**134DEMP-2**	**223306-40**	**F229MH0600HA**	1.08 (28.3)
3.7-4.2	**EWP34-37**	CPR229G	**134DET**	**134DEP-1**	**55001-229**	**F229PC0240CA**	1.08 (28.3)
Standard Waveguide Assemblies			**Non-Tunable**				
3.1-3.6	**EW34-31**	CPR229G	**134DE**	–	**55001-229**	**F229PC0240CS**	1.15 (23.1)
3.4-4.2	**EW34**	CPR229G	**134DE**	–	**55001-229**	**F229PC0240CS**	1.15 (23.1)

* Contact Andrew for information on other frequency bands.
** VSWR, max. (R.L.,dB) Up to 300 ft (90 m). The indicated maximum characteristics are guaranteed for factory assemblies and are typical for field assemblies.
† "Pre-tuned" connectors are for field attachment only. "Tunable" connectors ordered with factory assemblies are factory tuned.
†† For detailed information on mating flanges, refer to pages 214-218.

Accessories – Photos and detailed descriptions on pages 194-200

Description	Type No.
Hangers and Adapters	
Hanger Kit of 10, Recommended maximum spacing for outdoor installation is 4.5 ft (1.37 m)*	**42396A-15**
Hardware Kit of 10, 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Angle Adapter Kit of 10. Stainless steel	**31768A**
Round Member Adapter Kit of 10. Stainless steel	
Member Diameter, in (mm)	
1-2 (25-50)	**31670-1**
2-3 (50-75)	**31670-2**
3-4 (75-100)	**31670-3**
4-5 (100-125)	**31670-4**
5-6 (125-150)	**31670-5**
45° Adapter Kit of 10. Galvanized steel	**42334**
Threaded Rod Support, 3/8" rod, nuts, washers, ceiling bracket	
12 in (305 mm) long, kit of 1	**31771**
12 in (305 mm) long, kit of 5	**31771-4**
24 in (610 mm) long, kit of 1	**31771-9**
24 in (610 mm) long, kit of 5	**31771-6**
Tower Standoff Kit of 10. 1 in (25 mm) standoff	
Member Diameter, in (mm)	
0.75-1.5 (20-40)	**30848-5**
1.5-3.0 (40-75)	**30848-4**
3-4 (75-100)	**30848-1**
4-5 (100-125)	**30848-2**
5-6 (125-150)	**30848-3**
Tower Standoff Kit of 10. 2.5 in (60 mm) standoff	
Member Diameter, in (mm)	
3-4 (75-100)	**41108A-1**
4-5 (100-125)	**41108A-2**
5-6 (125-150)	**41108A-3**

* Standard conditions: 125 mph (200 km/h) survival wind velocity, 0.5 in (13 mm) radial ice. For other conditions see page 196.

Description	Type No.
Other Accessories	
Splice	**134DZ**
Grounding Kit with factory attached, one-hole lug	**204989-5**
Grounding Kit with factory attached, two-hole lug	**241088-5**
Grounding Kit with field attachable crimp-on, one-hole lug	**204989-25**
Grounding Kit with field attachable crimp-on, two-hole lug	**241088-10**
Grounding Kit with field attachable screw-on lug	**204989-35**
Crimping Tool to field attach lug to Grounding Kit	**207270**
Hoisting Grip	**26985A**
Bending Tool Kit. One each E and H Plane tool	**33586-11**
Connector Reattachment Kit	**33544-43**
Wall-Roof Feed Thru	**35849A-17**
Waveguide Boot for Plates (below),	
4 in (102 mm) dia.	**204679-34**
5 in (127 mm) dia	**48939-34**

Feed-Thru Plate for Boots (above)

Openings	For 4 in Boots	For 5 in Boots
1	**204673-1**	**48940-1**
1	**204673-2**	–
2	–	**48940-2**
3	–	**48940-3**
4	**204673-4**	**48940-4**
6	–	**48940-6**
8	**204673-8**	–

*3.54 - 4.18 GHz**

Antenna Inputs. All antenna VSWR values are specified with CPR and PDR flanges. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 5 lb/in^2 (35 kPa).

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
UHX		**Ultra High Performance Antennas** – Dual Polarized **Antenna Inputs:** CPR229G and PDR40												
UHX8-35**	8 (2.4)	2464 2463	B	–	–	3	2	36.1	36.8	37.5	2.4	30	65	1.06 (30.7)
UHX10-35**	10 (3.0)	1465 1466	A	–	–	2	2	38.1	38.8	39.5	1.8	32	65	1.06 (30.7)
UHX12-35**	12 (3.7)	1467 1468	A	–	–	2	2	39.6	40.4	41.1	1.5	32	68	1.06 (30.7)
UHX15-35**	15 (4.6)	2483 2484	A	–	–	2	2	41.6	42.3	43.0	1.2	30	65	1.06 (30.7)

3.6 - 4.2 GHz

Antenna Inputs. All antenna VSWR values are specified with CPR and PDR flanges. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 5 lb/in^2 (35 kPa).

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
HSX		**High Performance Antennas** – Super High Cross Polarization Discrimination Dual Polarized **Antenna Inputs:** CPR229G and PDR40												
HSX8-36**	8 (2.4)	2382 2381	B	–	–	3	2	36.7	37.3	37.8	2.4	40	65	1.06 (30.7)
HSX10-36**	10 (3.0)	2383 2384	B	–	–	3	2	38.3	38.9	39.4	1.9	40	68	1.06 (30.7)
HSX12-36**	12 (3.7)	2385 2386	A	–	–	3	2	40.3	40.9	41.4	1.6	40	71	1.06 (30.7)
HSX15-36**	15 (4.6)	2396 2394	A	–	–	3	2	42.1	42.7	43.2	1.2	40	71	1.06 (30.7)
HPX		**High Performance Antennas** – Dual Polarized **Antenna Inputs:** CPR229G and PDR40												
HPX8-36**	8 (2.4)	1143	–	–	–	1	2	36.4	37.1	37.7	2.5	30	59	1.10 (26.4)
HPX10-36**	10 (3.0)	1144	B	–	–	–	–	38.1	38.8	39.4	1.9	30	61	1.10 (26.4)
HPX12-36**	12 (3.7)	1145	B	–	–	–	–	39.9	40.6	41.2	1.6	30	62	1.10 (26.4)
HP		**High Performance Antennas** – Single Polarized **Antenna Inputs:** CPR229G and PDR40												
HP8-36**	8 (2.4)	1138	B	–	–	1	2	36.4	37.1	37.7	2.5	30	59	1.10 (26.4)
HP10-36**	10 (3.0)	1139	B	–	–	2	2	38.1	38.8	39.4	1.9	30	61	1.10 (26.4)
HP12-36**	12 (3.7)	1140	B	–	–	2	2	39.9	40.6	41.2	1.6	30	62	1.10 (26.4)
FPX **FP**		**Focal Plane Antennas** – Dual Polarized **Antenna Inputs:** CPR229G and PDR40												
FPX10-36**	10 (3.0)	6805	–	–	–	–	–	38.6	39.1	39.6	1.7	26	62	1.06 (30.7)
FPX12-36**	12 (3.7)	6807	A	–	–	2	2	40.3	40.9	41.2	1.4	27	64	1.06 (30.7)
		Focal Plane Antennas – Single Polarized **Antenna Inputs:** CPR229G and PDR40												
FP10-36**	10 (3.0)	6801	B	–	-	1	2	38.6	39.1	39.6	1.7	29	62	1.06 (30.7)
FP12-36**	12 (3.7)	6803	A	–	–	1	2	40.3	40.9	41.2	1.4	31	64	1.06 (30.7)

Reference ETSI Document EN300833 for 3 to 60 GHz.
*Multiband antennas are available in this frequency band. See page 93.
**5 lb/in^2 (35 kPa) maximum

Refer to page 64 for Elliptical Waveguide ordering information

*3.7 - 4.2 GHz**

Antenna Inputs. All antenna VSWR values are specified with CPR and PDR flanges. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 5 lb/in^2 (35 kPa).

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	U.S. FCC 74	U.S. FCC 78	ETSI Class	ETSI Gain	Gain, dBi Low	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
UHX 	**Ultra High Performance Antennas** **Antenna Inputs:** CPR229G and PDR40													
UHX8-37**	8 (2.4)	1433 1434	A	–	–	3	2	36.8	37.4	37.6	2.4	33	66	1.06 (30.7)
UHX10-37**	10 (3.0)	1436 1435	A	–	–	3	2	38.5	39.1	39.5	1.8	33	67	1.06 (30.7)
UHX12-37**	12 (3.7)	1437 1438	A	–	–	3	2	40.4	41.0	41.2	1.5	33	73	1.06 (30.7)
UHX15-37**	15 (4.6)	1439 1440	A	–	–	3	2	42.1	42.7	43.1	1.2	33	73	1.06 (30.7)
PXL **PL** 	**Standard Antennas** – Dual Polarized **Antenna Inputs:** CPR229G and PDR40													
PXL10-37**	10 (3.0)	2411	B	–	–	–	–	38.7	39.3	39.8	1.8	30	45	1.06 (307)
PXL12-37**	12 (3.7)	2413	B	–	–	1	2	40.4	41.0	41.1	1.5	30	48	1.06 (30.7)
PXL15-37**	15 (4.6)	2415	B	–	–	–	–	42.1	42.7	43.0	1.2	30	52	1.06 (30.7)
	Standard Antennas – Single Polarized **Antenna Inputs:** CPR229G and PDR40													
PL6-37**	6 (1.8)	2402	–	–	–	–	–	34.5	35.0	35.5	3.0	30	40	1.07 (29.4)
PL8-37**	8 (2.4)	2403	–	–	–	–	–	36.7	37.3	37.8	2.4	30	42	1.06 (30.7)
PL10-37**	10 (3.0)	2405	B	–	–	–	–	38.7	39.3	39.8	1.8	30	47	1.06 (30.7)
PL12-37**	12 (3.7)	2407	B	–	–	1	2	40.4	41.0	41.5	1.5	30	50	1.06 (30.7)
PL15-37**	15 (4.6)	2408	B	–	–	1	2	42.1	42.7	43.2	1.2	30	52	1.06 (30.7)

Reference ETSI Document EN300833 for 3 to 60 GHz.
*Multiband antennas are available in this frequency band. See page 93.
**5 lb/in^2 (35 kPa) maximum

Ordering Information for Waveguide Assemblies

Frequency GHz*	Waveguide Type	Flange Type††	Connector† Tunable	Connector† Pre-Tuned	Pressure Window	Flex-Twist 2 ft (0.6 m)
Super Premium Waveguide Assemblies						**VSWR 1.06 (30.7)****
3.7–4.2	**EWP37S**	CPR229G	**137DET**	–	**55001-229**	**F229PC0240CA**
		PDR40	**137DEMT**	–	**223306-40**	**F229PH0600HA**
Premium Waveguide Assemblies						**VSWR 1.08 (28.3)****
3.4-3.9	**EWP37-34W*****	CPR229G	**137DET**	–	**55001-229**	**F229PC0240CS**
3.4-3.9	**EWP37-34*****	PDR40	–	**137DEMP-3**	**223306-40**	**F229MH0600HS**
3.54-4.2	**EWP37-35**	CPR229G	**137DET**	**137DEP-2**	**55001-229**	**F229PC0240CA**
		PDR40	–	**137DEMP-2**	**223306-40**	**F229MH0600HA**
3.52-4.2	**EWP37-35W**	CPR229G	**137DET**	**137DEP-2**	**55001-229**	**F229PC0240CA**
		PDR40	–	**137DEMP-2**	**223306-40**	**F229MH0600HA**
3.6-4.2	**EWP37-36**	CPR229G	**137DET**	–	**55001-229**	**F229PC0240CA**
3.7-4.2	**EWP37-37**	CPR229G	**137DET**	**137DEP-1**	**55001-229**	**F229PC0240CA**
Standard Waveguide Assemblies				**Non-Tunable**		**VSWR 1.15 (23.1)****
3.4–4.2	**EW37**	CPR229G	**137DE**	–	**55001-229**	**F229PC0240CS**
		PDR40	**137DEM**	–	**223306-40**	**F229MH0600HS**

* Contact Andrew for information on other frequency bands.
** VSWR max., (R.L., dB). The indicated maximum VSWR characteristics are guaranteed for factory assemblies and are typical for field assemblies.
*** VSWR 1.10 (26.4) † "Pre-tuned" connectors are for field attachment only. "Tunable" connectors ordered with factory assemblies are factory tuned.
†† For detailed information on mating flanges, refer to pages 214-218.

Accessories – Photos and detailed descriptions on pages 194-200

Description	Type No.
Hangers and Adapters	
Hanger Kit of 10, Recommended maximum spacing for outdoor installation is 4.5 ft (1.37 m)*	**42396A-4**
Hardware Kit of 10, 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Angle Adapter Kit of 10. Stainless steel	**31768A**
Round Member Adapter Kit of 10. Stainless steel	
Member Diameter, in (mm)	
1-2 (25-50)	**31670-1**
2-3 (50-75)	**31670-2**
3-4 (75-100)	**31670-3**
4-5 (100-125)	**31670-4**
5-6 (125-150)	**31670-5**
45° Adapter Kit of 10. Galvanized steel	**42334**
Threaded Rod Support, 3/8" rod, nuts, washers, ceiling bracket	
12 in (305 mm) long, kit of 1	**31771**
12 in (305 mm) long, kit of 5	**31771-4**
24 in (610 mm) long, kit of 1	**31771-9**
24 in (610 mm) long, kit of 5	**31771-6**
Tower Standoff Kit of 10. 1 in (25 mm) standoff	
Member Diameter, in (mm)	
0.75-1.5 (20-40)	**30848-5**
1.5-3.0 (40-75)	**30848-4**
3-4 (75-100)	**30848-1**
4-5 (100-125)	**30848-2**
5-6 (125-150)	**30848-3**
Tower Standoff Kit of 10. 2.5 in (60 mm) standoff	
Member Diameter, in (mm)	
3-4 (75-100)	**41108A-1**
4-5 (100-125)	**41108A-2**
5-6 (125-150)	**41108A-3**

* Standard conditions: 125 mph (200 km/h) survival wind velocity, 0.5 in (13 mm) radial ice. For other conditions see page 196.

Description	Type No.
Other Accessories	
Flaring Tool Kit for connector attachment	**205869**
Splice	**134DZ**
Grounding Kit with factory attached, one-hole lug	**204989-5**
Grounding Kit with factory attached, two-hole lug	**241088-5**
Grounding Kit with field attachable crimp-on, one-hole lug	**204989-25**
Grounding Kit with field attachable crimp-on, two-hole lug	**241088-10**
Grounding Kit with field attachable screw-on lug	**204989-35**
Crimping Tool to field attach lug to Grounding Kit	**207270**
Hoisting Grip	**31535**
Bending Tool Kit. One each E and H Plane tool	**33586-3**
Connector Reattachment Kit	**33544-24**
Wall-Roof Feed Thru	**245314-37**
Waveguide Boot for Plates (below),	
4 in (102 mm) dia.	**WGB4-37**
5 in (127 mm) dia	**WGB5-37**

Feed-Thru Plate for Boots (above)

Openings	For 4 in Boots	For 5 in Boots
1	**204673-1**	**48940-1**
1	**204673-2**	–
2	–	**48940-2**
3	–	**48940-3**
4	**204673-4**	**48940-4**
6	–	**48940-6**
8	**204673-8**	–

Refer to page 66 for Elliptical Waveguide ordering information

*4.4 - 5.0 GHz**

Antenna Inputs. All antenna VSWR values are specified with CPR and PDR flanges. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in² (70 kPa) except LBX 5 lb/in² (35 kPa).

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
HSX 	**High Performance Antennas** – Super High Cross Polarization Discrimination **Antenna Inputs:** CPR187G and PDR48													
HSX6-44	6 (1.8)	2398 2400	–	–	–	3	2	35.7	36.3	36.8	2.6	40	68	1.06 (30.7)
HSX8-44	8 (2.4)	2406 2404	–	–	–	3	2	38.2	38.8	39.3	1.9	40	70	1.06 (30.7)
HSX10-44	10 (3.0)	2410 2412	–	–	–	3	2	40.0	40.6	41.1	1.5	40	71	1.06 (30.7)
HSX12-44	12 (3.7)	2414 2416	–	–	–	3	2	41.7	42.2	42.8	1.2	40	74	1.06 (30.7)
HSX15-44	15 (4.6)	2420 2418	–	–	–	2	2	43.7	44.3	44.8	1.0	40	75	1.06 (30.7)
HPX **HP** 	**High Performance Antennas** – Dual Polarized **Antenna Inputs:** CPR187G, PDR48, and UG-148C/U													
HPX6-44	6 (1.8)	2558	–	–	–	2	2	35.8	36.3	36.8	2.5	30	60	1.06 (30.7)
HPX8-44	8 (2.4)	2544	–	–	–	2	2	38.6	39.1	39.7	1.8	30	64	1.06 (30.7)
HPX10-44	10 (3.0)	2546	–	–	–	2	2	39.8	40.3	40.9	1.5	30	66	1.06 (30.7)
HPX12-44	12 (3.7)	2548	–	–	–	2	2	41.9	42.5	43.0	1.2	30	67	1.06 (30.7)
	High Performance Antennas –Single Polarized **Antenna Inputs:** CPR187G, PDR48, and UG-148C/U													
HP4-44	4 (1.2)	2523	–	–	–	2	2	30.0	32.6	33.1	3.8	30	56	1.10 (26.4)
HP6-44	6 (1.8)	2524	–	–	–	2	2	36.0	36.6	37.1	2.5	30	62	1.06 (30.7)
HP8-44	8 (2.4)	2527	–	–	–	2	2	38.7	39.3	39.8	1.8	30	65	1.06 (30.7)
HP10-44	10 (3.0)	2528	–	–	–	2	2	40.4	41.0	41.5	1.5	30	67	1.06 (30.7)
HP12-44	12 (3.7)	2540	–	–	–	2	2	42.1	42.7	43.2	1.2	30	67	1.06 (30.7)
HP15-44	15 (4.6)	2530	–	–	–	2	2	44.0	44.5	45.0	1.0	30	68	1.06 (30.7)
PXL **PL** 	**Standard Antennas** – Dual Polarized **Antenna Inputs:** CPR187G, PDR48, and UG-148C/U													
PXL4-44	4 (1.2)	2495	–	–	–	–	–	32.3	32.7	33.1	3.7	30	40	1.08 (28.3)
PXL6-44	6 (1.8)	2496	–	–	–	–	–	35.9	36.4	36.9	2.5	30	43	1.06 (30.7)
PXL8-44	8 (2.4)	2497	–	–	–	–	–	38.6	39.2	39.7	1.8	30	45	1.06 (30.7)
PXL10-44	10 (3.0)	2498	–	–	–	1	2	40.3	40.9	41.2	1.5	30	50	1.06 (30.7)
PXL12-44	12 (3.7)	2499	–	–	–	1	2	42.0	42.6	43.1	1.2	30	51	1.06 (30.7)
	Standard Antennas – Single Polarized **Antenna Inputs:** CPR187G, PDR48, and UG-148C/U													
PL4-44	4 (1.2)	2551	–	–	–	–	–	32.4	33.0	33.5	3.7	30	40	1.08 (28.3)
PL6-44	6 (1.8)	2552	–	–	–	1	2	36.0	36.6	37.1	2.5	30	44	1.06 (30.7)
PL8-44	8 (2.4)	2553	–	–	–	–	–	38.7	39.3	39.8	1.8	30	45	1.06 (30.7)
PL10-44	10 (3.0)	2554	–	–	–	1	2	40.4	41.0	41.5	1.5	30	49	1.06 (30.7)
PL12-44	12 (3.7)	2556	–	–	–	–	–	42.1	42.7	43.2	1.2	30	50	1.06 (30.7)
PL15-44	15 (4.6)	2557	–	–	–	–	–	44.0	44.5	45.0	1.0	29	51	1.06 (30.7)
LBX 	**Low Back Lobe Antennas** – Dual Polarized **Antenna Input:** CPR187G													
			Regulatory Compliance* **											
LBX6-44**	6 (1.8)	0806-1			B			35.8	36.4	36.9	2.5	33	52	1.09 (27.3)
LBX8-44**	8 (2.4)	0647-3			B			38.6	39.2	39.7	1.8	33	56	1.08 (28.3)
LBX10-44**	10 (3.0)	0912			B			40.1	40.7	41.2	1.5	33	62	1.08 (28.3)
LBX12-44**	12 (3.7)	0910			B			42.0	42.6	43.1	1.2	33	64	1.08 (28.3)

Reference ETSI Document EN300833 for 3 to 60 GHz.
*Multiband antennas are available in this frequency band. See pages 93-94.
**5 lb/in² (35 kPa) maximum
***ANATEL Brazilian Telecommunications Agency, Regulation 1286 Category

Ordering Information for Waveguide Assemblies

Frequency GHz*	Waveguide Type	Flange Type††	Connector† Tunable	Connector† Pre-Tuned	Pressure Window	Flex-Twist 2 ft (0.6 m)
Premium Waveguide Assemblies						**VSWR 1.07 (29.4)****
4.4–5.0	**EWP43**	UG-149/U†††	**143DCT**	**143SC**	**55000A-187**	**F187PA0240BA**
		CPR187G	**143DET**	**143SE**	**55001-187**	**F187PA0240CA**
		PDR48	–	**143SEM**	**223306-48**	**F187MH0600HA1**
		PAR48	–	**143SCM**		
Standard Waveguide Assemblies						**VSWR 1.15 (23.1)****
4.4–5.0	**EW43**	UG-149/U†††	–	**143SC**	**223306-48**	**F187MH0600HS**
		CPR187G	–	**143SE**	**55001-187**	**F187PA0240CS**
		PDR48	–	**143SEM**		
		PAR48	–	**143SCM**		

*Contact Andrew for information on other frequency bands.
** VSWR max., (R.L., dB). Up to 300 ft (90 m). The indicated maximum VSWR characteristics are guaranteed for factory assemblies and are typical for field assemblies.
† "Pre-tuned" connectors are for field attachment only. "Tunable" connectors ordered with factory assemblies are factory tuned.
†† For detailed information on mating flanges, refer to pages 214-218. ††† Modified cover flange with gasket groove. Mates with UG choke or cover flanges.

Accessories – Photos and detailed descriptions on pages 194-200

Description	Type No.
Hangers and Adapters	
Hanger Kit of 10, Recommended maximum spacing for outdoor installation is 4 ft (1.22 m)*	**42396A-16**
Hardware Kit of 10, 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Angle Adapter Kit of 10. Stainless steel	**31768A**
Round Member Adapter Kit of 10. Stainless steel	
Member Diameter, in (mm)	
1-2 (25-50)	**31670-1**
2-3 (50-75)	**31670-2**
3-4 (75-100)	**31670-3**
4-5 (100-125)	**31670-4**
5-6 (125-150)	**31670-5**
45° Adapter Kit of 10. Galvanized steel	**42334**
Threaded Rod Support, 3/8" rod, nuts, washers, ceiling bracket	
12 in (305 mm) long, kit of 1	**31771**
12 in (305 mm) long, kit of 5	**31771-4**
24 in (610 mm) long, kit of 1	**31771-9**
24 in (610 mm) long, kit of 5	**31771-6**
Tower Standoff Kit of 10. 1 in (25 mm) standoff	
Member Diameter, in (mm)	
0.75-1.5 (20-40)	**30848-5**
1.5-3.0 (40-75)	**30848-4**
3-4 (75-100)	**30848-1**
4-5 (100-125)	**30848-2**
5-6 (125-150)	**30848-3**

* Standard conditions: 125 mph (200 km/h) survival wind velocity, 0.5 in (13 mm) radial ice. For other conditions see page 196.

Description	Type No.
Hangers and Adapters	
Tower Standoff Kit of 10. 2.5 in (60 mm) standoff	
Member Diameter, in (mm)	
3-4 (75-100)	**41108A-1**
4-5 (100-125)	**41108A-2**
5-6 (125-150)	**41108A-3**
Other Accessories	
Flaring Tool Kit for connector attachment	**EWFTK-43**
Splice	**134DZ**
Grounding Kit with factory attached, one-hole lug	**204989-10**
Grounding Kit with field attachable crimp-on, one-hole lug	**204989-28**
Crimping Tool to field attach lug to Grounding Kit	**207270**
Hoisting Grip	**31535**
Bending Tool Kit. One each E and H Plane tool	**33586-3**
Connector Reattachment Kit	**33544-45**
Wall-Roof Feed Thru	**245314-43**
Waveguide Boot for Plates (below),	
4 in (102 mm) dia.	**WGB4-43**
5 in (127 mm) dia.	**WGB5-43**

Feed-Thru Plate for Boots (above)

Openings	For 4 in Boots
1	**204673-1**
1	**204673-2**
4	**204673-4**
8	**204673-8**

NEW!

5.25 - 5.85 GHz

Antenna Inputs. The standard connector is Type N Female. Contact Andrew for other options.
Pressurization. Pressurization not required.

Type Number	Side Dimension in (mm)	Gain, dBi Mid-Band	Beamwidth, degrees Mid-Band	F/B Ratio dB	VSWR max. (R.L., dB)
FPA 	**Flat Panel Array Antennas** – Single Polarized **Antenna Inputs:** Type N Female				
FPA5250D06-N	6 (150)	18.0	19.3	35	1.50 (14.0)
FPA5250D12-N	12 (300)	23.6	9.6	40	1.50 (14.0)
FPA5250D24-N	24 (600)	28.2	4.8	45	1.50 (14.0)

Refer to page 71 for Elliptical Waveguide ordering information

5.25 - 5.85 GHz

Antenna Inputs. All antenna VSWR values are specified with Type N Female connectors. Other optional inputs may result in equal or slightly VSWR. Contact Andrew for details.
Pressurization. Pressurization not required.

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	U.S. FCC 74	U.S. FCC 78	ETSI Class	ETSI Gain	Gain, dBi Low	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
P, PX 	**Unlicensed Radios Including Spread Spectrum, NII, and ISM** – Single and Dual Polarized **Antenna Input:** Type N Female													
P2F-52	2 (0.6)	4528	–	–	–	–	–	29.0	29.4	30.1	5.4	30	41	1.50 (14.0)
PX2F-52	2 (0.6)	4528	–	–	–	–	–	29.0	29.4	30.1	5.4	30	41	1.50 (14.0)
P3F-52	3 (0.9)	4529	–	–	–	–	–	33.4	33.4	33.5	3.8	30	42	1.50 (14.0)
PX3F-52	3 (0.9)	4529	–	–	–	–	–	33.4	33.4	33.5	3.8	30	42	1.50 (14.0)

5.6 - 6.2 GHz*

Antenna Inputs. All antenna VSWR values are specified with CPR and PDR flanges. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa).

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	U.S. FCC 74	U.S. FCC 78	ETSI Class	ETSI Gain	Gain, dBi Low	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
UHX 	**Ultra High Performance Antennas** – Dual Polarization **Antenna Inputs:** CPR137G and PDR70													
UHX10-56	10 (3.0)	1636, 1637	–	–	–	–	–	42.5	42.9	43.3	1.1	36	72	1.06 (30.7)
UHX12-56	12 (3.7)	1638, 1639	–	–	–	–	–	44.0	44.5	44.9	0.9	36	73	1.06 (30.7)
HPX 	**High Performance Antennas** – Dual Polarized **Antenna Inputs:** CPR137G and PDR70													
HPX8-56	8 (2.4)	1025	B	–	–	3	2	40.5	41.0	41.4	1.6	30	68	1.06 (30.7)
HPX10-56	10 (3.0)	1027	B	–	–	2	2	42.0	42.5	42.9	1.4	30	69	1.06 (30.7)
HPX12-56	12 (3.7)	1030	A	–	–	3	2	43.8	44.2	44.7	1.0	30	71	1.06 (30.7)

5.725 - 6.425 GHz

Antenna Inputs. All antenna VSWR values are specified with CPR and PDR flanges. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa).

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	U.S. FCC 74	U.S. FCC 78	ETSI Class	ETSI Gain	Gain, dBi Low	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
HP 	**High Performance / Wide Band Antennas** – Single Polarization **Antenna Inputs:** CPR137G and PDR70													
HP4-57W	4 (1.2)	4269	–	–	–	1	2	34.6	35.0	35.4	2.9	30	52	1.10 (26.4)
HP6-57W	6 (1.8)	4444	–	–	–	–	–	38.0	38.5	39.0	2.0	30	60	1.06 (30.7)
HP8-57W	8 (2.4)	4452	B	–	–	2	2	40.7	41.2	41.7	1.6	30	64	1.06 (30.7)
HP10-57W	10 (3.0)	4460	A	–	–	2	2	42.5	42.9	43.4	1.3	30	65	1.06 (30.7)
HP12-57W	12 (3.7)	4468	A	–	–	2	2	44.2	44.6	45.0	1.0	30	70	1.06 (30.7)
HP15-57W	15 (4.6)	4476	A	–	–	2	2	45.9	46.4	46.8	0.8	30	70	1.06 (30.7)
PL 	**Standard/Wide Band Antennas** – Single Polarized Standard and Low VSWR **Antenna Inputs:** CPR137G, PDR70, and Type N Female													
P2-57W	2 (0.6)	2892	–	–	–	–	–	29.2	29.3	29.9	5.8	30	40	1.10 (26.4)
P4-57W	4 (1.2)	4268	–	–	–	–	–	34.6	35.0	35.4	2.9	30	40	1.10 (26.4)
PL6-57W	6 (1.8)	4448	B	–	–	1	2	38.0	38.5	39.0	2.0	30	45	1.06 (30.7)
PL8-57W	8 (2.4)	4456	B	–	–	1	2	40.7	41.2	41.7	1.6	30	47	1.06 (30.7)
PL10-57W	10 (3.0)	4464	B	–	–	1	2	42.5	42.9	43.4	1.3	30	50	1.06 (30.7)
PL12-57W	12 (3.7)	4472	B	–	–	1	2	44.2	44.6	45.0	1.0	30	51	1.06 (30.7)
PL15-57W	15 (4.6)	4480	B	–	–	1	2	46.0	46.5	47.0	0.8	30	57	1.06 (30.7)

Reference ETSI Document EN300833 for 3 to 60 GHz.
*Multiband antennas are available in this frequency band. See pages 93-94.

Refer to page 71 for Elliptical Waveguide ordering information

5.850 - 5.915, 6.425 - 6.930 GHz

Antenna Inputs. All antenna VSWR values are specified with CPR and PDR flanges. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa).

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
UHX		**Ultra High Performance/Wide Band Antennas** – Dual Polarized **Antenna Inputs:** CPR137G and PDR70												
UHX8-58W														
5.850-5.915 GHz**8 (2.4)		3755 3759	A	–	–	3	2	40.4	40.5	40.6	1.45	34	68	1.08 (28.3)
6.425-6.930 GHz***		3772 3747	A	–	–	–	–	41.5	41.8	42.1	1.3	34	70	1.08 (28.3)
UHX10-58W														
5.850-5.915 GHz**10 (3.0)		3757 3759	A	–	–	3	2	42.0	42.1	42.2	1.25	34	71	1.08 (28.3)
6.425-6.930 GHz***		3774 3776	–	–	–	–	–	43.0	43.2	43.4	1.15	34	73	1.08 (28.3)
HPX		**High Performance/Wide Band Antennas** – Dual Polarized **Antenna Inputs:** CPR137G and PDR70												
HPX8-58W														
5.850-5.915 GHz**8 (2.4)		3761	–	–	–	3	2	40.7	40.8	40.9	1.4	32	65	1.08 (28.3)
6.425-6.930 GHz***		3749	–	–	–	–	–	41.7	41.9	42.2	1.4	34	67	1.08 (28.3)
HPX10-58W														
5.850-5.915 GHz**10 (3.0)		3751	–	–	–	2	2	42.6	42.7	42.8	1.2	32	68	1.08 (28.3)
6.425-6.930***		3770	–	–	–	–	–	43.4	43.4	43.8	1.2	34	69	1.08 (28.3)

*5.925 - 6.425 GHz**

Antenna Inputs. All antenna VSWR values are specified with CPR and PDR flanges. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 k Pa) except LBX Series 8 lb/in^2 (56 kPa).

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
UHX		**Ultra High Performance Antennas** – Dual Polarized **Antenna Inputs:** CPR137G and PDR70												
UHX6-59	6 (1.8)	1730 1729	A	–	–	3	2	38.4	38.8	39.1	1.8	33	75	1.06 (30.7)
UHX8-59	8 (2.4)	1654 1653	A	–	–	3	2	40.9	41.3	41.6	1.4	33	77	1.06 (30.7)
UHX10-59	10 (3.0)	1667 1666	A	–	–	3	2	42.9	43.2	43.6	1.1	34	80	1.06 (30.7)
UHX12-59	12 (3.7)	1665 1664	A	–	–	3	2	44.4	44.8	45.2	0.9	35	80	1.06 (30.7)
UHX15-59	15 (4.6)	1662 1661	A	–	–	3	2	46.1	46.4	46.8	0.8	34	80	1.06 (30.7)
HSX		**High Performance Antennas**, Super High Cross Polarization Discrimination Dual Polarized – TEGLAR Long Life Radome Included **Antenna Inputs:** CPR137G and PDR70												
HSX6-59	6 (1.8)	2424 2422	B	–	–	3	2	38.4	38.8	39.1	1.8	40	72	1.07 (29.4)
HSX8-59	8 (2.4)	2428 2429	A	–	–	3	2	40.9	41.3	41.6	1.4	40	74	1.08 (28.3)
HSX10-59	10 (3.0)	2442 2440	A	–	–	3	2	42.5	42.9	43.2	1.1	40	76	1.08 (28.3)
HSX12-59	12 (3.7)	2444 2446	A	–	–	3	2	44.4	44.7	45.0	0.9	40	78	1.08 (28.3)
HSX15-59	15 (4.6)	2450 2448	A	–	–	3	2	46.3	46.6	46.9	0.8	40	79	1.08 (28.3)
HPX HP		**High Performance Antennas** – Dual Polarized – Hypalon Radome Included **Antenna Inputs:** CPR137G and PDR70												
HPX6-59	6 (1.8)	2664	B	–	–	3	2	38.4	38.8	39.1	1.8	30	65	1.07 (29.4)
HPX8-59	8 (2.4)	2678	A	–	–	3	2	40.9	41.3	41.6	1.4	30	69	1.06 (30.7)
HPX10-59	10 (3.0)	2684	A	–	–	2	2	42.7	43.1	43.5	1.1	30	71	1.06 (30.7)
HPX12-59	12 (3.7)	2682	A	–	–	2	2	44.4	44.8	45.2	0.9	30	71	1.06 (30.7)
HPX15-59	15 (4.6)	2683	A	–	–	2	2	46.1	46.4	46.8	0.8	30	71	1.06 (30.7)

Reference ETSI Document EN300833 for 3 to 60 GHz

Continued on next page

* Multiband antennas are available in this frequency band. See pages 93-94.
** Meets Canadian DOC GL-34 Specification
*** Meets Canadian DOC SRSP 306.4 Issue #3 Specification

Refer to page 71 for Elliptical Waveguide ordering information

*5.925 - 6.425 GHz**

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
HP 	**High Performance Antennas** - Hypalon Radome Included – Single Polarized **Antenna Inputs:** CPR137G and PDR70													
HP6-59	6 (1.8)	4446	A	–	–	2	2	38.2	38.6	39.0	1.8	30	62	1.06 (30.7)
HP8-59	8 (2.4)	4454	A	–	–	2	2	41.1	41.5	41.9	1.4	30	66	1.06 (30.7)
HP10-59	10 (3.0)	4462	A	–	–	2	2	42.6	42.9	43.1	1.1	30	69	1.06 (30.7)
HP12-59	12 (3.7)	4470	A	–	–	2	2	44.7	45.0	45.2	0.9	30	71	1.06 (30.7)
HP15-59	15 (4.6)	4478	A	–	–	2	2	46.2	46.5	46.8	0.8	30	71	1.06 (30.7)
HDX 	**High Performance**, Dual Beam Antennas Dual Polarized - TEGLAR Long Life Radome Included – Dual Polarized **Antenna Inputs:** CPR137G and PDR70													
HDX8-59	8 (2.4)	1750 1751 1752 1753	A	–	–	2/3	2	41.2	41.5	41.8	1.4	26	73	1.06 (30.7)
HDX10-59	10 (3.0)	1758 1759 1760 1761	A	–	–	3	2	42.9	43.2	43.4	1.1	26	74	1.06 (30.7)
HDX12-59	12 (3.7)	1766 1767 1768 1769	A	–	–	3	2	44.6	45.0	45.4	1.0	26	75	1.06 (30.7)
PARX **PAR** 	**Standard Antennas** - Similar to PL()-59 Series, Except Meet Category A – Dual Polarized **Antenna Inputs:** CPR137G and PDR70													
PARX6-59**	6 (1.8)	4377	A	–	–	1	2	37.8	37.9	38.2	1.9	30	60	1.08 (28.3)
PARX8-59**	8 (2.4)	4378	A	–	–	1	2	40.4	40.7	40.9	1.4	30	60	1.08 (28.3)
PARX10-59	10 (3.0)	4379	A	–	–	1	2	42.7	43.1	43.3	1.1	35	60	1.06 (30.7)
PARX12-59	12 (3.7)	4380	A	–	–	1	2	43.3	44.7	45.1	0.9	34	60	1.06 (30.7)
	Standard Antennas - Single Polarized **Antenna Inputs:** CPR137G, PDR70, and UG-343B/U													
PAR6-59**	6 (1.8)	2472	A	–	–	1	2	38.0	38.2	38.4	1.9	30	55	1.06 (30.7)
PAR8-59**	8 (2.4)	2517	A	–	–	1	2	40.4	40.8	41.0	1.4	30	58	1.06 (30.7)
PAR10-59	10 (3.0)	1649	A	–	–	1	2	43.0	43.2	43.4	1.1	30	62	1.06 (30.7)
PAR12-59	12 (3.7)	2366	A	–	–	1	2	44.2	44.6	44.9	0.9	30	63	1.06 (30.7)
PXL **PL** 	**Standard Antennas** – Dual Polarized **Antenna Inputs:** CPR137G, PDR70, and UG-343B/U													
PXL6-59	6 (1.8)	2632	–	–	–	1	2	38.4	38.7	39.1	1.8	30	46	1.07 (29.4)
PXL8-59	8 (2.4)	2616	B	–	–	1	2	40.9	41.3	41.6	1.4	30	48	1.06 (30.7)
PXL10-59	10 (3.0)	2618	B	–	–	–	–	42.7	43.1	43.5	1.1	30	49	1.06 (30.7)
PXL12-59	12 (3.7)	2620	B	–	–	1	2	44.4	44.8	45.2	0.9	30	53	1.06 (30.7)
PXL15-59	15 (4.6)	2642	B	–	–	–	–	46.1	46.4	46.8	0.8	30	54	1.06 (30.7)
	Standard Antennas – Single Polarized **Antenna Inputs:** CPR137G, PDR70, and UG-343B/U													
PL4-59	4 (1.2)	2602	–	–	–	–	–	35.0	35.4	35.7	2.7	30	41	1.08 (28.3)
PL6-59	6 (1.8)	4450	B	–	–	1	2	38.7	39.1	39.5	1.8	30	46	1.06 (30.7)
PL8-59	8 (2.4)	4458	B	–	–	1	2	41.2	41.6	42.0	1.4	30	48	1.06 (30.7)
PL10-59	10 (3.0)	4466	B	–	–	–	–	42.9	43.3	43.6	1.1	30	51	1.06 (30.7)
PL12-59	12 (3.7)	4474	B	–	–	1	2	44.7	45.0	45.2	0.9	30	52	1.06 (30.7)
PL15-59	15 (4.6)	4482	B	–	–	1	2	46.3	46.7	47.7	0.8	30	53	1.06 (30.7)
FPX **FP** 	**Focal Plane Antennas** – Dual Polarized **Antenna Inputs:** CPR137G, PDR70, and UG-343B/U													
FPX8-59	8 (2.4)	6111	–	–	–	–	–	40.1	40.4	40.6	1.4	27	64	1.07 (29.4)
FPX10-59	10 (3.0)	6113	A	–	–	2	2	42.3	42.6	42.7	1.1	28	66	1.06 (30.7)
FPX12-59	12 (3.7)	6115	–	–	–	–	–	44.0	44.4	44.5	0.9	28	68	1.06 (30.7)
	Focal Plane Antennas – Single Polarized **Antenna Inputs:** CPR137G and PDR70													
FP8-59	8 (2.4)	6103	A	–	–	1	2	40.3	40.6	40.8	1.4	28	64	1.06 (30.7)
FP10-59	10 (3.0)	6105	A	–	–	2	2	42.5	42.8	42.9	1.1	28	66	1.04 (34.2)
FP12-59	12 (3.7)	6107	A	–	–	2	2	44.2	44.6	44.7	0.9	28	68	1.04 (34.2)

Reference ETSI Document EN300833 for 3 to 60 GHz

*Multiband antennas are available in this frequency range. See page 93-94. **Uses focal plane type reflector and feed system.

*5.925 - 6.425 GHz**

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance**	Low	Gain, dBi Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
LBX 	**Low Back Lobe Antennas** - Dual Polarized **Antenna Inputs:** CPR137G and PDR70									
LBX6-59* **	6 (1.8)	962	B	38.3	38.7	39.0	1.8	33	54	1.07 (29.4)
LBX8-59* **	8 (2.4)	538-1	B	40.9	41.3	41.6	1.4	33	60	1.06 (30.7)
LBX10-59* **	10 (3.0)	536-3	B	42.6	43.0	43.3	1.1	33	65	1.06 (30.7)
LBX12-59* **	12 (3.7)	537-5	B	44.4	44.8	45.1	0.9	33	62	1.06 (30.7)

5.925 - 7.125 GHz

Antenna Inputs. All antenna VSWR values are specified with CPR and PDR flanges. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 k Pa).

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Low	Gain, dBi Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
UHX **UHP** 	**Ultra High Performance/Wide Band Antennas** – Dual Polarized **Antenna Inputs:** CPR137G and PDR70													
UHX6-59W	6 (1.8)	1022 3303	A	A	–	3	2	37.5	38.8	39.5	1.8	36	67	1.08 (28.3)
UHX8-59W	8 (2.4)	1115 1116	A	A	–	2	2	41.0	41.7	42.3	1.4	36	68	1.08 (28.3)
UHX10-59W	10 (3.0)	1118 1117	A	A	–	2	2	42.5	43.2	43.8	1.2	36	71	1.08 (28.3)
UHX12-59W	12 (3.7)	1119 1120	A	A	–	3	2	44.1	44.8	45.4	1.0	36	74	1.08 (28.3)
	Ultra High Performance/Wide Band Antennas – Single Polarized **Antenna Inputs:** CPR137G and PDR70													
UHP6-59W	6 (1.8)	3492 3494	B	B	–	3	2	38.4	39.3	39.9	1.8	35	75	1.06 (30.7)
UHP8-59W	8 (2.4)	3496 3506	A	A	–	3	2	40.9	41.9	42.2	1.5	35	78	1.06 (30.7)
UHP10-59W	10 (3.0)	3498 3500	A	A	–	3	2	42.4	43.3	43.7	1.3	35	78	1.06 (30.7)
UHP12-59W	12 (3.7)	3502 3508	A	A	-	3	2	44.3	45.2	45.5	1.0	35	80	1.06 (30.7)
HP 	**High Performance/Wide Band Antennas** **Antenna Inputs:** CPR137G and PDR70													
HP6-59W	6 (1.8)	4445	–	–	–	–	–	38.2	39	39.8	1.8	32	66	1.06 (30.7)
HP8-59W	8 (2.4)	4453	B	A	–	2	2	41.0	41.7	42.5	1.5	35	66	1.06 (30.7)
HP10-59W	10 (3.0)	4461	A	A	–	2	2	42.6	43.1	43.8	1.2	33	69	1.06 (30.7)
HP12-59W	12 (3.7)	4469	A	A	–	2	2	44.3	45	45.7	0.9	32	66	1.06 (30.7)
HP15-59W	15 (4.6)	4477	A	A	–	2	2	46.2	46.9	47.6	0.8	30	71	1.06 (30.7)
PARX 	**Standard/Wide Band Antennas** – Dual Polarized **Antenna Inputs:** CPR137G, PDR70, and UG-343B/U.													
PARX6-59W	6 (1.8)	4371	A	A	–	1	2	37.8	38.3	38.7	1.8	30	59	1.12 (24.9)
PARX8-59W	8 (2.4)	4372	A	A	–	1	2	40.4	40.7	40.9	1.6	30	60	1.10 (26.4)
PARX10-59W	10 (3.0)	4373	A	A	–	1	2	42.7	43.3	44.0	1.1	35	60	1.15 (23.1)
PAR 	**Standard/Wide Band Antennas** – Single Polarized **Antenna Inputs:** CPR137G, PDR70, and UG-343B/U.													
PAR6-59W	6 (1.8)	2480	A	A	–	1	2	38.0	38.7	39.0	1.8	30	59	1.08 (28.3)
PAR8-59W	8 (2.4)	2572	A	A	–	1	2	40.4	41.0	41.6	1.4	30	58	1.06 (30.7)
PAR10-59W	10 (3.0)	1279	A	A	–	1	2	43.0	43.4	43.8	1.1	30	62	1.06 (30.7)
PAR12-59W	12 (3.7)	2578	A	A	–	1	2	44.2	44.9	45.7	0.9	30	63	1.06 (30.7)
PL 	**Standard/Wide Band Antennas** – Single Polarized **Antenna Inputs:** CPR137G and PDR70.													
PL6-59W	6 (1.8)	4449	B	B	–	–	–	38.7	39.5	40.2	1.8	35	46	1.06 (30.7)
PL8-59W	8 (2.4)	4457	B	A	–	–	–	41.2	42	42.8	1.4	35	51	1.06 (30.7)
PL10-59W	10 (3.0)	4465	B	B	–	–	–	42.7	45.3	43.9	1	33	55	1.06 (30.7)
PL12-59W	12 (3.7)	4473	B	A	–	1	2	44.6	45.2	45.9	1	33	60	1.06 (30.7)
PL15-59W	15 (4.6)	4481	B	B	–	1	2	46.3	47.0	47.7	0.8	30	57	1.06 (30.7)

Reference ETSI Document EN300833 for 3 to 60 GHz *Multiband antennas are available in this frequency band. See pages 93-94.
**ANATEL Telecommunications Agency, Regulation 1286 Category ***8 lb/in^2 (56 kPa) maximum

Ordering Information for Waveguide Assemblies

Frequency* GHz	Waveguide Type	Flange Type††	Connector† Tunable	Connector† Fixed-Tuned	Pressure Window	Flex-Twist 2 ft (0.6 m)
Super Premium Waveguide Assemblies						**VSWR 1.05 (32.3)****
5.925–6.425	**EWP52S**	CPR159G	**152DET*****	–	**55001-159**	**F159PC0240CA**
		UG-344/U†††	**252DCT*****	–	**55000A-137**	**F137PA0240BA**
		CPR137G	**252DET*****	–	**55001-137**	**F137PC0240CA**
		PDR70	**252DEMT**	–	**223306-70**	**F137MH0600HA**
Premium Waveguide Assemblies						**VSWR 1.06 (30.7)****
5.6–6.2	**EWP52-56**	CPR159G	**152DET**	**152SE**	**55001-159**	**F159PC0240CS**
		UG-344/U†††	**252DCT**	–	**55000A-137**	**F137PA0240BG**
		CPR137G	**252DET**	**252SE**	**55001-137**	**F137PC0240CG**
		PDR70	**252DEMT**	**252SEM**	**223306-70**	**F137MH0600HG**
5.725–6.425	**EWP52-58**	CPR159G	**152DET**	**152SE**	**55001-159**	**F159PC0240CA**
		UG-344/U†††	**252DCT**	–	**55000A-137**	**F137PA0240BD**
		CPR137G	**252DET**	**252SE**	**55001-137**	**F137PC0240CD**
		PDR70	**252DEMT**	**252SEM**	**223306-70**	**F137MH0600HD**
5.925–6.425	**EWP52-59**	CPR159G	**152DET**	**152SE**	**55001-159**	**F159PC0240CA**
		UG-344/U†††	**252DCT**	–	**55000A-137**	**F137PA0240BA**
		CPR137G	**252DET**	**252SE**	**55001-137**	**F137PC0240CA**
		PDR70	**252DEMT**	**252SEM**	**223306-70**	**F137MH0600HA**
5.6-6.425	**EWP52-56W**	CPR159G	–	**152SE**	**55001-159**	**F159PC0240CS**
		CPR137G	–	**252SE**	**55001-137**	**F137PC0240CS**
		PDR70	–	**252SEM**	**223306-70**	**F137MH0600HS**
Standard Waveguide Assemblies			**Non-Tunable**			**VSWR 1.15 (23.1)****
5.60–6.425	**EW52**	CPR159G	**152DE**	**152SE**	**55001-159**	**F159PC0240CS**
		UG-344/U†††	**252DC**	–	**55000A-137**	**F137PA0240BS**
		CPR137G	**252DE**	**252SEM**	**55001-137**	**F137PC0240CS**

* Contact Andrew for information on other frequency bands. ** VSWR max., (R.L., dB). Up to 300 ft (90 m). The indicated maximum VSWR characteristics are guaranteed for factory assemblies and are typical for field assemblies. *** 1.036 (35.0 dB) for lengths 150 ft (46 m) and shorter. † "Tunable" connectors ordered with factory assemblies are factory tuned. †† For detailed information on mating flanges, refer to pages 214-218.
††† Modified cover flange with gasket groove. Mates with UG choke or cover flanges.

Accessories – Photos and detailed descriptions on pages 194-200

Description	Type No.
Hangers and Adapters	
Hanger Kit of 10, Recommended maximum spacing for outdoor installation is 3.5 ft (1.07 m)*	**42396A-8**
NEW! Snap-In Hanger Kit of 10. Recommended spacing for outdoor installation is 3.5 ft (1.07 m)	**EWSH-52**
Hardware Kit of 10, 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Angle Adapter Kit of 10. Stainless steel	**31768A**
Angle Adapter Kit of 10. Galvanized	
3/8" Hardware	**242774**
Metric Hardware	**242774-M**
Round Member Adapter Kit of 10. Stainless steel	
Member Diameter, in (mm)	
1-2 (25-50)	**31670-1**
2-3 (50-75)	**31670-2**
3-4 (75-100)	**31670-3**
4-5 (100-125)	**31670-4**
5-6 (125-150)	**31670-5**
45° Adapter Kit of 10. Galvanized steel	**42334**
Threaded Rod Support, 3/8" rod, nuts, washers, ceiling bracket	
12 in (305 mm) long, kit of 1	**31771**
12 in (305 mm) long, kit of 5	**31771-4**
24 in (610 mm) long, kit of 1	**31771-9**
24 in (610 mm) long, kit of 5	**31771-6**
Tower Standoff Kit of 10. 1 in (25 mm) standoff	
Member Diameter, in (mm)	
0.75-1.5 (20-40)	**30848-5**
1.5-3.0 (40-75)	**30848-4**
3-4 (75-100)	**30848-1**
4-5 (100-125)	**30848-2**
5-6 (125-150)	**30848-3**

* Standard conditions: 125 mph (200 km/h) survival wind velocity, 0.5 in (13 mm) radial ice. For other conditions see page 196.

Description	Type No.
Tower Standoff Kit of 10. 2.5 in (60 mm) standoff	
Member Diameter, in (mm)	
3-4 (75-100)	**41108A-1**
4-5 (100-125)	**41108A-2**
5-6 (125-150)	**41108A-3**
Other Accessories	
Flaring Tool Kit for connector attachment	**EWFTK-52**
Splice	**152DZ**
Grounding Kit with factory attached, one-hole lug	**204989-4**
Grounding Kit with factory attached, two-hole lug	**241088-4**
Grounding Kit with field attachable crimp-on, one-hole lug	**204989-24**
Grounding Kit with field attachable crimp-on, two-hole lug	**241088-9**
Grounding Kit with field attachable screw-on lug	**204989-34**
Crimping Tool to field attach lug to Grounding Kit	**207270**
Hoisting Grip	**24312A**
Bending Tool Kit. One each E and H Plane tool	**33586-7**
Connector Reattachment Kit	**33544-38**
Wall-Roof Feed Thru	**245314-52**
Waveguide Boot for Plates (below),	
4 in (102 mm) dia.	**WGB4-52**
5 in (127 mm) dia	**WGB5-52**

Feed-Thru Plate for Boots (above)

Openings	For 4 in Boots	For 5 in Boots
1	**204673-1**	**48940-1**
1	**204673-2**	–
2	–	**48940-2**
3	–	**48940-3**
4	**204673-4**	**48940-4**
6	–	**48940-6**
8	**204673-8**	–

Refer to page 75 for Elliptical Waveguide ordering information

6.425 - 7.125 GHz, Dual Beam Antennas

Antenna Inputs. All antenna VSWR values are specified with CPR flange. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa).

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
HDH **HDV** 	**High Performance Dual-Beam (Angle Diversity) Antennas** - Hypalon Radome Included – Horizontal Polarization **Antenna Input:** CPR137G													
HDH6-65	6 (1.8)	1884 1885	B	B	–	–	–	39.4	39.7	40.0	1.9	30	60	1.08 (28.3)
HDH8-65	8 (2.4)	1893 1892	B	A	–	–	–	42.1	42.4	42.7	1.5	30	65	1.06 (30.7)
HDH10-65	10 (3.0)	1900 1901	B	A	–	–	–	43.6	43.9	44.2	1.2	26	66	1.06 (30.7)
HDH12-65	12 (3.7)	1908 1909	A	A	–	–	–	45.0	45.3	45.6	0.9	30	70	1.06 (30.7)
	High Performance Dual-Beam (Angle Diversity) Antennas - Hypalon Radome Included – Vertical Polarization **Antenna Input:** CPR137G													
HDV6-65	6 (1.8)	1880 1881	B	B	–	–	–	39.4	39.7	40.0	1.9	29	65	1.08 (28.3)
HDV8-65	8 (2.4)	1888 1889	B	A	–	–	–	42.1	42.4	42.7	1.5	30	62	1.06 (30.7)
HDV10-65	10 (3.0)	1896 1897	B	A	–	–	–	43.6	43.9	44.2	1.2	30	66	1.06 (30.7)
HDV12-65	12 (3.7)	1904 1905	A	A	–	–	–	45.0	45.3	45.6	0.9	30	67	1.06 (30.7)
PDH **PDV** 	**Standard, Dual-Beam (Angle Diversity) Antennas** – Horizontal Polarization **Antenna Input:** CPR137G													
PDH6-65	6 (1.8)	1778 1779	–	–	–	–	–	39.4	39.7	40.0	1.9	30	46	1.08 (28.3)
PDH8-65	8 (2.4)	1786 1787	B	B	–	–	–	42.1	42.4	42.7	1.5	30	55	1.06 (30.7)
PDH10-65	10 (3.0)	1794 1795	B	A	–	–	–	43.6	43.9	44.2	1.2	30	60	1.06 (30.7)
PDH12-65	12 (3.7)	1743 1744	A	A	–	–	–	45.0	45.3	45.6	0.9	30	53	1.06 (30.7)
	Standard, Dual-Beam (Angle Diversity) Antennas – Vertical Polarization **Antenna Input:** CPR137G													
PDV6-65	6 (1.8)	1774 1775	–	–	–	–	–	39.4	39.7	40.0	1.9	29	54	1.08 (28.3)
PDV8-65	8 (2.4)	1782 1783	B	B	–	–	–	42.1	42.4	42.7	1.5	30	55	1.06 (30.7)
PDV10-65	10 (3.0)	1790 1791	B	A	–	–	–	43.6	43.9	44.2	1.2	30	60	1.06 (30.7)
PDV12-65	12 (3.7)	1739 1740	A	A	–	–	–	45.0	45.3	45.6	0.9	30	60	1.06 (30.7)
	Standard, Dual-Beam (Angle Diversity) Antennas – Vertical/Horizontal, Sum and Difference Mode **Antenna Input:** CPR137G													
PDH8S-65	8 (2.4)	1788 1789	–	–	–	–	–	40.0	39.8	39.8	1.3	30	51	1.08 (28.3)
PDV8S-65	8 (2.4)	1784 1785	–	–	–	–	–	40.0	39.8	39.8	1.3	30	57	1.06 (30.7)

Reference ETSI Document EN300833 for 3 to 60 GHz

Refer to page 75 for Elliptical Waveguide ordering information

*6.425 - 7.125 GHz**

Antenna Inputs. All antenna VSWR values are specified with CPR and PDR flanges. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa).

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
UHX 	**Ultra High Performance Antennas** - TEGLAR Long Life Radome Included – Dual Polarized **Antenna Inputs:** CPR137G and PDR70													
UHX6-65	6 (1.8)	1717 1718	A	A	–	3	2	39.1	39.5	40.0	1.7	30	70	1.06 (30.7)
UHX8-65	8 (2.4)	2581 2584	A	A	–	3	2	41.6	42.0	42.4	1.3	30	76	1.06 (30.7)
UHX10-65	10 (3.0)	2582 2583	A	A	–	3	2	43.6	44.0	44.4	1.0	32	80	1.06 (30.7)
UHX12-65	12 (3.7)	1715 1716	A	A	–	3	2	45.2	45.7	46.1	0.9	38	78	1.06 (30.7)
UHX15-65	15 (4.6)	1709 1710	A	A	–	2	2	46.6	46.9	47.3	0.7	30	75	1.06 (30.7)
HSX 	**High Performance Antennas** – Dual Polarized **Antenna Inputs:** CPR137G and PDR70													
HSX6-64	6 (1.8)	2454 2452	A	A	–	3	2	39.1	39.6	40.0	1.7	40	70	1.07 (29.4)
HSX8-64	8 (2.4)	2456 2458	A	A	–	3	2	41.6	42.0	42.4	1.3	40	75	1.06 (30.7)
HSX10-64	10 (3.0)	2461 2459	A	A	–	3	2	43.2	43.6	44.0	1.0	40	77	1.06 (30.7)
HSX12-64	12 (3.7)	2470 2471	A	A	–	3	2	45.2	45.7	46.1	0.8	40	78	1.06 (30.7)
HSX15-64	15 (4.6)	2488 2486	A	A	–	3	2	46.9	47.4	47.8	0.7	40	79	1.06 (30.7)
HPX 	**High Performance Antennas** – Dual Polarized **Antenna Inputs:** CPR137G and PDR70													
HPX4-65	4 (1.2)	2649	–	–	–	1	2	35.4	35.9	36.3	2.7	30	58	1.08 (28.3)
HPX6-65	6 (1.8)	2794	B	B	–	2	2	39.1	39.5	39.9	1.7	30	64	1.07 (29.4)
HPX8-65	8 (2.4)	2654	A	A	–	2	2	41.6	42.0	42.4	1.3	34	68	1.06 (30.7)
HPX10-65	10 (3.0)	2655	A	A	–	3	2	43.6	44.0	44.4	1.0	34	70	1.06 (30.7)
HPX12-65	12 (3.7)	2656	A	A	–	2	2	45.0	45.4	45.9	0.8	30	71	1.06 (30.7)
HPX15-65	15 (4.6)	2657	A	A	–	2	2	46.6	46.9	47.3	0.7	30	71	1.06 (30.7)
	High Performance Antennas – Single Polarized **Antenna Inputs:** CPR137G and PDR70													
HP4-65	4 (1.2)	1081	–	–	–	2	2	35.5	36.0	36.4	2.7	30	58	1.08 (28.3)
HP6-65	6 (1.8)	4447	B	B	–	–	–	39.0	39.5	39.8	1.7	30	64	1.06 (30.7)
HP8-65	8 (2.4)	4455	A	A	–	2	2	41.9	42.3	42.8	1.3	30	66	1.06 (30.7)
HP10-65	10 (3.0)	4463	A	–	–	2	2	43.1	43.4	43.8	1.0	27	70	1.06 (30.7)
HP12-65	12 (3.7)	4471	A	A	–	2	2	45.2	45.6	46.1	0.8	30	71	1.06 (30.7)
HP15-65	15 (4.6)	4479	A	A	–	2	2	46.8	47.2	47.6	0.7	30	71	1.06 (30.7)
PARX **PAR** 	**Standard Antennas** – Dual Polarized **Antenna Inputs:** CPR137G, PDR70, and UG-343B/U													
PARX6-65	6 (1.8)	4381	A	A	–	1	2	38.2	38.4	38.7	1.8	30	59	1.08 (28.3)
PARX8-65	8 (2.4)	4382	A	A	–	1	2	40.9	41.2	41.3	1.3	30	60	1.08 (28.3)
PARX10-65	10 (3.0)	4383	A	A	–	1	2	43.3	43.6	44.0	1.1	35	60	1.06 (30.7)
PARX12-65	12 (3.7)	4384	A	A	–	1	2	45.1	45.5	45.9	0.9	35	60	1.06 (30.7)
	Standard Antennas – Single Polarized **Antenna Inputs:** CPR137G, PDR70, and UG-343B/U													
PAR6-65	6 (1.8)	1290	A	B	–	2	2	38.7	38.8	39.0	1.8	30	59	1.06 (30.7)
PAR8-65	8 (2.4)	2570	A	A	–	1	2	41.0	40.8	41.0	1.3	30	60	1.06 (30.7)
PAR10-65	10 (3.0)	1257	A	A	–	1	2	43.4	43.6	43.8	1.0	30	63	1.06 (30.7)
PAR12-65	12 (3.7)	2430	A	A	–	1	2	44.9	45.3	45.5	0.8	30	64	1.06 (30.7)

Reference ETSI Document EN300833 for 3 to 60 GHz

Continued on next page

* Multiband antennas available in this frequency band. See pages 93-94.

*6.425 - 7.125 GHz**

Antenna Inputs. All antenna VSWR values are specified with CPR and PDR flanges. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa), except LBX Series 8 lb/in^2 (56 kPa).

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
PXL PL 		**Standard Antennas** – Dual Polarized **Antenna Input:** CPR137G, PDR70, and UG-343B/U												
PXL6-65	6 (1.8)	2634	B	B	–	–	–	39.1	39.4	39.9	1.7	30	47	1.07 (29.41)
PXL8-65	8 (2.4)	2636	B	B	–	–	–	41.6	42.0	42.4	1.3	34	52	1.06 (30.7)
PXL10-65	10 (3.0)	2683	A	A	–	1	2	43.6	44.0	44.4	1.0	34	58	1.06 (30.7)
PXL12-65	12 (3.7)	2641	A	A	–	1	2	45.0	45.4	45.9	0.8	30	62	1.06 (30.7)
PXL15-65	15 (4.6)	2640	B	B	–	–	–	46.6	46.9	47.3	0.7	30	59	1.06 (30.7)
		Standard Antennas – Single Polarized **Antenna Input:** CPR137G, PDR70, and UG-343B/U												
PL4-65	4 (1.2)	2622	B	–	–	–	–	35.8	36.3	36.7	2.5	30	43	1.08 (28.3)
PL6-65	6 (1.8)	4451	B	B	–	–	–	39.5	39.9	40.2	1.7	30	47	1.06 (30.7)
PL8-65	8 (2.4)	4459	B	B	–	–	–	42.0	42.4	42.8	1.3	30	49	1.06 (30.7)
PL10-65	10 (3.0)	4467	B	A	–	–	–	43.6	43.9	44.3	1.0	30	52	1.06 (30.7)
PL12-65	12 (3.7)	4475	B	–	–	1	2	45.2	45.6	46.1	0.8	30	53	1.06 (30.7)
PL15-65	15 (4.6)	4483	B	B	–	1	2	47.0	47.4	47.7	0.7	30	54	1.06 (30.7)
FPX FP 		**Focal Plane Antennas** – Dual Polarized **Antenna Input:** CPR137G and PDR70												
FPX6-64	6 (1.8)	6126	B	A	–	1	2	38.0	38.4	38.6	1.8	28	57	1.08 (28.3)
FPX8-64	8 (2.4)	6127	A	A	–	2	2	40.8	41.2	41.4	1.3	30	64	1.07 (29.4)
FPX10-64	10 (3.0)	6129	A	A	–	2	2	43.0	42.4	42.8	1.0	30	66	1.06 (30.7)
FPX12-64	12 (3.7)	6131	A	A	–	2	2	44.8	45.2	45.4	0.8	30	68	1.06 (30.7)
		Focal Plane Antennas – Single Polarized **Antenna Input:** CPR137G and PDR70												
FP6-64	6 (1.8)	6117	A	A	–	1	2	38.2	38.6	38.8	1.8	28	57	1.07 (29.4)
FP8-64	8 (2.4)	6119	A	A	–	2	2	41.1	41.5	41.8	1.3	30	64	1.06 (30.7)
FP10-64	10 (3.0)	6122	A	B	–	1	2	43.2	43.4	43.6	1.0	27	66	1.04 (34.2)
FP12-64	12 (3.7)	6123	A	A	–	2	2	44.9	45.3	45.5	0.8	30	68	1.04 (34.2)
LBX 		**Low Back Lobe Antennas** – Dual Polarized **Antenna Input:** CPR137G												
		Regulatory Compliance* **												
LBX6-65**	6 (1.8)	834-2	–	–	B	–	–	39.1	39.6	40.0	1.7	33	54	1.07 (30.7)
LBX8-65**	8 (2.4)	825-3	–	–	B	–	–	41.5	42.0	42.4	1.3	33	60	1.06 (30.7)
LBX10-65**	10 (3.0)	826-1	–	–	B	–	–	43.1	43.6	44.0	1.0	33	65	1.06 (30.7)
LBX12-65**	12 (3.7)	827-1	–	–	B	–	–	44.8	45.3	45.7	0.8	33	63	1.06 (30.7)

Reference ETSI Document EN300833 for 3 to 60 GHz
*Multiband antennas available in this frequency band. See pages 93-94.
**8 lb/in2 (56 kPa) maximum
***ANATEL Brazilian Telecommunications Agency, Regulation 1286 Category

6.875-7.125 GHz, See PAR6-65

Ordering Information for Waveguide Assemblies

Frequency* GHz	Waveguide Type	Flange Type††	Connector† Tunable	Fixed-Tuned	Pressure Window	Flex-Twist 2 ft (0.6 m)
Super Premium Waveguide Assemblies						**VSWR 1.05 (32.3)****
6.425–7.125	**EWP63S**	UG-344/U†††	**163DCT**	–	**55000A-137**	**F137PA0240BB**
		CPR137G	**163DET**	–	**55001-137**	**F137PC0240CB**
		PDR70	–	**163SEM**	**223306-70**	**F137MH0600HB**
Premium Waveguide Assemblies						**VSWR 1.06 (30.7)****
5.925–6.575	**EWP63-59**	UG-344/U†††	**163DCT**	–	**55000A-137**	**F137PA0240BA*****
		CPR137G	**163DET**	**163SE**	**55001-137**	**F137PC0240CA*****
		PDR70	–	**163SEM**	**223306-70**	**F137MH0600HA*****
5.800–7.125	**EWP63-59W**	UG-344/U†††	**163DCT**	–	**55000A-137**	**F137PA0240BA*****
		CPR137G	**163DET**	**163SE**	**55001-137**	**F137PC0240CA*****
		PDR70	–	**163SEM**	**223306-70**	**F137MH0600HA*****
						VSWR 1.05 (32.3)*
6.525–6.875	**EWP63-65N**	UG-344/U†††	**163DCT**	–	**55000A-137**	**F137PA0240BB**
		CPR137G	**163DET**	**163SE**	**55001-137**	**F137PC0240CB**
		PDR70	–	**163SEM**	**223306-70**	**F137MH0600HB**
						VSWR 1.06 (30.7)**
6.425–7.125	**EWP63-65**	UG-344/U†††	**163DCT**	–	**55000A-137**	**F137PA0240BB**
		CPR137G	**163DET**	**163SE**	**55001-137**	**F137PC0240CB**
		PDR70	–	**163SEM**	**223306-70**	**F137MH0600HB**
Standard Waveguide Assemblies			**Non-Tunable**			**VSWR 1.15 (23.1)****
5.925–7.125	**EW63**	UG-344/U†††	**163DC**	–	**55000A-137**	**F137PA0240BS**
		CPR137G	**163DE**	**163SE**	**55001-137**	**F137PC0240CB**
		PDR70	–	**163SEM**	**223306-70**	**F137MH0600HS**

* Contact Andrew for information on other frequency bands. ** VSWR max., (R.L., dB). Up to 300 ft (90 m). The indicated maximum VSWR characteristics are guaranteed for factory assemblies and are typical for field assemblies. *** Low VSWR guaranteed for 5.925 to 6.425 GHz, nominal for 5.925 to 6.575 GHz.
† "Tunable" connectors ordered with factory assemblies are factory tuned. †† For detailed information on mating flanges, refer to pages 214-218. ††† Modified cover flange with gasket groove. Mates with UG choke or cover flanges.

Accessories – Photos and detailed descriptions on pages 194-200

Description	Type No.
Hangers and Adapters	
Hanger Kit of 10, Recommended maximum spacing for outdoor installation is 3 ft (0.91 m)*	**42396A-7**
NEW! Snap-In Hanger Kit of 10. Recommended spacing for outdoor installation is 3.5 ft (1.07 m)	**EWSH-63**
Hardware Kit of 10, 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Angle Adapter Kit of 10. Stainless steel	**31768A**
Angle Adapter Kit of 10. Galvanized	
3/8" Hardware	**242774**
Metric Hardware	**242774-M**
Round Member Adapter Kit of 10. Stainless steel	
Member Diameter, in (mm)	
1-2 (25-50)	**31670-1**
2-3 (50-75)	**31670-2**
3-4 (75-100)	**31670-3**
4-5 (100-125)	**31670-4**
5-6 (125-150)	**31670-5**
45° Adapter Kit of 10. Galvanized steel	**42334**
Threaded Rod Support, 3/8" rod, nuts, washers, ceiling bracket	
12 in (305 mm) long, kit of 1	**31771**
12 in (305 mm) long, kit of 5	**31771-4**
24 in (610 mm) long, kit of 1	**31771-9**
24 in (610 mm) long, kit of 5	**31771-6**
Tower Standoff Kit of 10. 1 in (25 mm) standoff	
Member Diameter, in (mm)	
0.75-1.5 (20-40)	**30848-5**
1.5-3.0 (40-75)	**30848-4**
3-4 (75-100)	**30848-1**
4-5 (100-125)	**30848-2**
5-6 (125-150)	**30848-3**

* Standard conditions: 125 mph (200 km/h) survival wind velocity, 0.5 in (13 mm) radial ice. For other conditions see page 196.

Description	Type No.
Tower Standoff Kit of 10. 2.5 in (60 mm) standoff	
Member Diameter, in (mm)	
3-4 (75-100)	**41108A-1**
4-5 (100-125)	**41108A-2**
5-6 (125-150)	**41108A-3**
Other Accessories	
Flaring Tool Kit for connector attachment	**EWFTK-63**
Splice	**163DZ**
Grounding Kit with factory attached, one-hole lug	**204989-4**
Grounding Kit with factory attached, two-hole lug	**241088-4**
Grounding Kit with field attachable crimp-on, one-hole lug	**204989-24**
Grounding Kit with field attachable crimp-on, two-hole lug	**241088-9**
Grounding Kit with field attachable screw-on lug	**204989-34**
Crimping Tool to field attach lug to Grounding Kit	**207270**
Hoisting Grip	**24312A**
Bending Tool Kit. One each E and H Plane tool	**33586-8**
Connector Reattachment Kit	**33544-33**
Wall-Roof Feed Thru	**245314-63**
Waveguide Boot for Plates (below),	
4 in (102 mm) dia.	**WGB4-63**
5 in (127 mm) dia	**WGB5-63**

Feed-Thru Plate for Boots (above)

Openings	For 4 in Boots	For 5 in Boots
1	**204673-1**	**48940-1**
1	**204673-2**	–
2	–	**48940-2**
3	–	**48940-3**
4	**204673-4**	**48940-4**
6	–	**48940-6**
8	**204673-8**	–

7.125 - 7.750 GHz

Antenna Inputs. All antenna VSWR values are specified with CPR and PDR flanges. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa).
ValuLine® Antennas. See page 127.

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
HPX HP 	**High Performance Antennas** – Dual Polarized **Antenna Inputs:** CPR137G, PDR70, and UG-343B/U													
HPX4-70	4 (1.2)	2862	–	–	–	2	2	36.0	36.4	36.7	2.3	26	61	1.08 (28.3)
HPX6-70	6 (1.8)	2816	–	A	–	2	2	40.0	40.4	40.7	1.5	25	65	1.07 (29.4)
HPX8-70	8 (2.4)	2826	–	–	–	2	2	42.4	42.9	43.2	1.1	30	67	1.06 (30.7)
HPX10-70	10 (3.0)	2754	–	A	–	2	2	44.5	44.8	45.0	0.9	30	70	1.06 (30.7)
HPX12-70	12 (3.7)	2758	–	A	–	–	–	45.7	46.1	46.4	0.8	28	71	1.06 (30.7)
HPX15-70	15 (4.6)	2782	–	A	–	2	2	47.3	47.7	48.0	0.7	32	72	1.06 (30.7)
	High Performance Antennas – Single Polarized **Antenna Inputs:** CPR137G, PDR70, and UG-343B/U													
HP6-70	6 (1.8)	2796	–	A	–	2	2	40.1	40.5	40.9	1.5	28	65	1.06 (30.7)
HP8-70	8 (2.4)	2751	–	A	–	2	2	42.6	43.0	43.3	1.1	30	67	1.06 (30.7)
HP10-70	10 (3.0)	2753	–	A	–	2	2	44.3	44.7	45.0	0.9	30	70	1.06 (30.7)
HP12-70	12 (3.7)	2756	–	A	–	2	2	46.3	46.7	47.1	0.7	30	71	1.06 (30.7)
HP15-70	15 (4.6)	2757	–	A	–	–	–	47.4	48.1	48.4	0.6	30	71	1.06 (30.7)
PXL PL 	**Standard Antennas** – Dual Polarized **Antenna Inputs:** CPR137G, PDR70, and UG-343B/U													
PXL6-70	6 (1.8)	2740	–	B	–	–	–	40.0	40.4	40.7	1.5	30	48	1.07 (29.4)
PXL8-70	8 (2.4)	2828	–	–	–	1	2	42.4	42.9	43.2	1.1	30	50	1.06 (30.7)
PXL10-70	10 (3.0)	2663	–	A	–	–	–	44.5	44.8	45.0	0.9	30	52	1.06 (30.7)
PXL12-70	12 (3.7)	2752	–	A	–	–	–	45.7	46.1	46.4	0.7	30	54	1.06 (30.7)
	Standard Antennas – Single Polarized **Antenna Inputs:** CPR137G, PDR70, and UG-343B/U													
PL4-70	4 (1.2)	2736	–	–	–	1	2	36.7	37.0	37.3	2.2	30	46	1.06 (30.7)
PL6-70	6 (1.8)	2658	–	B	–	–	–	40.1	40.5	40.9	1.5	30	48	1.06 (30.7)
PL8-70	8 (2.4)	2659	–	B	–	1	2	42.6	43.0	43.3	1.1	30	50	1.06 (30.7)
PL10-70	10 (3.0)	2660	–	A	–	1	2	44.3	44.7	45.0	0.9	30	52	1.06 (30.7)
PL12-70	12 (3.7)	2662	–	B	–	1	2	46.3	46.7	47.1	0.7	30	54	1.06 (30.7)
PL15-70	15 (4.6)	2745	–	B	–	–	–	47.7	48.1	48.4	0.6	30	55	1.06 (30.7)

7.125 - 7.750 GHz

Antenna Inputs. All antenna VSWR values are specified with CPR and PDR flanges. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa).
ValuLine Antennas. See page 127.

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
HSX 	**High Performance Antennas** - Super High Cross Polarization Discrimination – Dual Polarization **Antenna Inputs:** CPR112G, PDR84, and UG-52B/U													
HSX4-71	4 (1.2)	1548 1543	–	B	–	3	2	36.4	36.7	37.0	2.3	40	64	1.08 (28.3)
HSX6-71	6 (1.8)	1550 1554	–	A	–	3	2	40.0	40.3	40.6	1.5	40	72	1.08 (28.3)
HSX8-71	8 (2.4)	1556 1566	–	A	–	3	2	42.3	42.6	42.9	1.2	40	73	1.06 (30.7)
HSX10-71	10 (3.0)	1624 1622	–	A	–	3	2	43.9	44.2	44.4	1.0	40	75	1.06 (30.7)
HSX12-71	12 (3.7)	1626 1628	–	A	–	3	2	46.1	46.5	46.9	0.8	40	78	1.06 (30.7)
HSX15-71	15 (4.6)	1852 1858	–	A	–	3	2	47.7	48.1	48.5	0.6	40	78	1.06 (30.7)

Reference ETSI Document EN300833 for 3 to 60 GHz

Continued on next page

Refer to page 78 for Elliptical Waveguide ordering information

7.125 - 7.750 GHz

Antenna Inputs. All antenna VSWR values are specified with CPR and PDR flanges. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa) except LBX Series 8 lb/in^2 (56 kPa).
ValuLine® Antennas. See page 127.

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
HPX HP 	**High Performance Antennas** – Dual Polarization **Antenna Inputs:** CPR112G and PDR84													
HPX6-71	6 (1.8)	3771	–	B	–	2	2	39.5	39.9	40.2	1.6	30	66	1.06 (30.7)
HPX8-71	8 (2.4)	2775	–	A	–	2	2	42.1	42.5	42.8	0.9	30	67	1.06 (30.7)
	High Performance Antennas – Single Polarized **Antenna Inputs:** CPR112G, PDR84, and UG-52B/U													
HP4-71	4 (1.2)	2866	–		–	1	2	35.8	36.2	36.5	2.4	28	62	1.08 (28.3)
HP6-71	6 (1.8)	2800	–		–	2	2	39.7	40.0	40.3	1.5	30	66	1.06 (30.7)
HP8-71	8 (2.4)	2770	–	A	–	–	–	42.3	42.5	42.9	1.1	30	68	1.06 (30.7)
HP10-71	10 (3.0)	2772	–	A	–	3	2	44.1	44.5	44.8	0.9	28	70	1.06 (30.7)
HP12-71	12 (3.7)	2774	–	A	–	3	2	45.6	46.0	46.3	0.7	30	71	1.06 (30.7)
HP15-71	15 (4.6)	2783	–	–	–	2	2	47.5	47.8	48.2	0.6	30	71	1.06 (30.7)
PL 	**Standard Antennas** – Single Polarized Low VSWR **Antenna Inputs:** CPR112G, PDR84, and UG-52B/U													
PL4-71	4 (1.2)	3718	–	–	–	1	2	36.2	36.5	36.8	2.2	30	45	1.10 (26.4)
PL6-71	6 (1.8)	2704	–	B	–	1	2	39.7	40.0	40.3	1.5	30	48	1.06 (30.7)
PL8-71	8 (2.4)	2700	–	B	–	1	2	42.3	42.5	42.9	1.1	30	50	1.06 (30.7)
PL10-71	10 (3.0)	2699	–	A	–	1	2	44.1	44.5	44.8	0.9	30	52	1.06 (30.7)
PL12-71	12 (3.7)	3710	–	B	–	1	2	45.6	46.0	46.3	0.7	30	54	1.06 (30.7)
PL15-71	15 (4.6)	2726	–	B	–	1	2	47.5	47.8	48.2	0.6	30	57	1.06 (30.7)
FPX FP 	**Focal Plane Antennas** – Dual Polarized **Antenna Input:** PDR70													
FPX6-71	6 (1.8)	6141	–	–	–	1	2	38.8	39.2	39.5	1.5	25	58	1.08 (28.3)
FPX8-71	8 (2.4)	6143	–	A	–	2	2	41.8	42.1	42.3	1.1	26	65	1.07 (29.4)
FPX10-71	10 (3.0)	6145	–	A	–	2	2	43.9	44.2	44.3	0.9	26	67	1.06 (30.7)
FPX12-71	12 (3.7)	6147	–	A	–	2	2	45.5	45.9	46.0	0.7	28	69	1.06 (30.7)
	Focal Plane Antennas – Single Polarized **Antenna Input:** PDR70													
FP4-71	4 (1.2)	6132	–	–	–	1	2	34.9	35.2	35.4	2.2	25	52	1.10 (26.4)
FP6-71	6 (1.8)	6133	–	–	–	1	2	38.8	39.2	39.5	1.5	25	58	1.07 (29.4)
FP8-71	8 (2.4)	6135	–	A	–	2	2	42.0	42.3	42.4	1.1	26	65	1.06 (30.7)
FP10-71	10 (3.0)	6137	–	A	–	2	2	44.1	44.4	44.5	0.9	26	67	1.04 (34.2)
FP12-71	12 (3.7)	6139	–	A	–	2	2	45.7	46.1	46.2	0.7	28	69	1.04 (34.2)
LBX 	**Low Back Lobe Antennas** – Dual Polarized **Antenna Inputs:** CPR137G and PDR70													
			Regulatory Compliance**											
LBX6-71*	6 (1.8)	814-1	–	–	B	–	–	40.0	40.4	40.7	1.5	33	55	1.07 (29.4)
LBX8-71*	8 (2.4)	523-2	–	–	B	–	–	42.5	42.9	43.2	1.1	33	60	1.06 (30.7)
LBX10-71*	10 (3.0)	815-1	–	–	B	–	–	44.4	44.8	45.1	0.9	33	66	1.06 (30.7)
LBX12-71*	12 (3.7)	527-2	–	–	B	–	–	45.7	46.1	46.4	0.7	33	64	1.06 (30.7)

Reference ETSI Document EN300833 for 3 to 60 GHz
*8 lb/in^2 (56 kPa) maximum **ANATEL Brazilian Telecommunications Agency, Regulation 1286 Category

Ordering Information for Waveguide Assemblies

Frequency* GHz	Waveguide Type	Flange Type††	Connector† Tunable	Connector† Fixed-Tuned	Pressure Window	Flex-Twist 2 ft (0.6 m)
Premium Waveguide Assemblies						**VSWR 1.06 (30.7)****
7.125-7.750	**EWP64-71**	UG-344/U†††	**164DCT**	**164SC**	**55000A-137**	**F137PA0240BC**
		CPR137G	**164DET**	**164SE**	**55001-137**	**F137PC0240CC**
		CPR112G	**264DET**	**264SCM**	**55001-112**	**F112PC0240CA**
		PDR70	–	**164SEM**	**223306-70**	**F137MH0600HC**
		PDR84	–	**264SEM**	–	**F112MH0600HA**
6.425-7.125	**EWP64-65**	UG-344/U†††	**164DCT**	**164SC**	**55000A-137**	**F137PA0240BB**
		CPR137G	**164DET**	**164SE**	**55001-137**	**F137PC0240CB**
		PDR70	–	**164SEM**	**223306-70**	**F137MH0600HB**
		PAR70	–	**164SCM**	–	**F137MP0600PB**
6.525-6.875	**EWP64-65N**	UG-344/U†††	**164DCT**	**164SC**	**55000A-137**	**F137PA0240BB**
		CPR137G	**164DET**	**164SE**	**55001-137**	**F137PC0240CB**
		PDR70	–	**164SEM**	**223306-70**	**F137MH0600HB**
		PAR70	–	**164SCM**	–	**F137MP0600PB**
Standard Waveguide Assemblies						**VSWR 1.15 (23.1)****
6.425-7.750	**EW64**	UG-344/U†††	**164DC**	–	**55000A-137**	**F137PA0240BS**
		CPR137G	**164DE**	**164SE**	**55001-137**	**F137PC0240CS**
		PDR70	–	**164SEM**	**223306-70**	**F137MH0600HS**
7.125-7.750	**EW64**	CPR112G	**264DE**	**264SE**	**55001-112**	**F112PC0240CC**
		PDR84	–	**264SEM**	–	**F112MH0600HC**

* Contact Andrew for information on other frequency bands. ** VSWR max., (R.L., dB). Up to 300 ft (90 m). The indicated maximum VSWR characteristics are guaranteed for factory assemblies and are typical for field assemblies. † "Tunable" connectors ordered with factory assemblies are factory tuned. †† For detailed information on mating flanges, refer to pages 214-218. ††† Modified cover flange with gasket groove. Mates with UG choke or cover flanges.

Accessories – Photos and detailed descriptions on pages 194-200

Description	Type No.
Hangers and Adapters	
Hanger Kit of 10, Recommended maximum spacing for outdoor installation is 3.5 ft (1.07 m)*	**42396A-1**
NEW! Snap-In Hanger Kit of 10. Recommended spacing for outdoor installation is 3.5 ft (1.07 m)	**EWSH-64**
Hardware Kit of 10, 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Angle Adapter Kit of 10. Stainless steel	**31768A**
Angle Adapter Kit of 10. Galvanized	
3/8" Hardware	**242774**
Metric Hardware	**242774-M**
Round Member Adapter Kit of 10. Stainless steel Member Diameter, in (mm)	
1-2 (25-50)	**31670-1**
2-3 (50-75)	**31670-2**
3-4 (75-100)	**31670-3**
4-5 (100-125)	**31670-4**
5-6 (125-150)	**31670-5**
45° Adapter Kit of 10. Galvanized steel	**42334**
Threaded Rod Support, 3/8" rod, nuts, washers, ceiling bracket	
12 in (305 mm) long, kit of 1	**31771**
12 in (305 mm) long, kit of 5	**31771-4**
24 in (610 mm) long, kit of 1	**31771-9**
24 in (610 mm) long, kit of 5	**31771-6**
Tower Standoff Kit of 10. 1 in (25 mm) standoff Member Diameter, in (mm)	
0.75-1.5 (20-40)	**30848-5**
1.5-3.0 (40-75)	**30848-4**
3-4 (75-100)	**30848-1**
4-5 (100-125)	**30848-2**
5-6 (125-150)	**30848-3**

* Standard conditions: 125 mph (200 km/h) survival wind velocity, 0.5 in (13 mm) radial ice. For other conditions see page 196.

Description	Type No.
Tower Standoff Kit of 10. 2.5 in (60 mm) standoff Member Diameter, in (mm)	
3-4 (75-100)	**41108A-1**
4-5 (100-125)	**41108A-2**
5-6 (125-150)	**41108A-3**
Other Accessories	
Flaring Tool Kit for connector attachment	**202358**
Splice	**164DZ**
Grounding Kit with factory attached, one-hole lug	**204989-3**
Grounding Kit with factory attached, two-hole lug	**241088-3**
Grounding Kit with field attachable crimp-on, one-hole lug	**204989-23**
Grounding Kit with field attachable crimp-on, two-hole lug	**241088-8**
Grounding Kit with field attachable screw-on lug	**204989-33**
Crimping Tool to field attach lug to Grounding Kit	**207270**
Hoisting Grip	**29961**
Bending Tool Kit. One each E and H Plane tool	**33586-2**
Connector Reattachment Kit	**33544-35**
Wall-Roof Feed Thru	**245314-64**
Waveguide Boot for Plates (below),	
4 in (102 mm) dia.	**WGB4-64**
5 in (127 mm) dia	**WGB5-64**

Feed-Thru Plate for Boots (above)

Openings	For 4 in Boots	For 5 in Boots
1	**204673-1**	**48940-1**
1	**204673-2**	–
2	–	**48940-2**
3	–	**48940-3**
4	**204673-4**	**48940-4**
6	–	**48940-6**
8	**204673-8**	–

Refer to page 84 for Elliptical Waveguide ordering information

7.125 - 8.400 GHz

Antenna Inputs. All antenna VSWR values are specified with CPR and PDR flanges. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa).
ValuLine® Antennas. See page 127.

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
HPX 	**High Performance/Wide Band Antennas** – Dual Polarization **Antenna Inputs:** CPR112G and PDR84													
HPX6-71W	6 (1.8)	2860	–	–	–	2	2	39.6	40.4	41.0	1.5	30	65	1.15 (23.1)
HPX8-71W	8 (2.4)	2825	–	–	–	2	2	42.1	42.9	43.5	1.2	30	67	1.10 (26.4)
HPX10-71W	10 (3.0)	2864	–	–	–	–	–	44.1	44.9	45.5	0.9	30	70	1.10 (26.4)
HPX12-71W	12 (3.7)	1009	–	–	–	–	–	46.1	46.7	47.5	0.8	30	70	1.10 (26.4)
HPX15-71W	15 (4.6)	697	–	–	–	–	–	47.9	48.6	49.4	0.7	30	65	1.10 (26.4)

7.125 - 8.5 GHz

Antenna Inputs. All antenna VSWR values are specified with CPR and PDR flanges. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa).
ValuLine® Antennas. See page 127.

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
HP 	**High Performance/Wide Band Antennas** – Single Polarized **Antenna Inputs:** CPR112G and PDR84													
HP6-71W	6 (1.8)	2818	–	–	–	3	2	39.7	40.3	41.1	1.5	30	66	1.06 (30.7)
HP8-71W	8 (2.4)	2820	–	–	–	2	2	42.3	42.9	43.6	1.1	30	68	1.06 (30.7)
HP10-71W	10 (3.0)	2821	–	–	–	2	2	44.0	44.8	45.5	0.9	30	70	1.06 (30.7)
HP12-71W	12 (3.7)	2822	–	–	–	2	2	46.2	46.8	47.6	0.7	30	71	1.06 (30.7)
PL P 	**Standard/Wide Band Antennas** – Standard and Low VSWR **Antenna Inputs:** CPR112G and PDR84													
PL6-71W	6 (1.8)	3703	B	–	–	–	–	39.7	40.3	41.1	1.5	30	48	1.10 (26.4)
PL8-71W	8 (2.4)	1271	B	–	–	–	–	42.3	42.9	43.6	1.1	30	52	1.10 (26.4)
PL10-71W	10 (3.0)	1273	A	–	–	–	–	44.0	44.8	45.5	0.9	30	55	1.10 (26.4)
PL12-71W	12 (3.7)	1275	B	–	–	1	2	45.6	46.3	47.1	0.7	30	58	1.10 (26.4)
PL15-71W	15 (4.6)	2710	B	–	–	2	2	47.5	48.2	48.9	0.6	30	57	1.10 (26.4)

Reference ETSI Document EN300833 for 3 to 60 GHz

Refer to page 84 for Elliptical Waveguide ordering information

7.425 - 7.900 GHz

Antenna Inputs. All antenna VSWR values are specified with CPR and PDR flanges. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa).
ValuLine® Antennas. See page 127.

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
HSX 	**High Performance Antennas** - Super High Cross Polarization Discrimination – Dual Polarized **Antenna Inputs:** CPR112G and PDR84													
HSX4-74	4 (1.2)	2157 2156	–	–	–	3	2	36.7	37.0	37.3	2.3	40	64	1.08 (28.3)
HSX6-74	6 (1.8)	1860 1864	–	–	–	3	2	40.3	40.6	40.9	1.5	40	67	1.08 (28.3)
HSX8-74	8 (2.4)	1865 1866	–	–	–	3	2	42.6	42.9	43.2	1.1	40	74	1.06 (30.7)
HSX10-74	10 (3.0)	1913 1912	–	–	–	3	2	44.0	44.3	44.6	0.9	40	75	1.06 (30.7)
HSX12-74	12 (3.7)	1914 1916	–	–	–	3	2	46.5	46.8	47.0	0.8	40	78	1.06 (30.7)
HSX15-74	15 (4.6)	1918 1920	–	–	–	3	2	48.0	48.3	48.6	0.6	40	78	1.06 (30.7)
HPX HP 	**High Performance Antennas** – Dual Polarized **Antenna Inputs:** CPR112G and PDR84													
HPX4-74	4 (1.2)	3712	–	–	–	3	2	37.1	37.4	37.6	2.5	32	63	1.10 (26.4)
HPX6-74	6 (1.8)	3697	–	–	–	3	2	40.5	40.8	41.1	1.5	32	67	1.06 (30.7)
HPX8-74	8 (2.4)	3699	–	–	–	3	2	42.9	43.1	43.4	1.2	32	70	1.06 (30.7)
HPX10-74	10 (3.0)	3695	–	–	–	2	2	44.3	44.7	45.0	1.1	30	68	1.06 (30.7)
	High Performance Antennas – Single Polarized **Antenna Inputs:** CPR112G and PDR84													
HP4-74	4 (1.2)	4112	–	–	–	2	2	36.5	36.7	37.0	2.3	32	61	1.06 (30.7)
HP6-74	6 (1.8)	3691	–	–	–	2	2	40.1	40.4	40.6	1.5	32	64	1.06 (30.7)
HP8-74	8 (2.4)	3694	–	–	–	2	2	42.5	42.8	43.0	1.2	32	70	1.04 (34.2)
HP10-74	10 (3.0)	2792	–	–	–	1	2	43.8	44.0	44.2	1.0	32	70	1.04 (34.2)

*7.725 - 8.275 GHz**

Antenna Inputs. All antenna VSWR values are specified with CPR and PDR flanges. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa).
ValuLine® Antennas. See page 127.

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
UHX 	**Ultra High Performance Antennas** – Dual Polarized **Antenna Inputs:** CPR112G and PDR84													
UHX6-77	6 (1.8)	2874 2875	–	–	–	3	2	40.5	41.0	41.2	1.5	30	67	1.06 (30.7)
UHX8-77	8 (2.4)	2833 2834	–	–	–	2	2	43.1	43.5	43.7	1.1	30	68	1.06 (30.7)
UHX10-77	10 (3.0)	2835 2836	–	–	–	2	2	44.9	45.2	45.4	0.9	30	70	1.06 (30.7)
UHX12-77	12 (3.7)	2838 2837	–	–	–	3	2	46.4	46.7	46.9	0.7	30	75	1.06 (30.7)
UHX15-77	15 (4.6)	2839 2840	–	–	–	2	2	48.4	48.7	48.9	0.6	30	70	1.06 (30.7)
HSX 	**High Performance Antennas** - Super High Cross Polarization Discrimination – Dual Polarized **Antenna Inputs:** CPR112G and PDR84													
HSX4-77	4 (1.2)	2588 2589	–	–	–	3	2	37.0	37.2	37.5	2.3	40	64	1.08 (28.3)
HSX6-77	6 (1.8)	1922 1924	–	–	–	3	2	40.7	41.0	41.4	1.5	40	67	1.06 (30.7)
HSX8-77	8 (2.4)	1929 1930	–	–	–	3	2	43.2	43.5	43.8	1.1	40	77	1.06 (30.7)
HSX10-77	10 (3.0)	1966 1967	–	–	–	3	2	44.8	45.2	45.6	0.9	40	79	1.06 (30.7)
HSX12-77	12 (3.7)	1968 1969	–	–	–	3	2	46.4	46.7	47.0	0.7	40	79	1.06 (30.7)
HSX15-77	15 (4.6)	1960 1962	–	–	–	–	–	48.3	48.6	48.8	0.6	40	76	1.06 (30.7)

Reference ETSI Document EN300833 for 3 to 60 GHz
*Multiband antennas are available in this frequency band. See pages 93-94.

Continued on next page

Refer to page 84 for Elliptical Waveguide ordering information

*7.725 - 8.275 GHz**

Antenna Inputs. All antenna VSWR values are specified with CPR and PDR flanges. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 8 lb/in^2 (56 kPa).
ValuLine® Antennas. See page 127.

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance***					Gain, dBi Low	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
HPX 	**High Performance Antennas** – Dual Polarized **Antenna Inputs:** CPR112G and PDR84													
HPX6-77*	6 (1.8)	552-2	–	–	A	–	–	40.5	40.8	41.1	1.5	33	66	1.07 (29.4)
HPX8-77*	8 (2.4)	553-2	–	–	A	–	–	43.2	43.5	43.8	1.1	33	68	1.06 (30.7)
HPX10-77*	10 (3.0)	554-4	–	–	A	–	–	44.9	45.2	45.5	0.9	33	70	1.06 (30.7)
HPX12-77*	12 (3.7)	555-4	–	–	A	–	–	46.4	46.7	47.0	0.7	33	72	1.06 (30.7)
PXL 	**Standard Antennas** – Dual Polarized Low VSWR **Antenna Inputs:** CPR112G and PDR84													
PXL6-77**	6 (1.8)	657-2	–	–	B	–	–	40.3	40.6	40.9	1.5	33	48	1.07 (29.4)
PXL8-77**	8 (2.4)	658-2	–	–	B	–	–	42.8	43.1	43.4	1.1	33	50	1.06 (30.7)
PXL10-77**	10 (3.0)	659-2	–	–	B	–	–	44.7	45.0	45.3	0.9	33	54	1.06 (30.7)
PXL12-77**	12 (3.7)	660-2	–	–	B	–	–	46.6	46.9	47.2	0.7	33	63	1.06 (30.7)
LBX 	**Low Back Lobe Antennas** – Dual Polarized **Antenna Inputs:** CPR112G and PDR84													
LBX6-77**	6 (1.8)	559-2		–	B	–		40.3	40.8	41.1	1.5	33	56	1.07 (29.4)
LBX8-77**	8 (2.4)	560-2	–	–	B	–	–	42.8	43.1	43.4	1.1	33	60	1.06 (30.7)
LBX10-77**	10 (3.0)	561-4	–	–	B	–	–	44.9	45.2	45.5	0.9	33	66	1.06 (30.7)
LBX12-77**	12 (3.7)	562-2	–	–	B	–	–	46.4	46.7	47.0	0.7	33	67	1.06 (30.7)

Reference ETSI Document EN300833 for 3 to 60 GHz
*Multiband antennas are available in this frequency band. See pages 93-94.
**8 lb/in^2 (56 kPa) maximum
***ANATEL Brazilian Telecommunications Agency, Regulation 1286 Category

*7.75 - 8.40 GHz**

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
HP 		**High Performance Antennas** – Single Polarized **Antenna Inputs:** CPR112G and PDR84												
HP4-77	4 (1.2)	2858	–	–	–	2	2	36.8	37.2	37.5	2.2	30	63	1.06 (30.7)
HP6-77	6 (1.8)	3763	–	–	–	2	2	40.3	40.8	41.1	1.5	30	68	1.06 (30.7)
HP8-77	8 (2.4)	3765	–	–	–	2	2	42.9	43.3	43.6	1.1	30	68	1.06 (30.7)
HP10-77	10 (3.0)	2868	–	–	–	2	2	44.8	45.2	45.5	0.9	30	70	1.06 (30.7)
HP12-77	12 (3.7)	3767	–	–	–	3	2	46.3	46.7	47.1	0.7	30	71	1.06 (30.7)
HP15-77	15 (4.6)	3768	–	–	–	–	–	48.2	48.5	48.9	0.6	30	71	1.06 (30.7)
PL 		**Standard Antennas** – Single Polarized **Antenna Inputs:** CPR112G and PDR84												
PL4-77	4 (1.2)	3716	–	–	–	–	–	36.8	37.2	37.5	2.2	30	45	1.06 (30.7)
PL6-77	6 (1.8)	3721	–	–	–	–	–	40.3	40.8	41.1	1.5	30	48	1.06 (30.7)
PL8-77	8 (2.4)	2760	–	–	–	–	–	42.9	43.3	43.6	1.1	30	50	1.06 (30.7)
PL10-77	10 (3.0)	2747	–	–	–	1	2	44.8	45.2	45.5	0.9	30	58	1.06 (30.7)
PL12-77	12 (3.7)	2748	–	–	–	1	2	46.3	46.7	47.1	0.7	30	54	1.06 (30.7)
PL15-77	15 (4.6)	2763	–	–	–	1	2	48.2	48.5	48.9	0.6	30	57	1.06 (30.7)
FPX **FP** 		**Focal Plane Antennas** – Dual Polarized **Antenna Inputs:** CPR112G and PDR84												
FPX6-77	6 (1.8)	6161	–	–	–	1	2	40.2	40.4	40.6	1.5	30	58	1.08 (28.3)
		Focal Plane Antennas – Single Polarized **Antenna Inputs:** CPR112G and PDR84												
FP6-77	6 (1.8)	6150	–	–	–	1	2	40.2	40.6	40.8	1.5	30	60	1.07 (29.4)
FP8-77	8 (2.4)	6151	–	–	–	1	2	42.9	43.3	43.5	1.1	26	64	1.06 (30.7)
FP10-77	10 (3.0)	6153	–	–	–	2	2	44.9	45.3	45.4	0.9	30	66	1.04 (34.2)
FP12-77	12 (3.7)	6155	–	–	–	2	2	46.5	46.9	47.0	0.7	28	68	1.04 (34.2)

Reference ETSI Document EN300833 for 3 to 60 GHz

*Multiband antennas are available in this frequency band. See pages 93-94.

Refer to page 84 for Elliptical Waveguide ordering information

8.2 - 8.5 GHz

Antenna Inputs. All antenna VSWR values are specified with CPR and PDR flanges. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa) except LBX Series 8 lb/in^2 (56 kPa).
ValuLine® Antennas. See page 127.

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
HSX 		**High Performance Antennas** - Super High Cross Polarization Discrimination – Dual Polarized **Antenna Inputs:** CPR112G and PDR84												
HSX4-82	4 (1.2)	1799, 1810	–	–	–	3	2	37.5	37.6	37.7	2.3	40	63	1.08 (28.3)
HSX6-82	6 (1.8)	1222 1224	–	–	–	3	2	41.3	41.4	41.7	1.4	40	67	1.06 (30.7)
HSX8-82	8 (2.4)	1226 1228	–	–	–	3	2	43.7	43.8	43.9	1.0	40	78	1.06 (30.7)
HSX10-82	10 (3.0)	1230 1232	–	–	–	3	2	45.3	45.4	45.5	0.8	40	78	1.06 (30.7)
HSX12-82	12 (3.7)	1236 1234	–	–	–	3	2	47.1	47.2	47.3	0.7	40	79	1.06 (30.7)
HSX15-82	15 (4.6)	1238 1240	–	–	–	–	–	48.7	48.8	48.9	0.6	40	76	1.06 (30.7)
HPX **HP** 		**High Performance Antennas** – Dual Polarized **Antenna Inputs:** CPR112G and PDR84												
HPX6-82	6 (1.8)	2883	–	–	–	1	2	41.0	41.1	41.2	1.3	30	58	1.06 (30.7)
HPX8-82	8 (2.4)	2863	–	–	–	2	2	43.5	43.6	43.7	1.0	30	67	1.06 (30.7)
HPX10-82	10 (3.0)	2865	–	–	–	2	2	45.5	45.6	45.7	0.8	30	70	1.06 (30.7)
HPX12-82	12 (3.7)	2867	–	–	–	2	2	47.1	47.2	47.3	0.7	30	70	1.06 (30.7)
HPX15-82	15 (4.6)	2869	–	–	–	2	2	48.7	48.8	48.9	0.6	30	70	1.06 (30.7)
		High Performance Antennas – Single Polarized **Antenna Inputs:** CPR112G and PDR84												
HP6-82	6 (1.8)	2882	–	–	–	2	2	40.6	40.8	41.0	1.5	30	68	1.06 (30.7)
HP8-82	8 (2.4)	2891	–	–	–	2	2	43.4	43.5	43.7	1.1	30	68	1.06 (30.7)
HP10-82	10 (3.0)	2893	–	–	–	2	2	45.3	45.5	45.7	0.9	30	70	1.06 (30.7)
HP12-82	12 (3.7)	2895	–	–	–	2	2	46.8	47.0	47.1	0.7	30	71	1.06 (30.7)
HP15-82	15 (4.6)	2889	–	–	–	2	2	48.6	48.8	48.9	0.6	30	71	1.06 (30.7)
PXL **PL** 		**Standard Antennas** – Dual Polarized Low VSWR **Antenna Inputs:** CPR112G and PDR84												
PXL6-82	6 (1.8)	2851	–	–	–	–	–	41.0	41.1	41.2	1.3	30	48	1.06 (30.7)
PXL8-82	8 (2.4)	2853	–	–	–	1	2	43.7	43.8	43.9	1.0	30	55	1.06 (30.7)
PXL10-82	10 (3.0)	2855	–	–	–	1	2	45.7	45.8	45.9	0.8	30	57	1.06 (30.7)
PXL12-82	12 (3.7)	2857	–	–	–	1	2	47.3	47.4	47.5	0.7	30	63	1.06 (30.7)
PXL15-82	15 (4.6)	2859	–	–	–	–	–	48.5	48.6	48.7	0.6	30	65	1.06 (30.7)
		Standard Antennas – Single Polarized Low VSWR **Antenna Inputs:** CPR112G and PDR84												
PL6-82	6 (1.8)	2871	–	–	–	1	2	40.6	40.8	41.0	1.5	30	48	1.06 (30.7)
PL8-82	8 (2.4)	2897	–	–	–	1	2	43.4	43.5	43.7	1.1	30	50	1.06 (30.7)
PL10-82	10 (3.0)	2899	–	–	–	1	2	43.3	45.5	45.7	0.9	30	58	1.06 (30.7)
PL12-82	12 (3.7)	2901	–	–	–	1	2	46.8	47.0	47.1	0.7	30	54	1.06 (30.7)
PL15-82	15 (4.6)	2903	–	–	–	1	2	48.6	48.8	48.6	0.6	30	57	1.06 (30.7)
LBX 		**Low Back Lobe Antennas** – Dual Polarized **Antenna Inputs:** CPR112G and PDR84												
					Regulatory Compliance**									
LBX6-82*	6 (1.8)	786-1	–	–	B	–	–	40.9	41.1	41.2	1.5	33	58	1.07 (29.4)
LBX8-82*	8 (2.4)	787-2	–	–	B	–	–	43.6	43.8	43.9	1.1	33	60	1.06 (30.7)
LBX10-82*	10 (3.0)	788-2	–	–	B	–	–	45.6	45.8	45.9	0.9	33	63	1.06 (30.7)
LBX12-82*	12 (3.7)	789-2	–	–	B	–	–	46.9	47.1	47.2	0.7	33	65	1.06 (30.7)

Reference ETSI Document EN300833 for 3 to 60 GHz
*8 lb/in2 (56 kPa) maximum
**ANATEL Brazilian Telecommunications Agency, Regulation 1286 Category

Ordering Information for Waveguide Assemblies

Frequency* GHz	Waveguide Type	Flange Type††	Connector† Tunable	Connector† Fixed-Tuned	Pressure Window	Flex-Twist 2 ft (0.6 m)
Premium Waveguide Assemblies						**VSWR 1.06 (30.7)****
7.125–7.750	**EWP77-71**	UG-51/U†††	**177DCT**	**177SC**	**55000A-112**	**F112PA0240BA**
		CPR112G	**177DET**	**177SE**	**55001-112**	**F112PC0240CA**
		PBR84	**177DCMT**	**177SCM**	**243498-84**	**F112MK0600KA**
		PDR84	**177DEMT**	**177SEM**	**223306-84**	**F112MH0600HA**
		PDR70	**277DEMT**	**–**	**223306-70**	**F137MH0600HC**
7.725–8.500	**EWP77-77**	UG-51/U†††	**177DCT**	**177SC**	**55000A-112**	**F112PA0240BB**
		CPR112G	**177DET**	**177SE**	**55001-112**	**F112PC0240CB**
		PBR84	**177DCMT**	**177SCM**	**243498-84**	**F112MK0600KB**
		PDR84	**177DEMT**	**177SEM**	**223306-84**	**F112MH0600HB**
		PDR70	**277DEMT**	**–**	**223306-70**	**F137MH0600HF‡**
7.125–8.500	**EWP77-71W**	UG-51/U†††	**177DCT**	**177SC**	**55000A-112**	**F112PA0240BC**
		CPR112G	**177DET**	**177SE**	**55001-112**	**F112PC0240CC**
		PBR84	**177DCMT**	**177SCM**	**243498-84**	**F112MK0600KC**
		PDR84	**177DEMT**	**177SEM**	**223306-84**	**F112MH0600HC**
***		PDR70	**277DEMT**	**–**	**223306-70**	**F137MH0600HE**
Standard Waveguide Assemblies			**Non-Tunable**			**VSWR 1.15 (23.1)****
7.125–8.500	**EW77**	UG-51/U†††	**177DC**	**177SC**	**55000A-112**	**F112PA0240BC**
		PBR84	**177DCM**	**177SCM**	**243498-84**	**F112MK0600KC**
		CPR112G	**177DE**	**177SE**	**55001-112**	**F112PC0240CC**
		PDR84	**177DEM**	**177SCM**	**223306-84**	**F112MH0600HC**

* Contact Andrew for information on other frequency bands. ** VSWR max., (R.L., dB). Up to 300 ft (90 m). The indicated maximum VSWR characteristics are guaranteed for factory assemblies and are typical for field assemblies. *** 7.425 - 7.925 GHz ‡ 7.725 - 8.3 GHz ONLY

† "Tunable" connectors ordered with factory assemblies are factory tuned.

†† For detailed information on mating flanges, refer to pages 214-218. ††† Modified cover flange with gasket groove. Mates with UG choke or cover flanges.

Accessories – Photos and detailed descriptions on pages 194-200

Description	Type No.
Hangers and Adapters	
Hanger Kit of 10, Recommended maximum spacing for outdoor installation is 3 ft (0.91 m)*	**42396A-11**
NEW! Snap-In Hanger Kit of 10. Recommended spacing for outdoor installation is 3 ft (0.91 m)	**EWSH-77**
Hardware Kit of 10, 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Angle Adapter Kit of 10. Stainless steel	**31768A**
Angle Adapter Kit of 10. Galvanized	
3/8" Hardware	**242774**
Metric Hardware	**242774-M**
Round Member Adapter Kit of 10. Stainless steel	
Member Diameter, in (mm)	
1-2 (25-50)	**31670-1**
2-3 (50-75)	**31670-2**
3-4 (75-100)	**31670-3**
4-5 (100-125)	**31670-4**
5-6 (125-150)	**31670-5**
45° Adapter Kit of 10. Galvanized steel	**42334**
Threaded Rod Support, 3/8" rod, nuts, washers, ceiling bracket	
12 in (305 mm) long, kit of 1	**31771**
12 in (305 mm) long, kit of 5	**31771-4**
24 in (610 mm) long, kit of 1	**31771-9**
24 in (610 mm) long, kit of 5	**31771-6**
Tower Standoff Kit of 10. 1 in (25 mm) standoff	
Member Diameter, in (mm)	
0.75-1.5 (20-40)	**30848-5**
1.5-3.0 (40-75)	**30848-4**
3-4 (75-100)	**30848-1**
4-5 (100-125)	**30848-2**
5-6 (125-150)	**30848-3**

* Standard conditions: 125 mph (200 km/h) survival wind velocity, 0.5 in (13 mm) radial ice. For other conditions see page 196.

Description	Type No.
Tower Standoff Kit of 10. 2.5 in (60 mm) standoff	
Member Diameter, in (mm)	
3-4 (75-100)	**41108A-1**
4-5 (100-125)	**41108A-2**
5-6 (125-150)	**41108A-3**
Other Accessories	
Flaring Tool Kit for connector attachment	**202421**
Splice	**177DZ**
Grounding Kit with factory attached, one-hole lug	**204989-3**
Grounding Kit with factory attached, two-hole lug	**241088-3**
Grounding Kit with field attachable crimp-on, one-hole lug	**204989-23**
Grounding Kit with field attachable crimp-on, two-hole lug	**241088-8**
Grounding Kit with field attachable screw-on lug	**204989-33**
Crimping Tool to field attach lug to Grounding Kit	**207270**
Hoisting Grip	**19256B**
Bending Tool Kit. One each E and H Plane tool	**33586-9**
Connector Reattachment Kit	**33544-34**
Wall-Roof Feed Thru	**245314-77**
Waveguide Boot for Plates (below),	
4 in (102 mm) dia.	**WGB4-77**
5 in (127 mm) dia	**WGB5-77**

Feed-Thru Plate for Boots (above)

Openings	For 4 in Boots	For 5 in Boots
1	**204673-1**	**48940-1**
1	**204673-2**	–
2	–	**48940-2**
3	–	**48940-3**
4	**204673-4**	**48940-4**
6	–	**48940-6**
8	**204673-8**	–

Refer to page 88 for Elliptical Waveguide ordering information

10.2 - 10.7 GHz

Antenna Inputs. All antenna VSWR values are specified with CPR and PDR flanges. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa).
ValuLine® Antennas. See page 127.

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
UHX 	**Ultra High Performance Antennas** – Dual Polarized **Antenna Inputs:** CPR90G and PDR100													
UHX4-102	4 (1.2)	3758 4505	–	–	–	–	–	39.3	39.5	39.7	1.8	33	68	1.10 (26.4)
UHX6-102	6 (1.8)	3769 4494	–	–	–	–	–	42.5	42.7	42.9	1.2	33	79	1.10 (26.4)
UHX8-102	8 (2.4)	3760 4506	–	–	–	–	–	45.0	45.1	45.2	0.9	33	78	1.10 (26.4)
UHX10-102	10 (3.0)	3348 3762	A	–	–	2	2	46.7	46.8	46.9	0.8	33	80	1.10 (26.4)
HPX **HP** 	**High Performance Antennas** – Dual Polarized **Antenna Inputs:** CPR90G and PDR100													
HPX4-102	4 (1.2)	3752	–	–	–	–	–	39.6	39.8	40.0	1.8	30	58	1.15 (23.1)
HPX6-102	6 (1.8)	3336	A	–	–	2	2	42.9	43.1	43.3	1.2	30	68	1.10 (26.4)
HPX8-102	8 (2.4)	3754	–	–	–	–	–	45.3	45.4	45.5	0.9	30	68	1.10 (26.4)
HPX10-102	10 (3.0)	3756	–	–	–	–	–	47.0	47.1	47.2	0.7	30	68	1.10 (26.4)
	High Performance Antennas – Single Polarized **Antenna Inputs:** CPR90G and PDR100													
HP2-102	2 (0.6)	3742	–	–	–	1	2	33.2	33.3	33.4	3.6	30	50	1.15 (23.1)
HP4-102	4 (1.2)	3744	B	–	–	2	2	39.7	39.9	40.1	1.8	30	58	1.10 (26.4)
HP6-102	6 (1.8)	3326	B	–	–	1	2	42.9	43.1	43.3	1.2	30	68	1.10 (26.4)
HP8-102	8 (2.4)	3746	A	–	–	2	2	45.3	45.4	45.5	0.9	30	68	1.10 (26.4)
HP10-102	10 (3.0)	3748	A	–	–	2	2	47.0	47.1	47.2	0.7	30	68	1.10 (26.4)
PX **P** 	**Standard Antennas** – Dual Polarized **Antenna Inputs:** CPR90G and PDR100													
PX4-102	4 (1.2)	3314	B	–	–	–	–	39.7	39.9	40.1	1.8	30	45	1.10 (26.4)
PX6-102	6 (1.8)	3316	B	–	–	–	–	43.1	43.2	43.3	1.2	30	50	1.10 (26.4)
PX8-102	8 (2.4)	3740	–	–	–	–	–	45.4	45.5	45.6	0.9	30	52	1.10 (26.4)
PX10-102	10 (3.0)	3320	A	–	–	1	2	47.1	47.2	47.3	0.7	30	58	1.10 (26.4)
	Standard Antennas – Single Polarized **Antenna Inputs:** CPR90G and PDR100													
P4-102	4 (1.2)	3731	B	–	–	–	–	39.7	39.9	40.1	1.8	30	45	1.10 (26.4)
P6-102	6 (1.8)	3308	B	–	–	1	2	43.1	43.2	43.3	1.2	30	50	1.10 (26.4)
P8-102	8 (2.4)	3732	–	–	–	–	–	45.4	45.5	45.6	0.9	30	52	1.10 (26.4)
P10-102	10 (3.0)	3312	A	–	–	1	2	47.1	47.2	47.3	0.7	30	58	1.10 (26.4)

Reference ETSI Document EN300833 for 3 to 60 GHz

10.5 - 10.7 GHz

Antenna Inputs. All antenna VSWR values are specified with CPR and PDR flanges. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa).
ValuLine® Antennas. See page 127.

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
UHX 	**Ultra High Performance Antennas** – Dual Polarized **Antenna Inputs:** CPR90G and PDR100													
UHX4-105	4 (1.2)	2013 2012	A	–	–	3	2	39.8	39.9	40.0	1.7	33	70	1.08 (28.3)
UHX6-105	6 (1.8)	2037 2038	A	–	–	3	2	43.4	43.5	43.6	1.2	33	81	1.06 (30.7)
UHX8-105	8 (2.4)	2024 2025	A	–	–	3	2	45.8	45.9	46.0	1.0	33	80	1.06 (30.7)
UHX10-105	10 (3.0)	2033 2032	A	–	–	3	2	47.8	47.9	48.0	0.8	33	83	1.06 (30.7)
UHX12-105	12 (3.7)	2034 2035	A	–	–	3	2	49.2	49.3	49.4	0.65	33	80	1.06 (30.7)
HSX 	**High Performance Antennas** – Super High Cross Polarization Discrimination – Dual Polarized **Antenna Inputs:** CPR90G and PDR100													
HSX4-105	4 (1.2)	1972 1974	A	–	–	2	2	39.6	39.7	39.8	1.7	40	64	1.10 (26.4)
HSX6-105	6 (1.8)	1976 1980	A	–	–	3	2	43.2	43.4	43.5	1.1	40	72	1.08 (28.3)
HSX8-105	8 (2.4)	2017 2019	A	–	–	3	2	45.8	45.9	46.0	0.8	40	75	1.06 (30.7)
HSX10-105	10 (3.0)	2026 2028	A	–	–	3	2	47.6	47.7	47.8	0.7	40	75	1.06 (30.7)
HSX12-105	12 (3.7)	2253 2255	A	–	–	3	2	49.5	49.3	49.2	0.6	40	80	1.06 (30.7)
HPX **HP** 	**High Performance Antennas** – Dual Polarized **Antenna Inputs:** CPR90G and PDR100													
HPX4-105	4 (1.2)	3462	B	–	–	2	2	39.8	39.9	40.0	1.8	30	60	1.10 (26.4)
HPX6-105	6 (1.8)	3269	A	–	–	2	2	43.4	43.5	43.6	1.2	30	64	1.08 (28.3)
HPX8-105	8 (2.4)	3274	A	–	–	2	2	45.8	45.9	46.0	0.9	30	68	1.06 (30.7)
HPX10-105	10 (3.0)	3280	A	–	–	2	2	47.7	47.8	47.9	0.8	30	70	1.06 (30.7)
HPX12-105	12 (3.7)	3282	A	–	–	2	2	49.2	49.3	49.4	0.7	30	71	1.06 (30.7)
	High Performance Antennas – Single Polarized **Antenna Inputs:** CPR90G and PDR100													
HP4-105	4 (1.2)	3472	B	–	–	2	2	39.8	39.9	40.0	1.8	30	60	1.08 (28.3)
HP6-105	6 (1.8)	3258	B	–	–	2	2	43.4	43.5	43.6	1.2	30	66	1.06 (30.7)
HP8-105	8 (2.4)	3259	A	–	–	2	2	45.8	45.9	46.0	0.9	30	68	1.06 (30.7)
HP10-105	10 (3.0)	3260	A	–	–	2	2	47.7	47.8	47.9	0.8	30	70	1.06 (30.7)
HP12-105	12 (3.7)	3261	A	–	–	1	2	49.2	49.3	49.4	0.7	30	71	1.06 (30.7)
PX **P** 	**Standard Antennas** – Dual Polarized **Antenna Inputs:** CPR90G and PDR100													
PX6-105	6 (1.8)	3290	B	–	–	1	2	43.4	43.5	43.6	1.2	30	49	1.15 (23.1)
PX8-105	8 (2.4)	3291	B	–	–	–	–	45.8	45.9	46.0	0.9	30	50	1.10 (26.4)
PX10-105	10 (3.0)	3292	B	–	–	1	2	47.7	47.8	47.9	0.8	30	52	1.10 (26.4)
PX12-105	12 (3.7)	3293	B	–	–	–	–	49.2	49.3	49.4	0.7	30	55	1.10 (26.4)
	Standard Antennas – Single Polarized **Antenna Inputs:** CPR90G and PDR100													
P4-105	4 (1.2)	3002	B	–	–	–	–	39.8	39.9	40.0	1.8	30	45	1.15 (23.1)
P6-105	6 (1.8)	3146	B	–	–	1	2	43.4	43.5	43.6	1.2	30	51	1.10 (26.4)
P8-105	8 (2.4)	3004	B	–	–	1	2	45.8	45.9	46.0	0.9	30	53	1.10 (26.4)
P10-105	10 (3.0)	3006	A	–	–	1	2	47.8	47.9	48.0	0.8	30	53	1.10 (26.4)
P12-105	12 (3.7)	3218	B	–	–	1	2	49.2	49.3	49.4	0.7	30	55	1.10 (26.4)
PAR 	**Standard Antennas** – Single Polarized Low VSWR **Antenna Inputs:** CPR90G and PDR100													
PAR6-105*	6 (1.8)	1646	A	–	–	1	2	43.0	43.1	43.2	1.2	30	60	1.06 (30.7)
PAR8-105*	8 (2.4)	1647	A	–	–	1	2	45.6	45.7	45.8	0.9	30	63	1.06 (30.7)

Reference ETSI Document EN300833 for 3 to 60 GHz
* Uses focal plane reflector and feed system.

Refer to page 88 for Elliptical Waveguide ordering information

*10.5 - 11.7 GHz**

Antenna Inputs. All antenna VSWR values are specified with CPR and PDR flanges. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa). **ValuLine® Antennas**. See page 127.

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
UHX 		**Ultra High Performance Antennas** – Dual Polarized **Antenna Inputs:** CPR90G and PDR100												
UHX4-107	4 (1.2)	2098 2097	A	–	–	3	2	40.0	40.4	40.8	1.6	33	70	1.08 (28.3)
UHX6-107	6 (1.8)	2141 2142	A	–	–	3	2	43.6	44.0	44.4	1.1	33	80	1.06 (30.7)
UHX8-107	8 (2.4)	2124 2125	–	–	–	–	–	46.0	46.5	46.8	0.8	33	80	1.06 (30.7)
UHX10-107	10 (3.0)	2127 2126	A	–	–	3	2	47.6	48.0	48.3	0.7	33	82	1.06 (30.7)
UHX12-107	12 (3.7)	2128 2129	A	–	–	3	2	49.4	49.8	50.2	0.5	33	80	1.06 (30.7)
HSX 		**High Performance Antennas** - Super High Cross Polarization Discrimination – Dual Polarized **Antenna Inputs:** CPR90G and PDR100												
HSX4-107	4 (1.2)	2314 2312	A	–	–	2	2	39.8	40.2	40.6	1.6	40	64	1.10 (26.4)
HSX6-107	6 (1.8)	2316 2318	A	–	–	3	2	43.5	43.9	44.3	1.1	40	72	1.08 (28.3)
HSX8-107	8 (2.4)	2320 2322	A	–	–	2	2	46.0	46.5	46.8	0.8	40	75	1.06 (30.7)
HSX10-107	10 (3.0)	2340 2338	A	–	–	2	2	47.8	48.2	48.6	0.7	40	75	1.06 (30.7)
HSX12-107	12 (3.7)	2362 2364	A	–	–	3	2	49.2	49.6	50.3	0.5	40	80	1.06 (30.7)
HPX **HP** 		**High Performance Antennas** – Dual Polarized **Antenna Inputs:** CPR90G and PDR100												
HPX4-107	4 (1.2)	2460	B	–	–	2	2	40.0	40.3	40.6	1.6	30	62	1.10 (26.4)
HPX6-107	6 (1.8)	3224	A	–	–	2	2	43.6	44.0	44.4	1.0	30	70	1.08 (28.3)
HPX8-107	8 (2.4)	3175	A	–	–	2	2	46.0	46.4	46.8	0.8	30	70	1.06 (30.7)
HPX10-107	10 (3.0)	3173	A	–	–	2	2	47.9	48.3	48.6	0.7	30	70	1.06 (30.7)
HPX12-107	12 (3.7)	3190	A	–	–	2	2	49.4	49.8	50.2	0.5	30	72	1.06 (30.7)
		High Performance Antennas – Single Polarized **Antenna Inputs:** CPR90G and PDR100												
HP4-107	4 (1.2)	3429	A	–	–	2	2	40.0	40.4	40.8	1.6	30	61	1.08 (28.3)
HP6-107	6 (1.8)	3222	A	–	–	3	2	43.6	44.0	44.4	1.0	30	70	1.06 (30.7)
HP8-107	8 (2.4)	3174	A	–	–	3	2	46.0	46.4	46.8	0.8	30	71	1.06 (30.7)
HP10-107	10 (3.0)	3250	A	–	–	–	–	47.9	48.3	48.6	0.7	30	70	1.06 (30.7)
HP12-107	12 (3.7)	3188	A	–	–	2	2	49.4	49.8	50.2	0.5	30	70	1.06 (30.7)
HDX 		**High Performance, Dual Beam Antennas** – Dual Polarized Angle Diversity **Antenna Input:** CPR90G												
HDX8-107	8 (2.4)	3791 3793 3787 3789	A	–	–	2/3	2	47.6	47.9	48.1	0.8	26	78	1.10 (26.4)
HDX10-107	10 (3.0)	4352 4353 4354 4355	A	–	–	3	2	47.6	47.9	48.1	0.8	22	78	1.10 (26.4)
PAR 		**Standard Antennas** – Single Polarized **Antenna Inputs:** CPR90G and PDR100												
PAR6-107**	6 (1.8)	3743	A	–	–	1	2	43.2	43.6	44.0	1.1	30	60	1.06 (30.7)
PAR8-107**	8 (2.4)	3745	A	–	–	1	2	45.8	46.2	46.6	0.8	30	63	1.06 (30.7)
PXL **PL** 		**Standard Antennas** – Dual Polarized Low VSWR **Antenna Inputs:** CPR90G and PDR100												
PXL6-107	6 (1.8)	3183	B	–	–	–	–	43.6	44.0	44.4	1.0	30	49	1.08 (28.3)
PXL8-107	8 (2.4)	3185	B	–	–	–	–	46.0	46.4	46.8	0.8	30	50	1.06 (30.7)
PXL10-107	10 (3.0)	3187	B	–	–	–	–	47.9	48.3	48.6	0.7	30	52	1.06 (30.7)
PXL12-107	12 (3.7)	3199	B	–	–	–	–	49.4	49.8	50.2	0.5	30	53	1.06 (30.7)
		Standard Antennas – Single Polarized Low VSWR **Antenna Inputs:** CPR90G and PDR100												
PL4-107	4 (1.2)	3214	B	–	–	–	–	40.1	40.5	40.9	1.6	30	46	1.08 (28.3)
PL6-107	6 (1.8)	3101	B	–	–	–	–	43.6	44.0	44.4	1.0	30	51	1.06 (30.7)
PL8-107	8 (2.4)	3249	B	–	–	1	2	46.0	46.4	46.8	0.8	30	53	1.06 (30.7)
PL10-107	10 (3.0)	3200	B	–	–	–	–	47.8	48.2	48.5	0.7	30	54	1.06 (30.7)
PL12-107	12 (3.7)	3116	B	–	–	1	2	49.4	49.8	50.2	0.5	30	60	1.06 (30.7)

Reference ETSI Document EN300833 for 3 to 60 GHz
* Multiband antennas are available for this frequency band. See pages 93-94. ** Uses focal plane reflector and feed system

Ordering Information for Waveguide Assemblies

Frequency* GHz	Waveguide Type	Flange Type††	Connector† Tunable	Fixed-Tuned	Pressure Window	Flex-Twist 2 ft (0.6 m)
Super Premium Waveguide Assemblies						**VSWR 1.05 (32.3)****
10.7-11.7	**EWP90S**	CPR90G	**190DET**	**190SE**	**55001-90**	**F090PC0240CB**
		PDR100	**190DEMT**	**190SEM**	**223306-100**	**F090MH0600HB**
Premium Waveguide Assemblies						**VSWR 1.06 (30.7)****
10.2-10.7	**EWP90-105**	CPR90G	**190DET**	**190SE**	**55001-90**	**F090PC0240CA**
		PDR100	**190DEMT**	**190SEM**	**223306-100**	**F090MH0600HA**
10.5-11.7	**EWP90-105W**	CPR90G	–	**190SE**	**55001-90**	**F090PC0240CB**
		PDR100	–	**190SEM**	**223306-100**	**F090MH0600HB**
10.7-11.7	**EWP90-107**	CPR90	**190DET**	**190SE**	**55001-90**	**F090PC0240CB**
		PDR100	**190DEMT**	**190SEM**	**223306-100**	**F090MH0600HB**
						VSWR 1.09 (27.3)**
10.7-11.7		WR75†††	–	**290SC**	**55000A-75**	**F075PA0240BB**
Standard Waveguide Assemblies			**Non-Tunable**			**VSWR 1.15 (23.1)****
10.2-11.7	**EW90**	CPR90G	**190DE**	**190SE**	**55001-90**	**F090PC0240CS**
		PDR100	**190DEM**	**190SEM**	**223306-100**	**F090MH0600HS**
		WR75†††	–	–	**55000A-75**	**F075PA0240BS**

* Contact Andrew for information on other frequency bands.
** VSWR max., (R.L., dB). Up to 300 ft (90 m). The indicated maximum VSWR characteristics are guaranteed for factory assemblies and are typical for field assemblies.
† "Tunable" connectors ordered with factory assemblies are factory tuned.
†† For detailed information on mating flanges, refer to pages 214-218. ††† Pressurizable cover flange.

Accessories – Photos and detailed descriptions on pages 194-200

Description	Type No.
Hangers and Adapters	
Hanger Kit of 10, Recommended maximum spacing for outdoor installation is 3 ft (0.91 m)*	**42396A-5**
NEW! Snap-In Hanger Kit of 10. Recommended spacing for outdoor installation is 3 ft (0.91 m)	**EWSH-90**
Hardware Kit of 10, 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Angle Adapter Kit of 10. Stainless steel	**31768A**
Angle Adapter Kit of 10. Galvanized	
3/8" Hardware	**242774**
Metric Hardware	**242774-M**
Round Member Adapter Kit of 10. Stainless steel Member Diameter, in (mm)	
1-2 (25-50)	**31670-1**
2-3 (50-75)	**31670-2**
3-4 (75-100)	**31670-3**
4-5 (100-125)	**31670-4**
5-6 (125-150)	**31670-5**
45° Adapter Kit of 10. Galvanized steel	**42334**
Threaded Rod Support, 3/8" rod, nuts, washers, ceiling bracket	
12 in (305 mm) long, kit of 1	**31771**
12 in (305 mm) long, kit of 5	**31771-4**
24 in (610 mm) long, kit of 1	**31771-9**
24 in (610 mm) long, kit of 5	**31771-6**
Tower Standoff Kit of 10. 1 in (25 mm) standoff Member Diameter, in (mm)	
0.75-1.5 (20-40)	**30848-5**
1.5-3.0 (40-75)	**30848-4**
3-4 (75-100)	**30848-1**
4-5 (100-125)	**30848-2**
5-6 (125-150)	**30848-3**
Tower Standoff Kit of 10. 2.5 in (60 mm) standoff Member Diameter, in (mm)	
3-4 (75-100)	**41108A-1**
4-5 (100-125)	**41108A-2**
5-6 (125-150)	**41108A-3**

Description	Type No.
Other Accessories	
Flaring Tool Kit for connector attachment	**204919**
Splice	**190DZ**
Grounding Kit with factory attached, one-hole lug	**204989-2**
Grounding Kit with factory attached, two-hole lug	**241088-2**
Grounding Kit with field attachable crimp-on, one-hole lug	**204989-22**
Grounding Kit with field attachable crimp-on, two-hole lug	**241088-7**
Grounding Kit with field attachable screw-on lug	**204989-32**
Crimping Tool to field attach lug to Grounding Kit	**207270**
Hoisting Grip	**29958**
Bending Tool Kit. One each E and H Plane tool	**33586-1**
Connector Reattachment Kit	**33544-37**
Wall-Roof Feed Thru	**245314-90**
Waveguide Boot for Plates (below),	
4 in (102 mm) dia.	**WGB4-90**
5 in (127 mm) dia	**WGB5-90**

Feed-Thru Plate for Boots (above)

Openings	For 4 in Boots	For 5 in Boots
1	**204673-1**	**48940-1**
1	**204673-2**	–
2	–	**48940-2**
3	–	**48940-3**
4	**204673-4**	**48940-4**
6	–	**48940-6**
8	**204673-8**	–

* Standard conditions: 125 mph (200 km/h) survival wind velocity, 0.5 in (13 mm) radial ice. For other conditions see page 196.

Refer to page 185 for Elliptical Waveguide ordering information

12.2 - 12.7 GHz

Antenna Inputs. All antenna VSWR values are specified with PDR flange. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa). **ValuLine® Antennas**. See page 127.

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
HPX 	**High Performance Antennas** – Dual Polarized **Antenna Inputs:** WR75 cover/gasket and PDR120													
HPX6-122	6 (1.8)	3285	A	–	A	2	2	44.6	44.8	45.0	0.9	30	68	1.10 (26.4)
HPX8-122	8 (2.4)	3232	A	–	A	2	2	47.1	47.3	47.5	0.7	30	70	1.10 (26.4)
HPX10-122	10 (3.0)	3233	A	–	A	2	2	48.4	48.5	48.7	0.6	25	71	1.10 (26.4)
HPX12-122	12 (3.7)	3234	A	–	A	–	–	50.5	50.6	50.8	0.5	25	71	1.10 (26.4)
PX 	**Standard Antennas** – Dual Polarized **Antenna Inputs:** WR75 cover/gasket and PDR120													
PX4-122	4 (1.2)	3211	B	–	B	1	2	40.5	40.7	40.9	1.4	25	52	1.10 (26.4)
PX6-122	6 (1.8)	3213	A	–	A	–	–	44.6	44.8	45.0	0.9	25	51	1.10 (26.4)
PX8-122	8 (2.4)	3215	A	–	A	–	–	47.1	47.3	47.5	0.7	30	54	1.10 (26.4)
PX10-122	10 (3.0)	3217	A	–	A	–	–	48.4	48.5	48.7	0.6	30	57	1.10 (26.4)
PX12-122	12 (3.7)	3219	A	–	A	–	–	50.5	50.6	50.8	0.5	25	58	1.10 (26.4)

12.2 - 13.25 GHz

Antenna Inputs. All antenna VSWR values are specified with PDR flange. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa). **ValuLine® Antennas**. See page 127.

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
HP 	**High Performance Antennas** – Single Polarized **Antenna Inputs:** WR75 cover/gasket and PDR120													
HP6-122	6 (1.8)	3284	A	–	A	2	2	44.7	45.1	45.4	0.9	30	70	1.08 (28.3)
HP8-122	8 (2.4)	3228	A	–	A	2	2	47.2	47.6	47.9	0.7	30	70	1.08 (28.3)
HP10-122	10 (3.0)	3270	A	–	A	2	2	48.4	48.8	49.1	0.6	28	71	1.08 (28.3)
HP12-122	12 (3.7)	3272	A	–	A	2	2	50.6	50.9	51.2	0.5	30	71	1.08 (28.3)
P 	**Standard Antennas** – Single Polarized **Antenna Inputs:** WR75 cover/gasket and PDR120													
P2-122	2 (0.6)	3216	–	–	–	–	–	35.1	35.5	35.8	2.8	25	42	1.10 (26.4)
P4-122	4 (1.2)	3204	B	–	B	–	–	41.2	41.5	41.9	1.4	30	49	1.10 (26.4)
P6-122	6 (1.8)	1277	A	–	A	1	2	44.7	45.1	45.4	0.9	30	55	1.08 (28.3)
P8-122	8 (2.4)	1286	A	–	A	1	2	47.2	47.6	47.9	0.7	30	59	1.08 (28.3)
P10-122	10 (3.0)	1288	A	–	A	1	2	48.4	48.8	49.1	0.6	26	60	1.08 (28.3)
P12-122	12 (3.7)	4271	A	–	A	1	2	50.6	50.9	51.2	0.5	30	58	1.08 (28.3)

*12.7 - 13.25 GHz**

Antenna Inputs. All antenna VSWR values are specified with PDR flange. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa).
ValuLine® Antennas. See page 127.

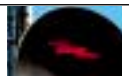
Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
UHX 	**Ultra High Performance Antennas** – Dual Polarized **Antenna Inputs:** WR75 cover/gasket and PDR120													
UHX8-127	8 (2.4)	1255 1256	A	A	A	3	2	47.5	47.6	47.8	0.7	32	80	1.10 (26.4)
UHX10-127	10 (3.0)	1258 1259	A	A	A	3	2	48.7	48.8	49.0	0.6	30	82	1.10 (26.4)
HPX 	**High Performance Antennas** – Dual Polarized **Antenna Inputs:** WR75 cover/gasket and PDR120													
HPX6-127	6 (1.8)	3296	B	B	B	2	2	45.0	45.1	45.3	0.9	30	68	1.10 (26.4)
HPX8-127	8 (2.4)	3278	A	A	A	2	2	47.5	47.6	47.8	0.7	30	70	1.10 (26.4)
HPX10-127	10 (3.0)	3279	A	A	A	2	2	48.7	48.8	49.0	0.6	25	71	1.10 (26.4)
HPX12-127	12 (3.7)	3281	A	A	A	–	–	50.8	50.9	51.1	0.5	25	72	1.10 (26.4)

Reference ETSI Document EN300833 for 3 to 60 GHz
*Multiband antennas are available in this frequency band. See page 94.

Continued on next page

*12.7 - 13.25 GHz**

Antenna Inputs. All antenna VSWR values are specified with PDR flange. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa). **ValuLine® Antennas**. See page 127.

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
PX		**Standard Antennas** – Dual Polarized **Antenna Inputs:** WR75 cover/gasket and PDR120												
PX4-127	4 (1.2)	3220	B	B	B	1	2	40.9	41.0	41.2	1.4	25	52	1.10 (26.4)
PX6-127	6 (1.8)	3221	A	A	A	–	–	45.0	45.1	45.3	0.9	25	52	1.10 (26.4)
PX8-127	8 (2.4)	3223	A	A	A	–	–	47.5	47.6	47.8	0.7	30	54	1.10 (26.4)
PX10-127	10 (3.0)	3225	A	A	A	–	–	48.7	48.8	49.0	0.6	30	57	1.10 (26.4)
PX12-127	12 (3.7)	3226	A	A	A	–	–	50.8	50.9	51.1	0.5	25	58	1.10 (26.4)

*12.75 - 13.25 GHz**

Antenna Inputs. All antenna VSWR values are specified with PDR flange. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa).
ValuLine® Antennas. See page 127.

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
HSX		**High Performance Antennas**- Super High Cross Polarization Discrimination – Dual Polarized **Antenna Input:** PDR120												
HSX4-130	4 (1.2)	2490 2492	B	B	B	3	2	41.4	41.6	41.8	1.6	40	68	1.10 (26.4)
HSX6-130	6 (1.8)	2099 2100	A	A	A	3	2	44.9	45.1	45.3	0.9	40	75	1.10 (26.4)
HSX8-130	8 (2.4)	2513 2515	A	A	A	3	2	47.4	47.6	47.8	0.7	40	76	1.10 (26.4)
HSX10-130	10 (3.0)	2566 2568	A	A	A	3	2	48.7	48.8	49.0	0.6	40	76	1.10 (26.4)
HPX **HP**		**High Performance Antennas** – Dual Polarized **Antenna Inputs:** WR75 cover/gasket and PDR120												
HPX4-130	4 (1.2)	1254	A	A	A	3	2	40.9	41.0	41.1	1.3	28	66	1.10 (26.4)
HPX6-130	6 (1.8)	3288	A	A	A	2	2	45.0	45.1	45.2	0.9	28	68	1.10 (26.4)
HPX8-130	8 (2.4)	1033	A	A	A	3	2	47.6	47.7	47.8	0.7	32	74	1.10 (26.4)
		High Performance Antennas – Single Polarized **Antenna Inputs:** WR75 cover/gasket and PDR120												
HP4-130	4 (1.2)	1252	A	A	A	3	2	40.9	41.0	41.1	1.3	28	68	1.10 (26.4)
HP6-130	6 (1.8)	3286	A	A	A	2	2	45.1	45.2	45.3	0.9	28	70	1.08 (28.3)
HP8-130	8 (2.4)	3289	A	A	A	2	2	47.6	47.7	47.8	0.7	28	71	1.08 (28.3)

14.25 - 14.5 GHz

Antenna Inputs. All antenna VSWR values are specified with PDR flange. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa).
ValuLine® Antennas. See page 127.

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
HSX		**High Performance Antennas** – Dual Polarized **Antenna Input:** PDR140												
HSX4-142	4 (1.2)	1010 1012	–	–	–	–	–	42.5	42.6	42.7	1.2	40	68	1.10 (26.4)
HSX6-142	6 (1.8)	1014 1016	–	–	–	–	–	45.9	46.0	46.1	0.8	40	75	1.10 (26.4)
HSX8-142	8 (2.4)	1018 1020	–	–	–	–	–	48.4	48.5	48.6	0.6	40	76	1.10 (26.4)
HSX10-142	10 (3.0)	1202 1204	–	–	–	–	–	50.1	50.2	50.3	0.5	40	76	1.10 (26.4)

Reference ETSI Document EN300833 for 3 to 60 GHz
* Multiband antennas are available in this frequency band. See page 94.

Refer to pages 187 and 189 for Elliptical Waveguide ordering information

14.4 - 15.35 GHz

Antenna Inputs. All antenna VSWR values are specified with PDR flange. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa).
ValuLine® Antennas. See page 127.

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
HSX 	**High Performance Antennas** – Dual Polarized **Antenna Input:** UG-541A/U													
HSX4-144	4 (1.2)	1206 1208	–	–	–	–	–	42.5	42.7	43.0	1.2	40	68	1.10 (26.4)
HSX6-144	6 (1.8)	1210 1212	–	–	–	–	–	46.0	46.3	46.5	0.8	40	75	1.10 (26.4)
HSX8-144	8 (2.4)	1214 1216	–	–	–	–	–	48.5	48.8	49.1	0.6	40	76	1.10 (26.4)
HSX10-144	10 (3.0)	1218 1220	–	–	–	1	2	50.2	50.5	50.8	0.5	40	76	1.10 (26.4)
PX **P** 	**Standard Antennas** – Dual Polarized **Antenna Inputs:** UG-541A/U and PDR140													
PX4-144	4 (1.2)	1565	–	–	–	–	–	42.3	42.5	42.8	1.2	30	48	1.10 (26.4)
PX6-144	6 (1.8)	1567	–	–	–	1	2	45.8	46.1	46.3	0.8	30	55	1.10 (26.4)
PX8-144	8 (2.4)	1569	–	–	–	–	–	48.3	48.6	48.9	0.6	30	57	1.10 (26.4)
PX10-144	10 (3.0)	1571	–	–	–	1	2	50.2	50.5	50.8	0.5	30	58	1.10 (26.4)
	Standard Antennas – Single Polarized **Antenna Inputs:** UG-541A/U and PDR140													
P8-144	8 (2.4)	1505	–	–	–	1	2	48.3	48.6	48.9	0.6	30	57	1.10 (26.4)
P10-144	10 (3.0)	1507	–	–	–	–	–	50.2	50.5	50.8	0.5	30	58	1.10 (26.4)

17.7 - 19.7 GHz

Antenna Inputs. All antenna VSWR values are specified with PDR flange. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa).
ValuLine® Antennas. See page 127.

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
HSX 	**High Performance Antennas**- Super High Cross Polarization Discrimination – Dual Polarized **Antenna Inputs:** UG-595/U and PBR220													
HSX1-180	1 (0.3)	2050 2051	–	–	–	2	2	32.4	33.0	33.5	3.6	34	60	1.135 (24.0)
HSX2-180	2 (0.6)	2052 2053	A	A	A	2	2	38.0	38.4	38.8	1.9	36	64	1.135 (24.0)
HSX4-180	4 (1.2)	2055 2054	A	A	A	2	2	44.0	44.4	44.8	1.0	36	67	1.135 (24.0)
HSX6-180	6 (1.8)	2057 2056	A	A	A	2	2	47.5	48.0	48.4	0.7	36	72	1.135 (24.0)
HP 	**High Performance Antennas** – Single Polarized **Antenna Inputs:** UG-595/U and PBR220													
HP8-180	8 (2.4)	3983	A	A	A	2	2	50.2	50.7	51.2	0.5	30	72	1.15 (23.1)
P 	**Standard Antennas** – Single Polarized **Antenna Inputs:** UG-595/U and PBR220													
P8-180	8 (2.4)	4058	B	B	B	1	2	50.2	50.7	51.2	0.5	30	59	1.15 (23.1)

Reference ETSI Document EN300833 for 3 to 60 GHz

Multiband Antennas

Multiband antennas offer very high route capacity at minimum antenna/tower system cost. They also offer great system planning flexibility, especially for upgrades of existing frequency congested routes. Multiband antennas provide a second frequency band of operation using one antenna. Maximum channel expansion, with minimum increase in tower wind load, saves system installation time and cost.

Size, weight, wind load characteristics and tower interface requirements are similar to other Andrew antennas of equivalent size. Our line of multiband antennas can, in general, be used as direct replacements for your existing single band antennas.

Andrew also offers the combining networks and circulators you need to complete your multiband antenna system.

The multiband antennas listed in this catalog are a small sampling of our total capabilities. We understand that your upgrade or expansion needs may be unique and we would like the opportunity to discuss your requirements with you. Contact Andrew for further information and help in designing your system.

Input Flange Information

Antenna Series	Antenna Input	
-3444	CPR229G	CPR229G
-3456	CPR229G	CPR137G
-459	CPR229G	CPR137G
-465	CPR229G	CPR137G
-4456	CPR187G	CPR137G
-4459	CPR187G	CPR137G
-4464	CPR187G	CPR137G
-6477	CPR137G	CPR112G
-6511	CPR137G	CPR90G
-186	7/8" EIA	CPR137G
-4477	CPR187G	CPR112G
-6812	CPR137G	WR75

Type Number	Diameter ft (m)	Band	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
UMX 	**Ultra High Performance Multiband 4-Port Antennas** **Antenna Inputs:** See page 92														
3.4-3.9 GHz and 4.4-5.0 GHz															
UMX10-3444	10	3.4	4142 4143	–	–	–	3	2	37.4	38.0	38.6	2.0	35	68	1.10 (26.4)
	(3.0)	4.4	4144 4145	–	–	–	3	2	39.7	40.2	40.7	1.6	35	71	1.15 (23.1)
UMX12-3444	12	3.4	4154 4155	B	–	–	3	2	39.0	39.6	40.2	1.7	35	71	1.10 (26.4)
	(3.7)	4.4	4156 4157	B	–	–	3	2	41.4	41.9	42.5	1.3	35	78	1.15 (23.1)
UMX15-3444	15	3.4	4166 4167	A	–	–	3	2	40.8	41.4	42.0	1.5	35	72	1.10 (26.4)
	(4.6)	4.4	4168 4169	–	–	–	3	2	42.9	43.5	44.0	1.1	35	79	1.15 (23.1)
3.4-3.9 GHz and 5.6-6.2 GHz															
UMX10-3456	10	3.4	4150 4151	–	–	–	2	2	36.6	37.2	37.8	2.1	35	70	1.15 (23.1)
	(3.0)	5.6	4152 4153	B	–	–	2	2	40.7	41.2	41.3	1.2	35	73	1.15 (23.1)
UMX12-3456	12	3.4	4162 4163	B	–	–	2	2	38.5	39.1	39.7	1.8	35	71	1.15 (23.1)
	(3.7)	5.6	4164 4165	A	–	–	2	2	42.6	43.1	43.2	1.0	35	76	1.15 (23.1)
UMX15-3456	15	3.4	4174 4175	B	–	–	2	2	40.3	40.9	41.5	1.6	35	74	1.15 (23.1)
	(4.6)	5.6	4176 4177	A	–	–	2	2	44.5	45.0	45.1	1.0	35	77	1.15 (23.1)
3.7-4.2 GHz and 5.925-6.425 GHz															
UMX10-459*	10	3.7	4102	A	–	–	3	2	38.4	39.0	39.4	1.8	30	75	1.06 (30.7)
	(3.0)	5.9	4104	A	–	–	3	2	42.8	43.1	43.5	1.1	30	80	1.06 (30.7)
UMX12-459*	12	3.7	4105	A	–	–	3	2	40.7	41.3	41.5	1.5	30	74	1.06 (30.7)
	(3.7)	5.9	4107	A	–	–	3	2	44.9	45.3	45.7	0.9	30	80	1.06 (30.7)
3.58-4.20 GHz and 6.425-7.125 GHz															
UMX10-465**	10	3.5	4357 4358	A	A	–	2	2	37.4	38.1	38.7	1.8	30	72	1.15 (23.1)
	(3.0)	6.4	4360 4361	A	–	–	2	2	42.2	42.7	42.8	1.0	30	76	1.15 (23.1)
UMX12-A465**	12	3.5	4108 4109	A	–	–	3	2	40.3	40.9	41.5	1.7	30	73	1.12 (24.9)
	(3.7)	6.4	4110 4111	A	A	–	3	2	44.5	45.0	45.4	0.95	30	78	1.12 (24.9)
4.40-5.00 GHz and 5.6-6.2 GHz															
UMX10-4456	10	4.4	4146 4147	–	–	–	2	2	39.7	40.2	40.8	1.6	35	75	1.15 (23.1)
	(3.0)	5.6	4148 4149	–	–	–	2	2	41.8	42.2	42.6	1.2	35	76	1.10 (26.4)
UMX12-4456	12	4.4	4158 4159	–	–	–	2/3	2	41.4	41.9	42.5	1.3	35	74	1.15 (23.1)
	(3.7)	5.6	4160 4161	–	–	–	–	–	43.4	43.8	44.2	1.0	35	77	1.10 (26.4)
UMX15-4456	15	4.4	4170 4171	–	–	–	3	2	43.1	43.7	44.2	1.2	35	75	1.15 (23.1)
	(4.6)	5.6	4172 4173	A	–	–	3	2	45.0	45.4	45.8	1.0	35	78	1.10 (26.4)
4.40-5.00 GHz and 5.925-6.425 GHz															
UMX8-4459	8	4.4	3310 3311	–	–	–	3	2	37.3	37.8	38.3	1.9	35	68	1.15 (23.1)
	(2.4)	5.9	3313 3315	A	–	–	3	2	39.8	40.0	40.7	1.4	35	69	1.15 (23.1)
UMX10-4459	10	4.4	3324 3325	A	–	–	3	2	39.7	40.2	40.7	1.6	35	73	1.15 (23.1)
	(3.0)	5.9	3327 3329	A	–	–	3	2	42.3	42.6	42.9	1.1	35	75	1.15 (23.1)
UMX12-4459	12	4.4	3330 3331	–	–	–	3	2	41.4	42.1	42.6	1.3	35	75	1.15 (23.1)
	(3.7)	5.9	3332 3333	A	–	–	3	2	43.9	44.3	44.6	1.0	35	77	1.15 (23.1)
4.40-5.00 GHz and 6.425-7.125 GHz															
UMX8-4464	8	4.4	4284 4285	–	–	–	2	2	37.3	38.0	38.4	1.9	35	68	1.15 (23.1)
	(2.4)	6.4	4286 4287	A	A	–	–	–	40.8	41.2	41.6	1.3	35	70	1.15 (23.1)
UMX10-4464	10	4.4	4288 4289	A	B	–	2	2	39.2	39.7	40.2	1.6	35	72	1.15 (23.1)
	(3.0)	6.4	4290 4291	–	–	–	–	–	42.5	42.9	43.4	1.1	35	74	1.15 (23.1)
UMX12-4464	12	4.4	4292 4293	B	B	–	2/3	2	41.1	41.6	42.2	1.3	35	73	1.15 (23.1)
	(3.7)	6.4	4294 4295	–	–	–	–	–	44.4	44.8	45.3	0.9	35	75	1.15 (23.1)
UMX15-4464	15	4.4	4296 4297	A	A	–	3	2	43.0	43.67	44.1	1.0	35	74	1.15 (23.1)
	(4.6)	6.4	4298 4299	–	–	–	–	–	46.3	46.7	47.2	0.7	35	76	1.15 (23.1)
6.425-7.125 GHz and 7.725-8.275 GHz															
UMX8-6477	8	6.4	4300 4301	A	A	–	3	2	41.7	42.3	42.7	1.3	35	70	1.15 (23.1)
	(2.4)	7.7	4302 4303	–	–	–	3	2	43.3	43.8	44.0	1.1	35	73	1.15 (23.1)
UMX10-6477	10	6.4	4304 4305	A	A	–	3	2	42.8	43.4	43.8	1.0	35	74	1.15 (23.1)
	(3.0)	7.7	4306 4307	A	A	–	3	2	44.6	44.8	45.0	0.8	35	76	1.15 (23.1)
UMX12-6477	12	6.4	4308 4309	A	A	–	3	2	44.9	45.5	45.9	0.7	35	75	1.15 (23.1)
	(3.7)	7.7	4310 4311	–	–	–	3	2	46.4	47.1	47.3	0.6	35	77	1.15 (23.1)
UMX15-6477	15	6.4	4312 4313	A	A	–	3	2	46.5	46.8	47.0	0.7	35	76	1.15 (23.1)
	(4.6)	7.7	4314 4315	A	A	–	3	2	47.9	48.2	48.5	0.6	35	78	1.15 (23.1)

Reference ETSI Document EN300833 for 3 to 60 GHz
* 0.5 lb/in^2 (3.5 kPa) maximum
** 5 lb/in^2 (35 kPa) maximum

Multiband Antennas

Type Number	Diameter ft (m)	Band	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
HP 	**High Performance Multiband 2-Port Antennas** (Single Polarized each band, Orthogonal Polarized) **Antenna Inputs:** See page 92														
1.85-1.99 GHz and 6.425-7.125 GHz															
HP8-186**	8	1.8	3960	A	–	–	2	–	30.4	30.7	31.0	4.3	28	51	1.15 (23.1)
	(2.4)	6.4	3961 3962	B	A	–	2	2	41.5	41.9	42.4	1.3	30	69	1.10 (26.4)
HP10-186**	10	1.8	3963	A	–	–	2	–	32.4	32.7	33.0	3.7	28	54	1.15 (23.1)
	(3.0)	6.4	3964 3965	B	A	–	2	2	42.7	43.0	43.4	1.0	30	71	1.10 (26.4)
4.4-5.0 GHz and 7.725-8.5 GHz															
HP8-4477	8	4.4	815	–	–	–	3	2	38.2	38.7	39.3	2.0	35	64	1.20 (20.8)
	(2.4)	7.7	816	–	–	–	3	2	42.8	43.1	43.4	1.2	35	71	1.15 (23.1)
HP10-4477	10	4.4	811	–	–	–	2	2	40.3	40.6	41.2	1.6	35	67	1.20 (20.8)
	(3.0)	7.7	812	–	–	–	2	2	44.2	44.5	44.7	0.8	35	74	1.15 (23.1)
HP12-4477	12	4.4	813	–	–	–	2	2	42.0	42.4	43.1	1.3	35	69	1.20 (20.8)
	(3.7)	7.7	814	–	–	–	3	2	46.4	46.7	46.9	0.7	35	78	1.15 (23.1)
5.925-6.425 GHz and 10.7-11.7 GHz															
HP8-611*	8	5.9	3038	A	–	–	2	2	40.9	41.3	41.6	1.4	35	65	1.06 (30.7)
	(2.4)	10.7	3040	A	–	–	2	2	44.3	44.7	45.1	0.8	25	70	1.10 (26.4)
HP10-611*	10	5.9	3049	A	–	–	3	2	42.7	43.0	43.2	1.1	30	72	1.06 (30.7)
	(3.0)	10.7	3050	A	–	–	2	2	46.1	45.8	46.2	0.7	25	72	1.10 (26.4)
HP12-611*	12	5.9	3046	B	–	–	3	2	44.3	44.7	45.0	0.9	28	72	1.06 (30.7)
	(3.7)	10.7	3048	A	–	–	–	–	46.9	47.3	47.7	0.5	25	72	1.10 (26.4)
6.425-7.125 GHz and 10.7-11.7 GHz															
HP8-6511*	8	6.4	2387	–	–	–	–	–	41.6	41.9	42.3	1.3	32	65	1.06 (30.7)
	(2.4)	10.7	2392	–	–	–	–	–	44.3	44.7	45.1	0.8	25	70	1.10 (26.4)
P 	**Standard Multiband 3-Port Antennas** (2 GHz Single Polarized, 6 GHz Dual Polarized) **Antenna Inputs:** See page 92														
1.85-1.99 GHz and 6.425-7.125 GHz															
P8-186**	8	1.8	3945	A	–	–	–	–	30.5	30.8	31.1	4.4	18	39	1.15 (23.1)
	(2.4)	6.4	3946 3947	B	B	–	–	–	41.6	42.0	42.5	1.3	30	49	1.10 (26.4)
P10-186**	10	1.8	3950	A	A	–	2	–	32.5	32.8	33.1	3.7	20	42	1.15 (23.1)
	(3.0)	6.4	3951 3952	B	B	–	–	–	43.7	43.4	43.8	1.0	30	52	1.10 (26.4)
P 	**Standard Multiband 2-Port Antennas** (Both Bands Single Polarized, Orthogonal Polarization) **Antenna Inputs:** See page 92														
6.875-7.125 GHz and 12.70-13.25 GHz															
P8-6812	8	6.8	1093	–	B	–	1	2	42.2	42.4	42.5	1.3	30	53	1.10 (26.4)
	(2.4)	12.7	1094	B	B	B	–	–	44.6	43.1	42.2	1.1	15	54	1.15 (23.1)
P10-6812	10	6.8	1095	–	A	–	1	2	42.8	43.0	43.1	1.2	30	59	1.10 (26.4)
	(3.0)	12.7	1096	B	B	B	–	–	44.7	43.1	40.7	1.1	10	60	1.15 (23.1)

Reference ETSI Document EN300833 for 3 to 60 GHz

* 5 lb/in^2 (35 kPa) maximum

** 2 lb/in^2 (14 kPa) maximum

Mounting Information

All microwave antennas listed on pages 51-94, except UMX-459 series, include a mount for attachment to a vertical pipe. Standard mounting information is summarized in the table on page 96. Special purpose mounts are described on page 122. Dimensional information and illustrations for installation planning are presented on pages 97-110.

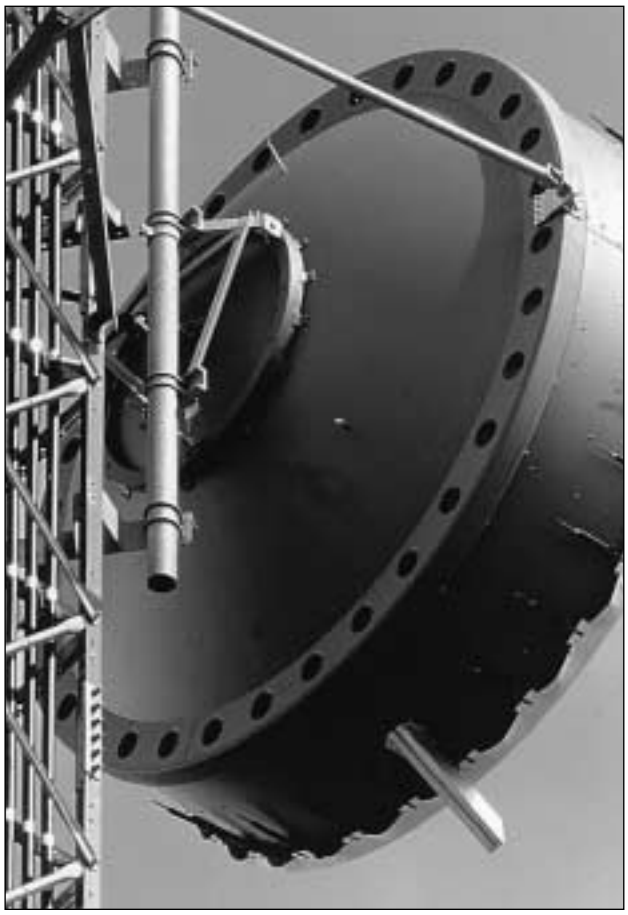
Mounting pipe. Vertical tower mounts attached to a tower supported vertical pipe of the diameter specified on page 96. The mounting pipe is not included with the antenna. It is normally purchased as part of the tower.

Mount construction. Structural members are hot-dip galvanized steel or aluminum.

Hardware. Fixed hardware is hot-dip galvanized steel. Adjusting hardware, including adjusting rods, is stainless steel.

Azimuth and elevation adjustments. The adjustment ranges are indicated in the table on page 96. Some mounts, as noted in the table, use a swivel clamp for azimuth adjustment. Adjustment range for these is 360 degrees. All mounts have threaded fine elevation adjustment, except those for the 4 ft (1.2 m) GRIDPAK® and the Mini-GRIDPAK® antennas.

Side struts. Some antennas include one or two side struts. The number supplied with each antenna is indicated in the table on page 96. Where one side strut is supplied, it includes a stainless steel threaded rod fine azimuth adjustment. Where two side struts are supplied, one is adjustable (has fine azimuth adjustment) and the other is fixed (adjustable but without fine azimuth adjustment). Refer to page 97 for information on side strut positioning.



Vertical Tower Mounts

The vertical tower mounts listed below are included as part of all new antennas. Mount type numbers are shown for ordering replacement mounts.

Antenna Size, ft (m)	Replacement Mount Type Number Metric Standard Hardware	Mounting Pipe Dia. in (mm)	Center Offset* in (mm)	Fine Azimuth Adjustment Degrees	Fine Elevation Adjustment Degrees	Side Struts Included
Shielded Antennas						
4 (1.2)	**T6MSB**	4.5 (115)	5.4 (137)**	±5	±5	–
6 (1.8)	**T6MSC**	4.5 (115)	5.4 (137)**	±5	±5	1
8 (2.4)	**T10MSB**	4.5 (115)	8.0 (200) left*	±5	±5	2
10 (3.0)	**T10MSB**	4.5 (115)	8.0 (200) left*	±5	±5	2
12 (3.7)	**T12MSA††**	4.5 (115)	8.5 (215) left*	±5	±5	2
15 (4.6)	**Integral**	4.5 (115)	8.0 (200) right*	±5	±3.6	1
Standard and Focal Plane Antennas						
4 (1.2)‡	**T6MSB**	4.5 (115)	5.4 (137)**	±5	±5	–
4 (1.2)‡‡	**46770A-2**	4.5 (115)	5.4 (137)**	***	±5	–
6 (1.8)‡	**T6MSB**	4.5 (115)	5.4 (137)**	±5	±5	–
6 (1.8)‡‡	**46770A-2**	4.5 (115)	5.4 (137)**	***	±5	–
8 (2.4)	**T10MSB**	4.5 (115)	8.0 (200) left*	±5	±5	1
10 (3.0)	**T10MSB**	4.5 (115)	8.0 (200) left*	±5	±5	1
12 (3.7)	**T12MSA**	4.5 (115)	8.5 (215) left*	±5	±5	2
15 (4.6)	**Integral**	4.5 (115)	8.0 (200) right*	±5	±3.6	1
GRIDPAK® Antennas						
4 (1.3)	**Integral**	4.5 (115)	6.88 (175)	***	±15	–
6 (2)	**140854**	4.5 (115)	6.88 (175)	***	±5	–
8 (2.4)	**140855**	4.5 (115)	6.88 (175)	±5	±5	1
10 (3)	**140856**	4.5 (115)	6.88 (175)	±5	±5	1
13 (4)	**140857**	4.5 (115)	6.88 (175)	±5	±5	2

* With respect to the mounting pipe viewed from the rear of the antenna. Can be reversed by inverting the mount or antenna.
** Can be offset right or left without inverting the mount or antenna.
*** 360° azimuth capability, no fine adjustment.
†† UHX12-59 includes a bottom strut and requires a 10 ft (3 m) long mounting pipe.
‡ Applies to antennas 3.5 GHz and higher.
‡‡ Applies to antennas 2.7 GHz and lower, except for FP antennas which use the T6MSB mount.
Note: Integral mounts consist of multiple type numbers. Contact Andrew for type numbers.

Dimensional information and illustrations for installation planning are presented on the following pages.

Side Strut Positioning

For maximum wind load capacity, side struts should be installed straight back to the tower. When this is not possible, the following guidelines apply:

When only one side strut is supplied, its angle should not exceed ±25° in the horizontal plane and ±5° in the vertical plane. See illustration for “adjustable strut”.

For antennas with two side struts, the adjustable strut can be lowered or raised 5° from horizontal. The fixed side strut can be lowered or raised 25°. In the horizontal plane, both struts can be positioned at an angle up to 25°. See illustration at right. Further, the strut closest to the mounting pipe may be positioned at an angle up to 35°, provided the sum of the angles for both struts does not exceed 50°.

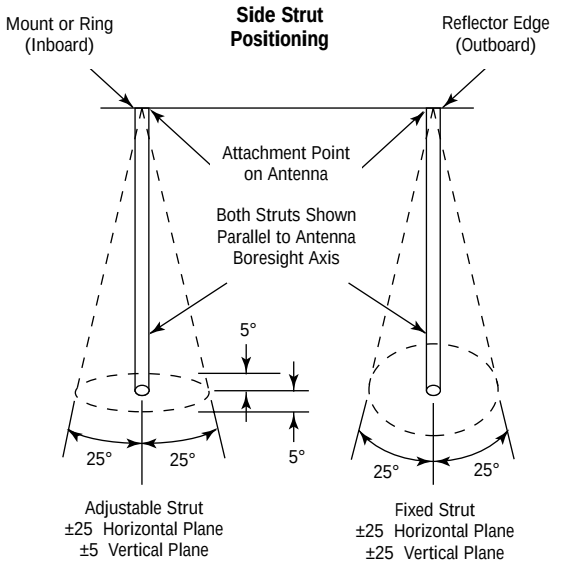
Feed Orientation

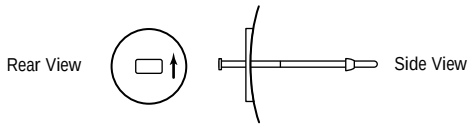
All Andrew solid parabolic antennas are fed from the center of the reflector and include polarization adjustment. The polarizations are clearly marked with arrows on the feed mounting hub. For single polarized antennas, the arrow is positioned up or down for vertical polarization and right or left for horizontal polarization. See illustrations.

Dual polarized, waveguide fed antennas have both input flanges in the same plane to ease the attachment of waveguide. One input signal is rotated 90° inside the feed horn to provide cross polarization.

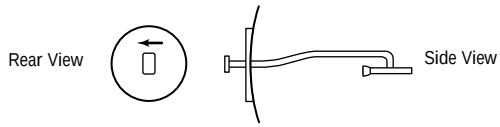
UHX® high performance antennas have asymmetrical patterns with lower sidelobe levels on one side. For these antennas, RPEs are prepared for the full 360°. The frequency coordinator can use the better half of the radiation pattern on either the right or the left side of the antenna to reduce potential interference. HSX and UHX feed hubs use red to identify the better side. This side can be placed either right or left or boresight. Therefore, it is necessary for the frequency coordinator to specify “red right” or “red left” feed position.

The installer must be advised of the proper feed orientation on all ultra high performance antennas and the proper polarization for single-polarized antennas.

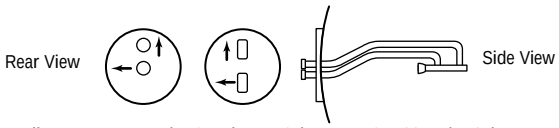




Vertically Polarized Antenna

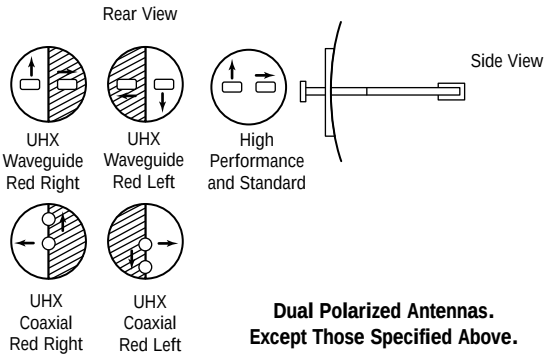


Horizontally Polarized Antenna



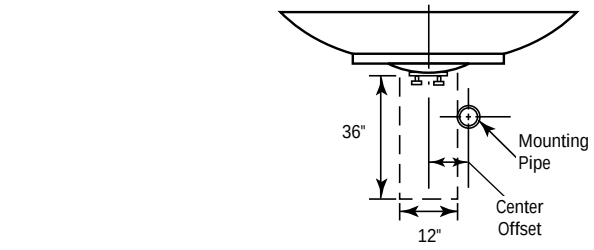
Applies to: PXL-17 and -19 series, PX6 (except -107 -22 and -127), PXL6 (except -107, -122 and -127) PXL10-37, PXL8-37

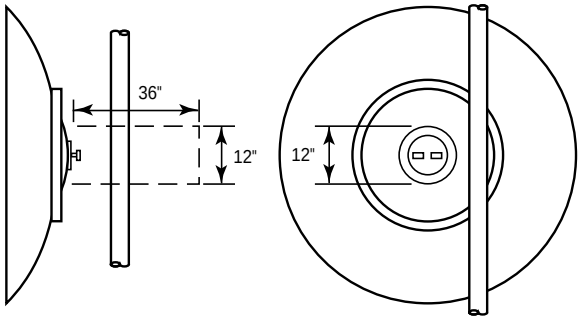
Dual Polarized Antennas. Applies to Specified Types



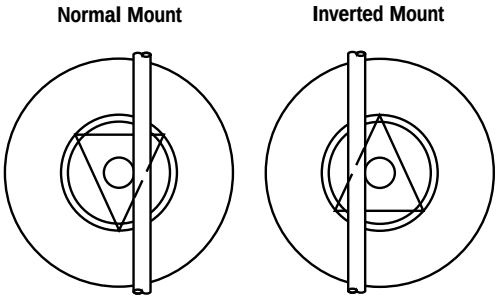
Dual Polarized Antennas.
Except Those Specified Above.

Feed Installation





Clear space required behind reflector for routing and attachment of transmission line.



Normal and Inverted Mounts. Applies to all 8, 10 and 12 ft antennas.

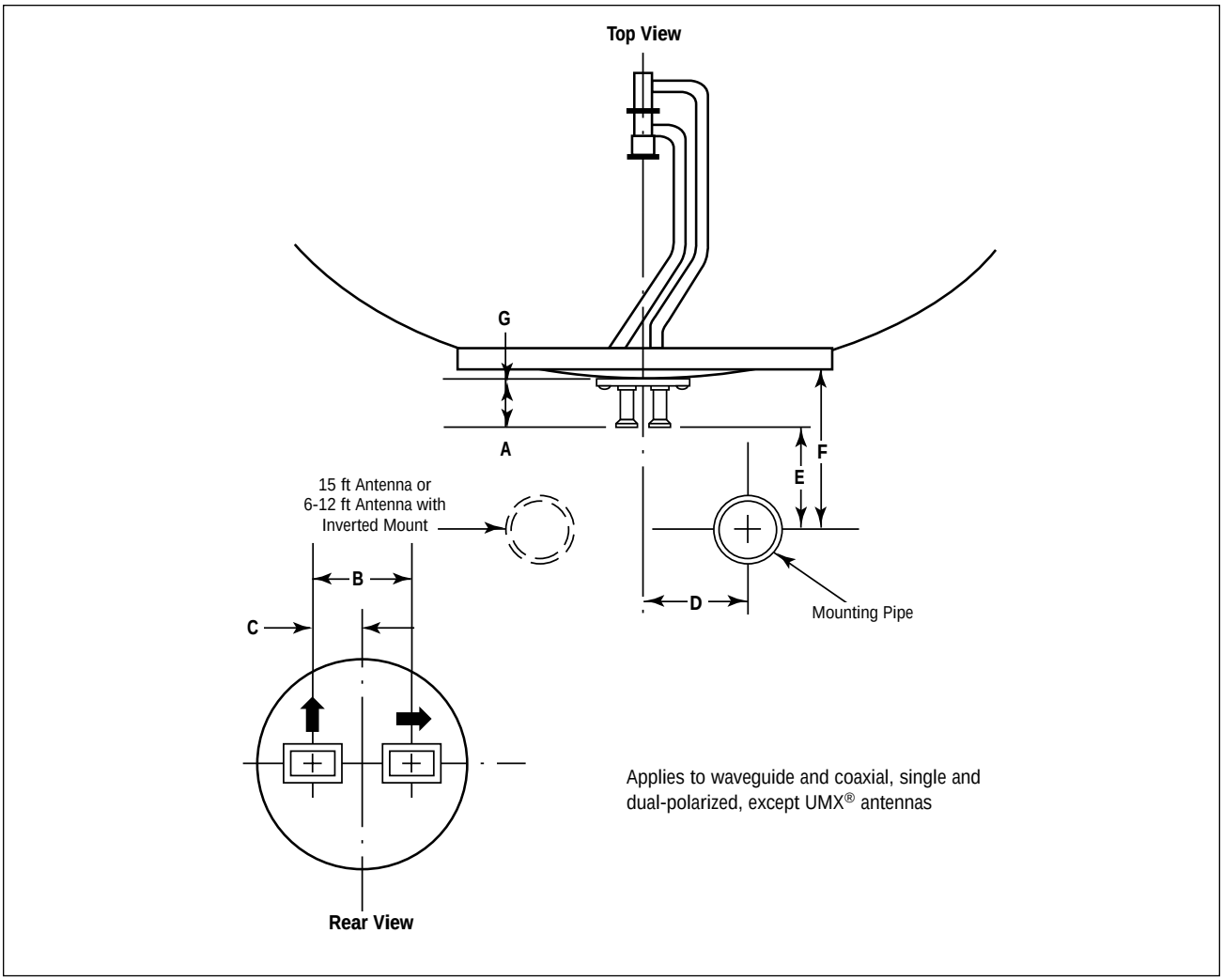
Most feeds are designed to be originally installed from the front of the antenna. However, single-polarized feeds (except -59, -65, -70, -71, -77 series) and most dual polarized -105, -107, -122, -127, -130, -144, -180, -220 series feeds (except HPX()-105A, UHX()-107 and UHX()-127H) can be replaced from the back of the antenna. All other feeds, including dual band feeds, must be inserted from the front of the antenna before the radome is attached.

Reversing the Feed Offset

It is recommended that a cylindrical clear space of 12 in (305 mm) diameter by 36 in (915 mm) long be provided behind the center of the antenna to permit proper routing and attachment of the transmission line. Tower members directly behind the feed will interfere with the routing of the HELIAX® elliptical waveguide or coaxial cable to the feed. If there are interfering members behind the center of the antenna when mounted normally, it is possible to reverse the feed offset to position the feed on the other side of the mounting pipe.

The antenna mount can be inverted to change the offset of the feed for all 8, 10 and 12-ft antennas. Reflectors used on these antennas are designed to accommodate both standard and inverted mounting. To shift the offset of 1-ft, 2-ft and 15-ft antennas, the entire antenna is inverted. The offset for 4-ft and 6-ft antennas can be shifted without inverting the mount or antenna.

The installer should be advised which antennas require inverted mounting prior to assembly and the antennas should be clearly identified prior to lifting.



Applies to waveguide and coaxial, single and dual-polarized, except UMX® antennas

The dimensions presented below are for use in planning transmission line routing for waveguide, coaxial, single-polarized and dual-polarized feeds.

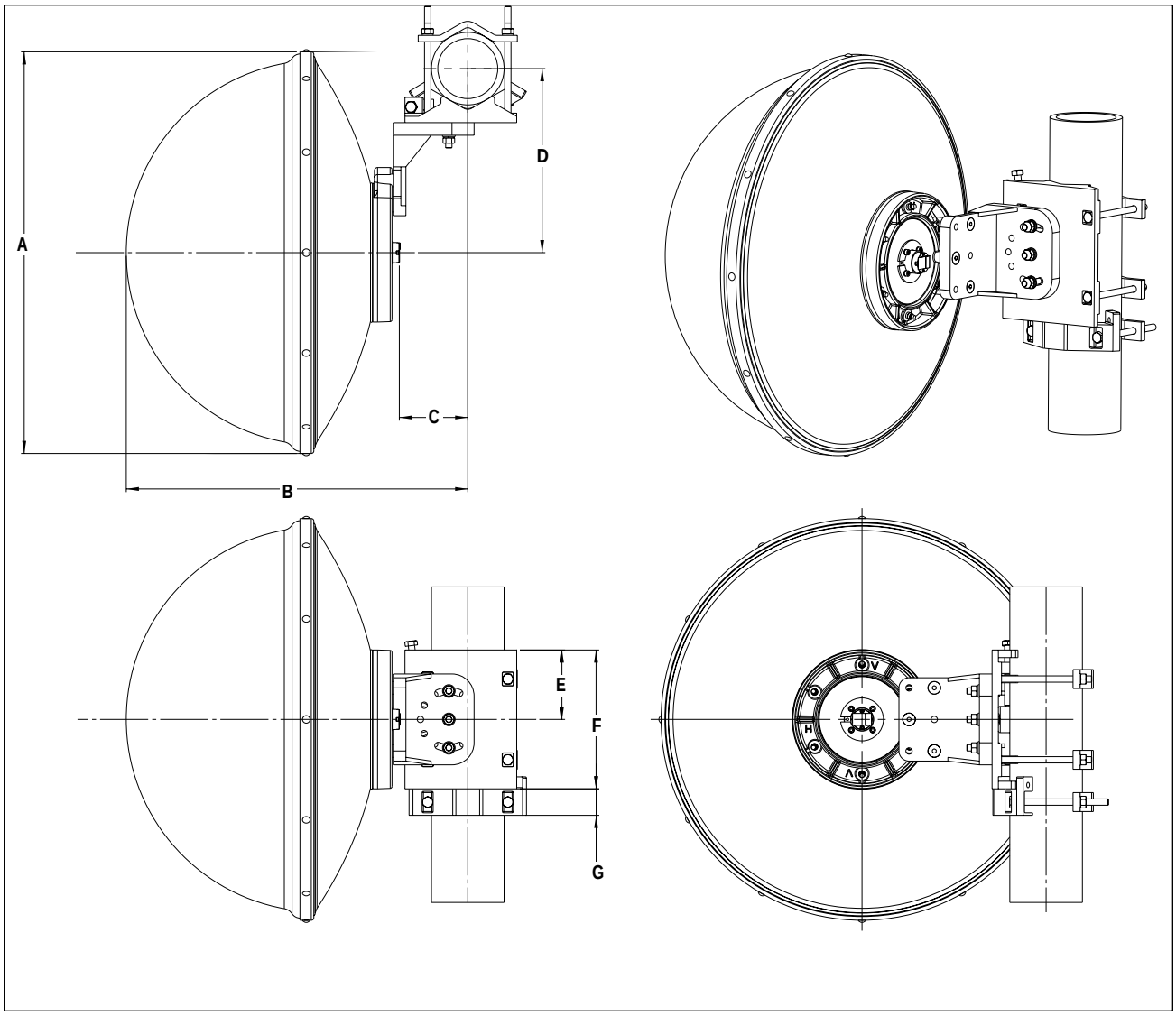
Dimensions A, B, C and E

A	= 4.5 in (115 mm)
B	= 3 in (76 mm)
C	= 1.5 in (38 mm)
E	= F - (G + A)

Dimensions D, F and G, in (mm)

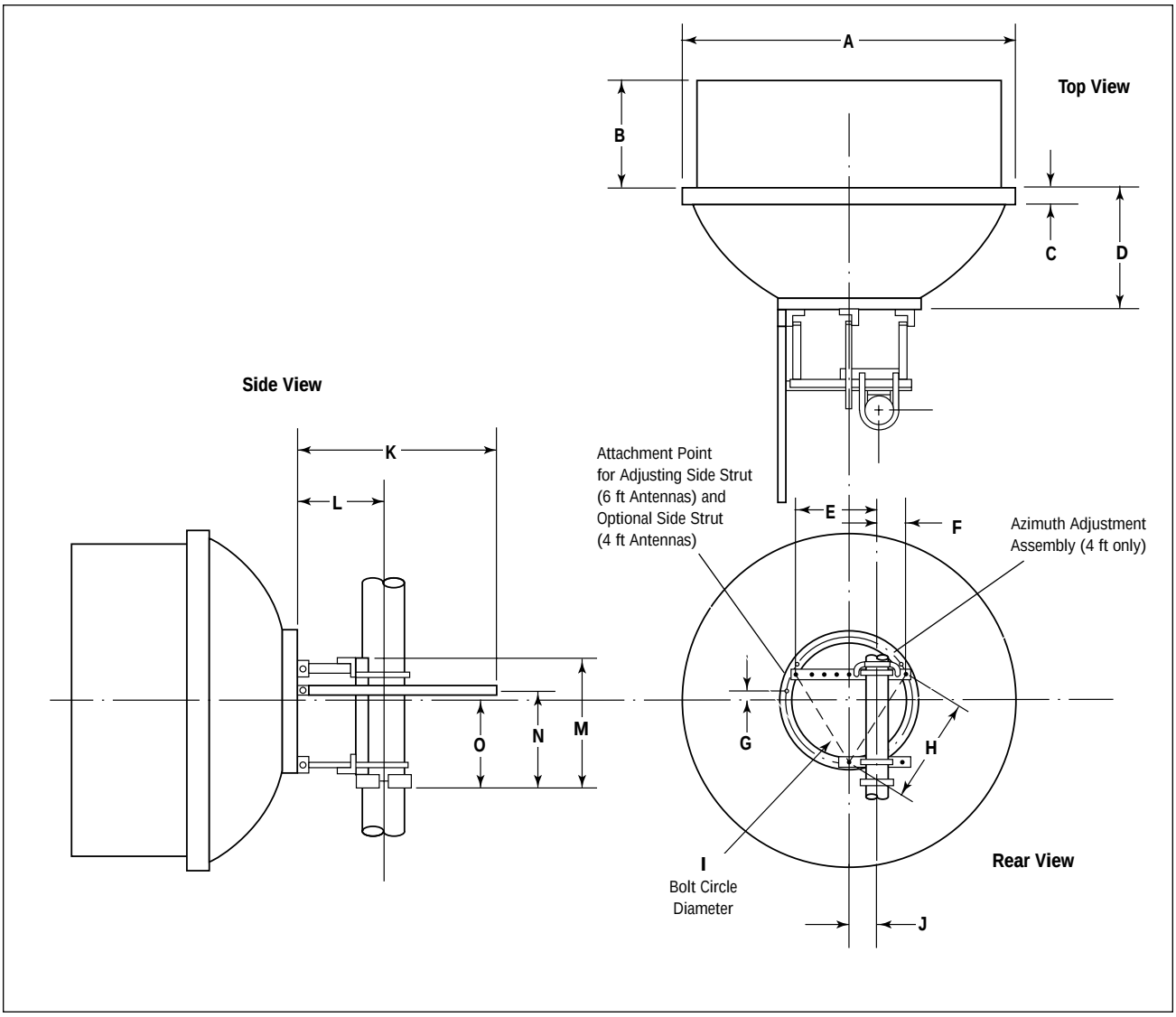
Antenna Type and Size, ft (m)	D	F	G
Shielded Antennas			
4 (1.2)	5.4 (140)	14.5 (370)	0.75 (19)
6 (1.8)	5.4 (140)	11.75 (298)	-0.6 (-15)
8 and 10 (2.4 and 3.0)	8 (205)	13 (330)	1.1 (28)
12 (3.7)	8.5 (215)	13 (330)	0.5 (13)
15 (4.6)	- 8 (-205)	15.25 (387)	8.1 (206)
Standard Antennas			
4 (1.2)	5.4 (135)	11.75 (298)	0.75 (19)
6 (1.8)	5.4 (135)	11.75 (298)	-0.6 (-15)
8 and 10 (2.4 and 3.0)	8 (205)	13 (330)	1.1 (28)
12 (3.7)	8.5 (215)	13 (330)	0.5 (-13)
15 (4.6)	-8 (-205)	15.25 (387)	8.1 (206)

2 ft Standard Antenna



Dimensions in Inches (mm)

Antenna Size, ft (m)	A	B	C	D	E	F	G
2 (0.6)	25.0 (637)	21.0 (541)	4.3 (108)	11.5 (292)	4.3 (110)	8.7 (220)	1.6 (42)

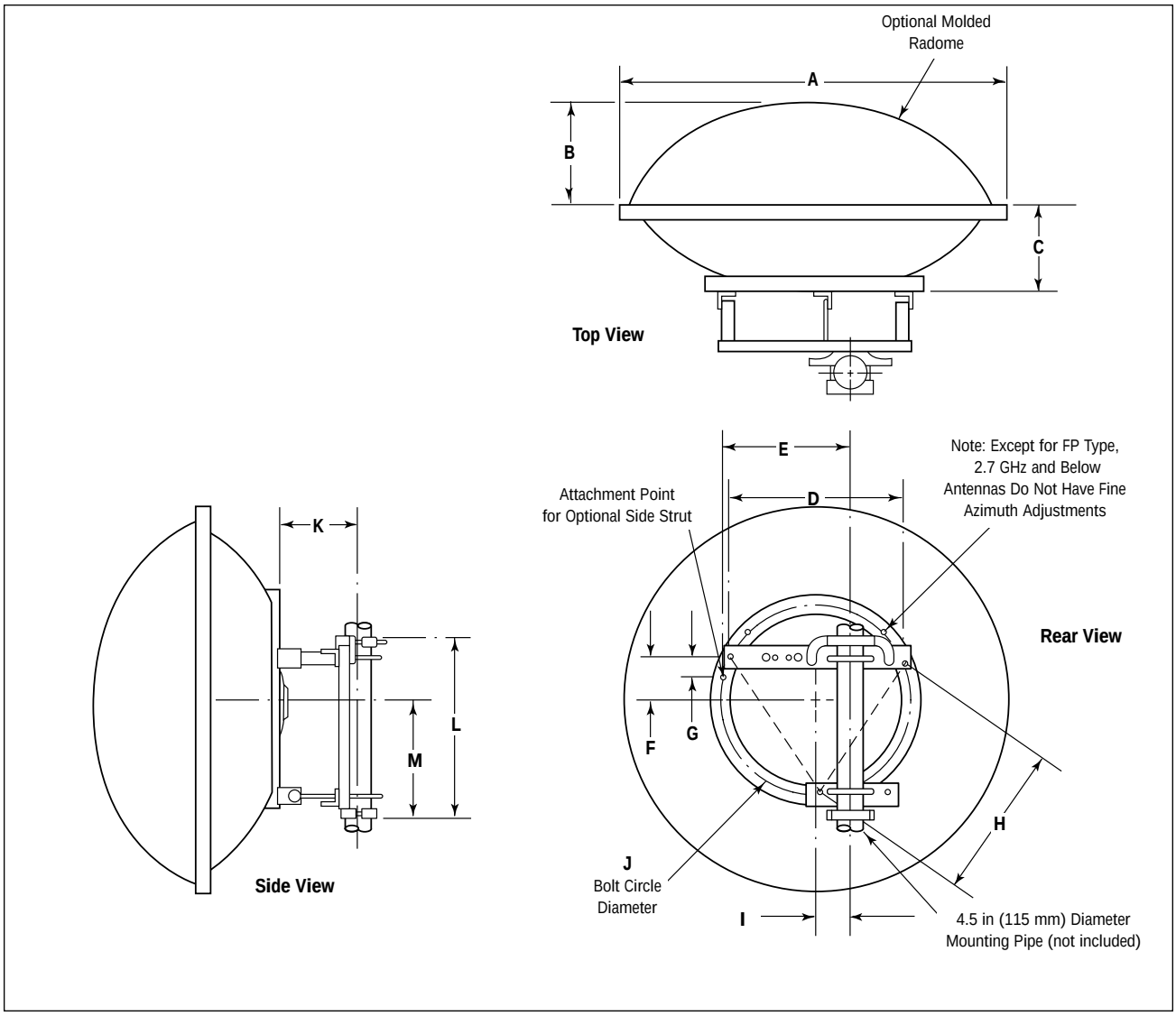


Dimensions in Inches (mm)

Antenna Size, ft (m)	A	B	C	D	E	F	G	H
4 (1.2)	52.4 (1330)	23.1 (585)	3.5 (90)	7.75 (195)	19.6 (500)	6.9 (175)	2.25 (55)	26.5 (675)
6 (1.8)	76.5 (1945)	35.25 (895)	3.75 (95)	13.25 (335)	19.6 (500)	6.9 (175)	2.25 (55)	26.5 (675)

	I	J	K	L	M	N	O
4 (1.2)	30.6 (780)	6.4 (160)	–	11.62 (295)	29 (735)	21.5 (545)	19.25 (490)
6 (1.8)	30.6 (780)	6.4 (160)	84.75 (2155)	11.62 (295)	29 (735)	21.5 (545)	19.25 (490)

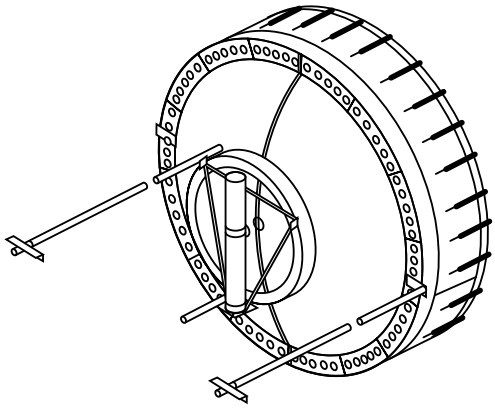
4 and 6 ft Standard and Focal Plane Antennas



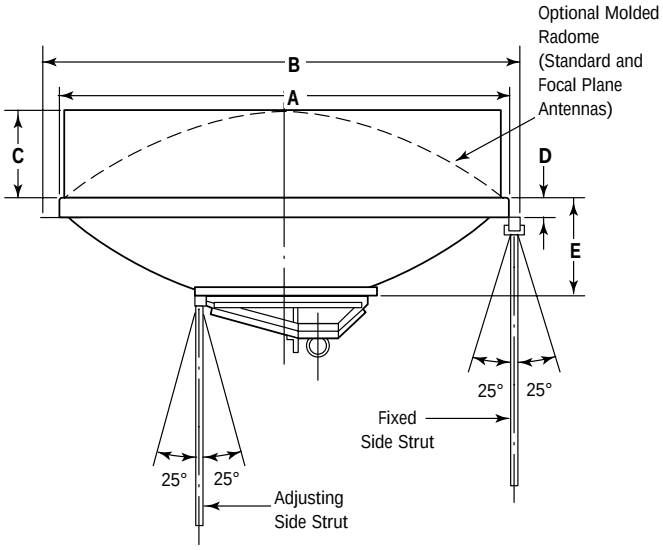
Dimensions in Inches (mm)

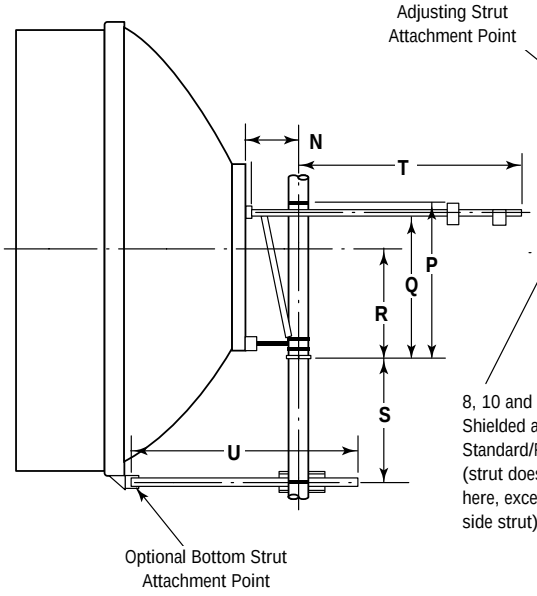
Antenna Size, ft (m)	A	B	C	D	E	F	G
Standard Antennas							
4 (1.2)	52.4 (1330)	18.5 (470)	7.75 (195)	26.5 (675)	21.5 (545)	7.75 (195)	2.25 (60)
6 (1.8)	76.3 (1940)	27.75 (690)	13.2 (335)	26.5 (675)	21.5 (545)	7.75 (195)	2.25 (60)
Focal Plane Antennas							
4 (1.2)	50.75 (1290)	23.3 (590)	9.5 (245)	26.5 (675)	21.5 (545)	7.75 (195)	2.25 (60)
6 (1.8)	76 (1930)	13.46 (340)	17.5 (445)	26.5 (675)	21.5 (545)	7.75 (195)	2.25 (60)
	H	**I**	**J**	**K**	**L**	**M**	
Standard Antennas							
4 (1.2)	26.5 (675)	5 (137)	30.6 (780)	11.6 (295)	30.75 (780)	19 (480)	
6 (1.8)	26.5 (675)	5 (137)	30.6 (780)	11.6 (295)	30.75 (780)	19 (480)	
Focal Plane Antennas							
4 (1.2)	26.5 (675)	5 (137)	30.6 (780)	11.6 (295)	30.75 (780)	19 (480)	
6 (1.8)	26.5 (675)	5 (137)	30.6 (780)	11.6 (295)	30.75 (780)	19 (480)	

8, 10 and 12 ft Shielded, Standard and Focal Plane Antennas

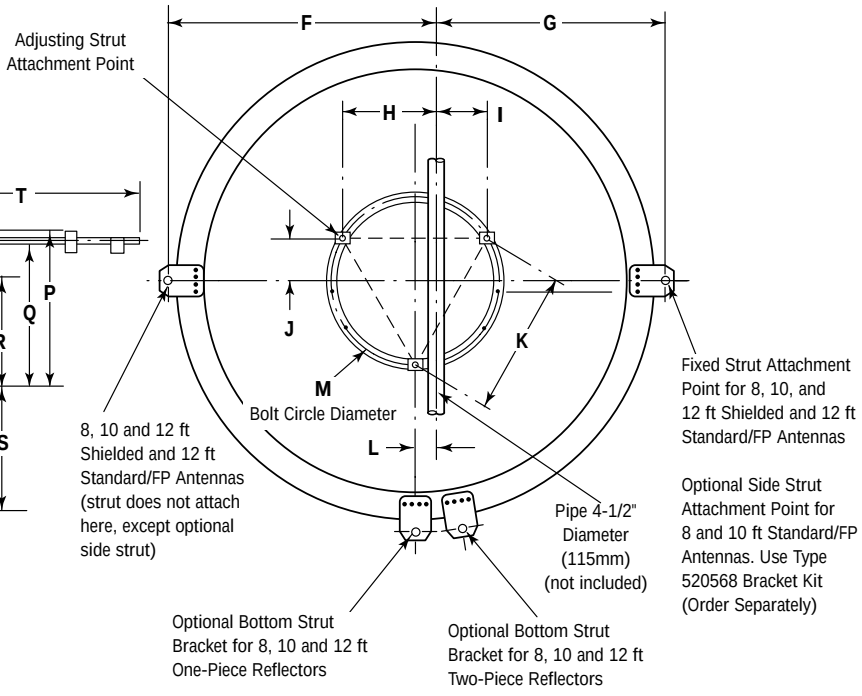


Top View





Side View



Rear View

Dimensions in Inches (mm)

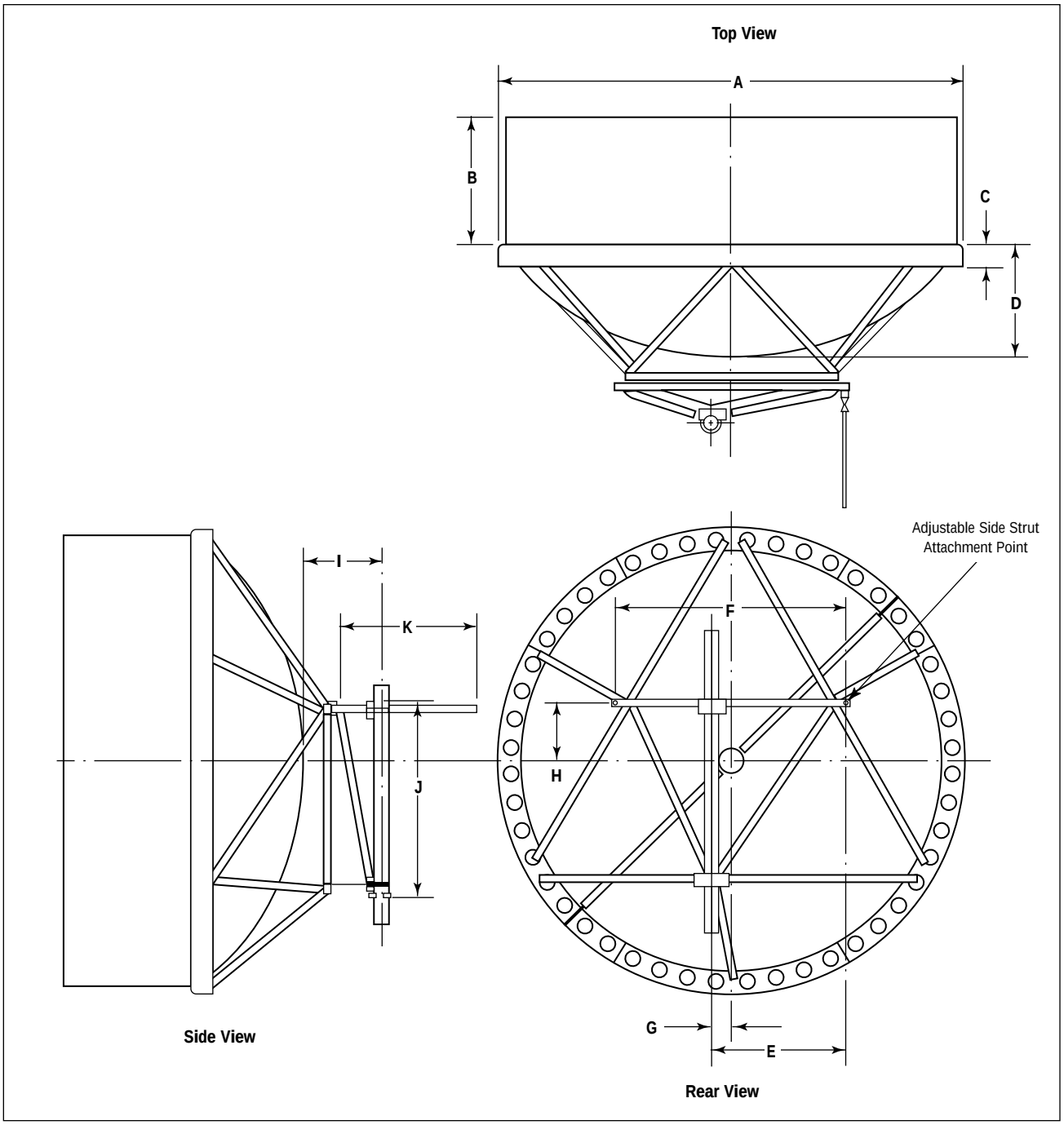
Antenna Size, ft (m)	A	B	C	D	E	F	G
Shielded Antennas (Except Dual Beam with Extended Mount)							
8 (2.4)	100.5 (2555)	106.5 (2705)	41.75 (1060)	5 (125)	15.5 (395)	59.75 (1520)	43.25 (1110)
10 (3.0)	124.5 (3160)	130.5 (3315)	31.5 (800)**	5.5 (140)	24.25 (615)	71.75 (1820)	55.75 (1415)
12 (3.7)	148.5 (3775)	154.5 (3915)	43 (1090)*	5.75 (145)	27 (685)	84.25 (2140)	67.25 (1710)
Dual Beam Antennas with Extended Mount (Sum and Difference)							
8 (2.4)	100.5 (2555)	106.5 (2705)	41.75 (1060)	5 (125)	15.5 (395)	62.75 (1595)	40.25 (1020)
10 (3.0)	124.5 (3160)	130.5 (3315)	31.5 (800)	5.5 (140)	24.25 (615)	74.75 (1900)	52.75 (1340)
12 (3.7)	148.5 (3775)	154.5 (3915)	43 (1090)	5.75 (145)	27 (685)	86.75 (2205)	64.75 (1645)
Focal Plane Antennas							
8 (2.4)	100.5 (2555)	106.5 (2705)	26.5 (670)	5 (125)	21.5 (545)	59.75 (1520)	43.25 (1110)
10 (3.0)	124.5 (3160)	130.5 (3315)	36.25 (920)	5.5 (140)	29.5 (750)	71.75 (1820)	55.75 (1415)
12 (3.7)	148.5 (3775)	154.5 (3915)	40.5 (1030)	5.75 (145)	35.5 (905)	84.25 (2140)	67.25 (1710)
Standard Antennas							
8 (2.4)	100.5 (2555)	–	36 (915)	5 (125)	15.5 (395)	–	–
10 (3.0)	124.5 (3160)	–	32.75 (830)	5.5 (140)	24.25 (615)	71.75 (1820)	–
12 (3.7)	148.5 (3775)	154.5 (3925)	36.5 (930)	5.75 (145)	27 (685)	84.25 (2140)	67.25 (1710)

Antenna Size, ft (m)	H	I	J	K	L	M	
Shielded Antennas (Except Dual Beam with Extended Mount)							
8 (2.4)	26.75 (680)	10.75 (275)	10.75 (275)	37.5 (950)	8 (200)	43.25 (1100)	
10 (3.0)	26.75 (680)	10.75 (275)	10.75 (275)	37.5 (950)	8 (200)	43.25 (1100)	
12 (3.7)	32.75 (835)	15.75 (400)	14 (355)	47.5 (1205)	8.5 (215)	56.25 (1430)	
Dual Beam Antennas with Extended Mount (Sum and Difference)							
8 (2.4)	29.75 (755)	7.75 (195)	10.75 (275)	37.5 (950)	11.0 (280)	43.25 (1100)	
10 (3.0)	29.75 (755)	7.75 (195)	10.75 (275)	37.5 (950)	11.0 (280)	43.25 (1100)	
12 (3.7)	35.25 (895)	13.25 (335)	14 (355)	47.5 (1205)	11.0 (280)	56.25 (1430)	
Focal Plane Antennas							
8 (2.4)	26.75 (680)	10.75 (275)	10.75 (275)	37.5 (950)	8 (200)	43.25 (1100)	
10 (3.0)	26.75 (680)	10.75 (275)	10.75 (275)	37.5 (950)	8 (200)	43.25 (1100)	
12 (3.7)	32.75 (835)	15.75 (400)	14 (355)	47.5 (1205)	8.5 (215)	56.25 (1430)	
Standard Antennas							
8 (2.4)	26.75 (680)	10.75 (275)	10.75 (275)	37.5 (950)	8 (200)	43.25 (1100)	
10 (3.0)	26.75 (680)	10.75 (275)	10.75 (275)	37.5 (950)	8 (200)	43.25 (1100)	
12 (3.7)	32.75 (835)	15.75 (400)	14 (355)	47.5 (1205)	8.5 (215)	56.25 (1430)	

Antenna Size, ft (m)	N	P	Q	R	S	T	U
Shielded Antennas (Except Dual Beam with Extended Mount)							
8 (2.4)	13 (330)	37.5 (950)	35.25 (895)	24.5 (625)	27.25 (695)	120 (3050)	60 (1525)
10 (3.0)	13 (330)	37.5 (950)	35.25 (895)	24.5 (625)	39.25 (1000)	120 (3050)	60 (1525)
12 (3.7)	13 (330)	48.25 (1225)	45 (1145)	31 (790)	44.75 (1140)	120 (3050)	60 (1525)
Dual Beam Antennas with Extended Mount (Sum and Difference)							
8 (2.4)	20 (510)	37.5 (950)	35.25 (895)	24.5 (625)	27.25 (695)	120 (3050)	60 (1525)
10 (3.0)	20 (510)	37.5 (950)	35.25 (895)	24.5 (625)	39.25 (1000)	120 (3050)	60 (1525)
12 (3.7)	20 (510)	48.25 (1225)	45 (1145)	31 (790)	44.75 (1140)	120 (3050)	60 (1525)
Focal Plane Antennas							
8 (2.4)	13 (330)	37.5 (950)	35.25 (895)	24.5 (625)	27.25 (695)	120 (3050)	60 (1525)
10 (3.0)	13 (330)	37.5 (950)	35.25 (895)	24.5 (625)	39.25 (1000)	120 (3050)	60 (1525)
12 (3.7)	13 (330)	48.25 (1225)	45 (1145)	31 (790)	44.75 (1140)	120 (3050)	60 (1525)
Standard Antennas							
8 (2.4)	13 (330)	37.5 (950)	35.25 (895)	24.5 (625)	27.25 (695)	120 (3050)	60 (1525)
10 (3.0)	13 (330)	37.5 (950)	35.25 (895)	24.5 (625)	39.25 (1000)	120 (3050)	60 (1525)
12 (3.7)	13 (330)	48.25 (1225)	45 (1145)	31 (790)	44.75 (1140)	120 (3050)	60 (1525)

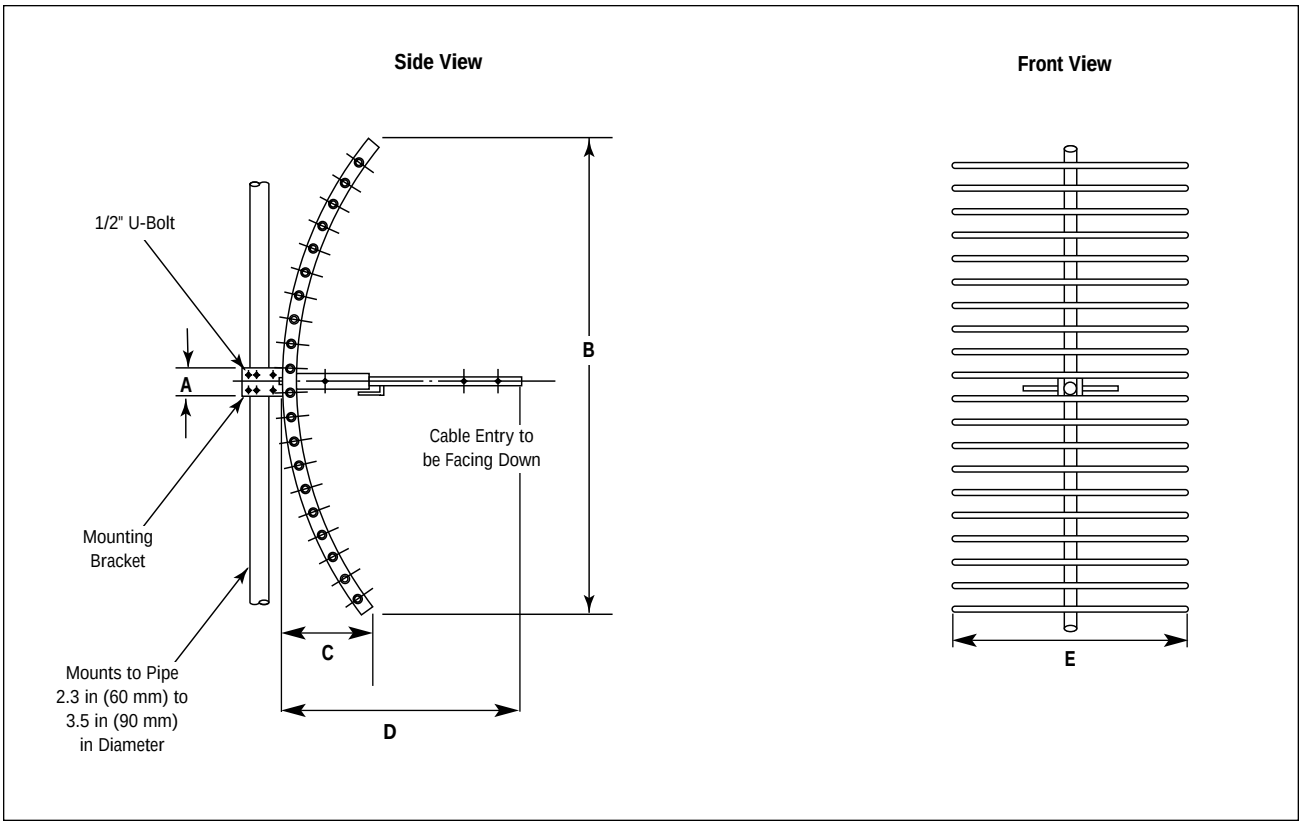
* C = 57-1/4 in (1455 mm) for UHX12-59 ** C = 37.0 in (940 mm) for HDX10-107

15 ft Shielded and Standard Antennas



Dimensions in Inches (mm)

Antenna Size, ft (m)	A	B	C	D	E	F	G	H	I	J	K
15 (4.6)	184.5 (4685)	49.0 (1245)	5.3 (135)	34.0 (865)	51.5 (1310)	87 (2210)	8 (200)	23.5 (595)	23.5 (595)	76.0 (1930)	108 (1240)



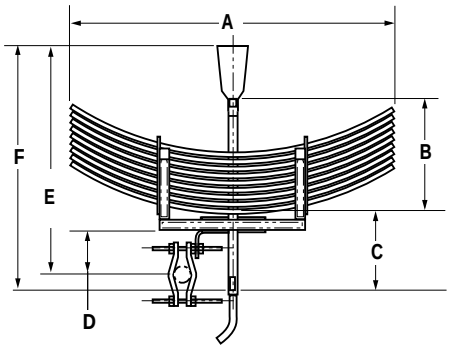
Dimensions

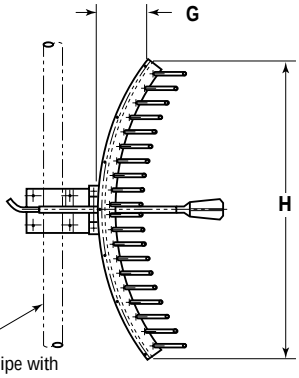
Antenna Size, ft (m)	A in (mm)	B ft (m)	C in (mm)	D in (mm)	E ft (m)
6.6 x 3.3 (2 x 1)	5 (127)	6.6 (2)	15.4 (340)	37.0 (940)	5.3 (1)

3 and 4 ft GRIDPAK® Antennas

3 ft GRIDPAK® Antennas

Top View





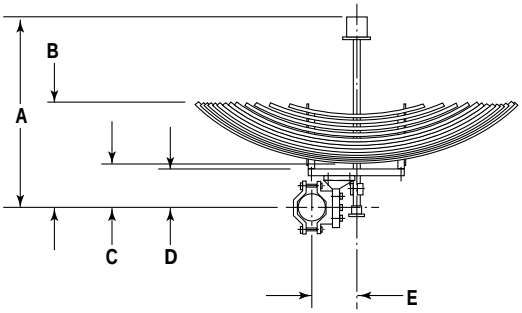
Mounts to Pipe with Outside Diameters from 1.88 in (48mm) to 4.5 in (115mm)

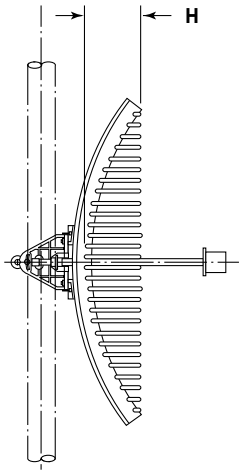
Side View

4 ft GRIDPAK® Antennas

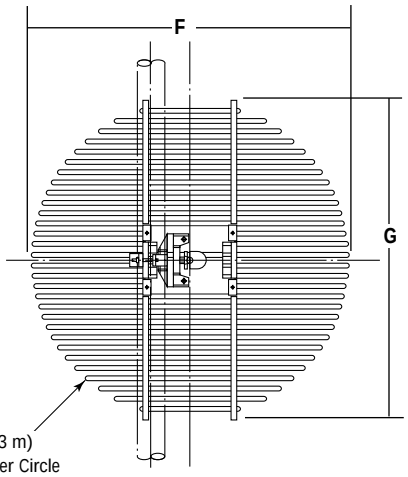
NOTE: Antenna shown is horizontally polarized and offset right

Top View





Side View

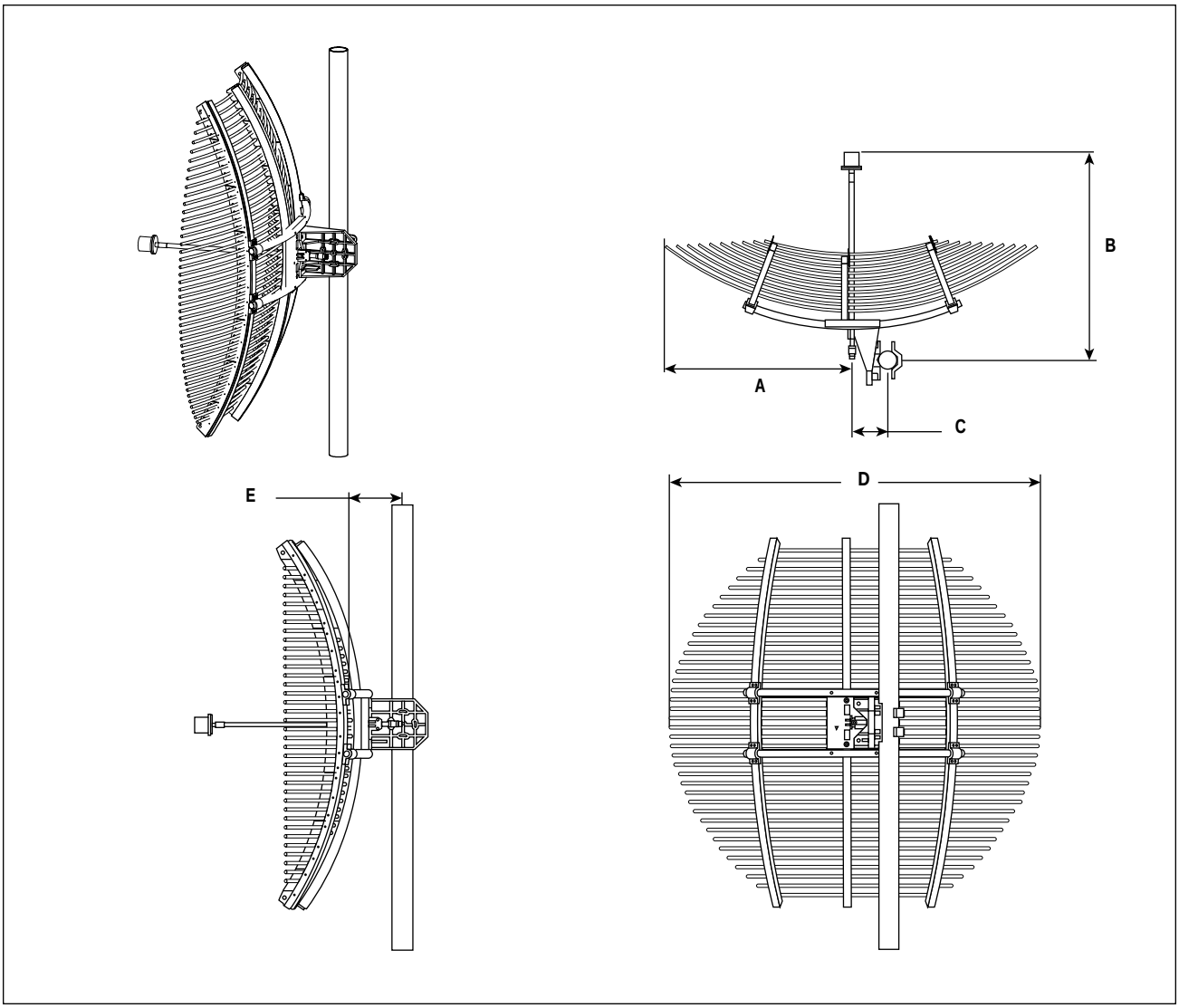


4 ft (1.3 m) Diameter Circle

Rear View

Dimensions in Inches (mm)

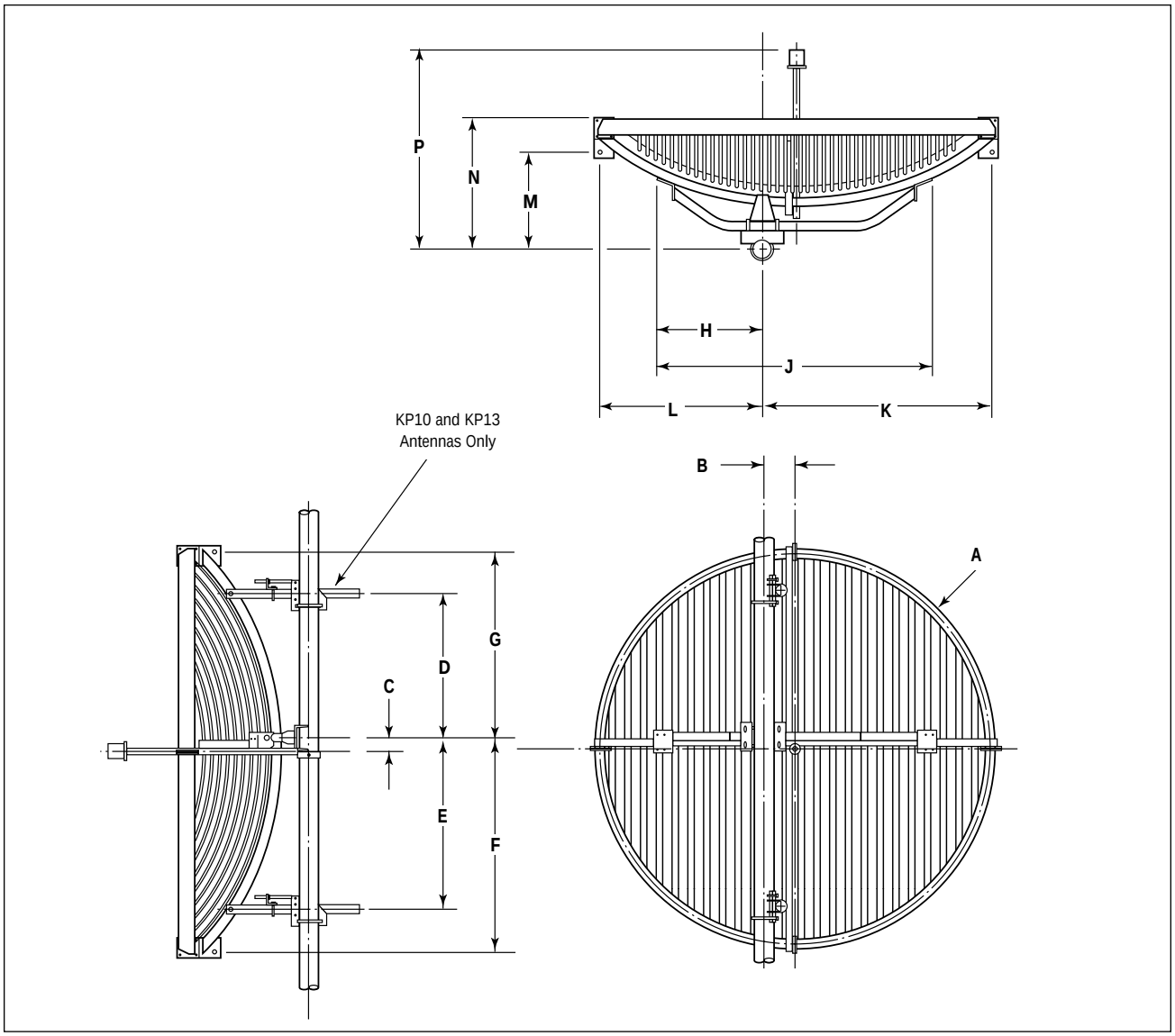
Antenna Size, ft (m)	A	B	C	D	E	F	G	H
3 (1.0)	32.3 (950)	10.9 (278)	8.1 (205)	3.6 (92)	20.5 (520)	23.1 (587)	65 (165)	37.8 (959)
4 (1.2)	29.9(772)	16.4 (416)	7.3 (185)	5.7 (146)	6.9 (175)	48.5 (1231)	51.5 (1309)	8.3 (232)



Dimensions in Inches (mm)

Antenna Size, ft (m)	A	B	C	D	E
6 (2.0)	41.3 (1049)	46.0 (1172)	8.0 (200)	81.0 (2061)	12.0 (304)

8, 10 and 13 ft GRIDPAK® Antennas



Dimensions in Inches (mm)

Antenna Size, ft (m)	A	B	C	D	E	F	G	H	J	K	L	M	N	P
8 (2.4)	99.8 (2536)	6.9 (175)	2.7 (68)	– –	40.4 (1026)	52.5 (1333)	47.1 (1197)	29.9 (760)	73.6 (1870)	56.7 (1440)	42.9 (1089)	25.6 (651)	33.0 (838)	54.8 (1392)
10 (3)	124.0 (3149)	6.9 (175)	2.7 (68)	45.9 (1167)	51.3 (1303)	64.6 (1641)	58.3 (1505)	38.4 (976)	90.6 (2302)	68.8 (1748)	55.0 (1398)	34.2 (868)	41.5 (1055)	54.3 (1378)
13 (4)	162.7 (4135)	6.9 (175)	3.0 (76)	58.7 (1491)	64.7 (1643)	84.3 (2140)	78.3 (1988)	56.4 (1433)	126.6 (3216)	88.1 (2239)	74.4 (1889)	39.7 (1008)	47.0 (1195)	71.6 (1818)

Wind Forces

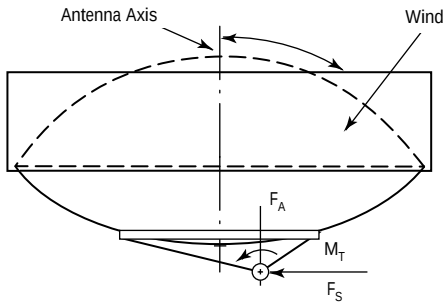
The axial, side and twisting moment forces tabulated below and on page 112 are maximum values exerted on a supporting structure. They are the result of wind from the most critical direction for each parameter. The individual maximums may not occur simultaneously. All forces are referenced to the antenna mounting pipe. The components are:

- *Axial Force, F_A*
- *Side Force, F_S*
- *Twisting Moment, M_T*

Andrew software, included on the Powertools CD-ROM and downloadable from www.andrew.com, calculates the forces produced by winds from any angle.

See page 44 for more information about Powertools.

Parabolic Antennas



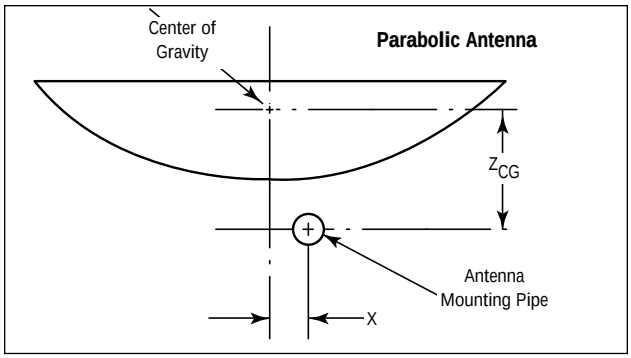
Top View

Wind Forces at 125 mph (200 km/h)

Antenna Type	Antenna Dia. ft (m)	F_A Max. lb	F_A Max. (N)	F_S Max. lb	F_S Max. (N)	M_T Max. lb-ft	M_T Max. (N•m)	α For M_T Max
Shielded Antenna	4 (1.2)	634	2821	314	1398	-632	-826	-110
With Planar Radome	6 (1.8)	1427	6348	707	3144	-1681	-2209	-110
(Except "other shielded"	8 (2.4)	2537	11284	1257	5590	-3615	-4901	-110
shown below)	10 (3.0)	3964	17632	1964	8734	-6365	-8630	-110
	12 (3.7)	5708	25390	2827	12577	-10423	-14132	-110
	15 (4.6)	8919	39672	4418	19652	22000	29828	110
Other Shielded, With Planar Radome								
UHX10-59	10 (3.0)	4000	17790	1910	8500	-6880	-9330	-105
UMX10-459	10 (3.0)	4000	17790	1970	8760	-10100	-13700	-105
HDX10-107	10 (3.0)	4040	17970	2065	9190	-7260	-9850	-105
UHX12-59	12 (3.7)	5800	25800	3020	13430	-13610	-18450	-105
UMX12-459	12 (3.7)	5760	25620	2830	12590	13400	18170	105
UMX12-465	12 (3.7)	5910	26290	3210	14280	-15590	-21140	-105
Focal Plane and PAR Series	4 (1.2)	918	4083	279	1240	-705	-937	-125
Antenna without Radome	6 (1.8)	2065	9187	625	2790	-1936	-2635	-125
	8 (2.4)	3672	16333	1115	4960	-4247	-5758	-125
	10 (3.0)	5737	25520	1742	7749	-7608	-10314	-125
	12 (3.7)	8261	36749	2509	11159	-12575	-17050	-125
Focal Plane and PAR Series	4 (1.2)	434	1930	267	1188	540	774	90
Antennas with Radome*	6 (1.8)	976	4343	685	2673	1597	2309	100
	8 (2.4)	1736	7720	1068	4751	3714	5036	99
	10 (3.0)	2712	12064	1669	7424	6883	9333	99
Standard Antenna	4 (1.2)	864	3843	236	1049	-647	-858	-130
without Radome	6 (1.8)	1944	8647	531	2360	-1597	-2425	-130
	8 (2.4)	3456	15372	943	4196	-3945	-5349	-125
	10 (3.0)	5400	24019	1474	6556	-7084	-9605	-125
	12 (3.7)	7775	34587	2122	9441	-11728	-15900	-125
	15 (4.6)	12149	54042	3316	14751	24294	32938	-125
Standard Antenna	2 (0.6)	109	483	67	297	94	128	-10
with Radome	4 (1.2)	434	1930	267	1188	540	774	90
	6 (1.8)	976	4343	685	2673	1597	2309	100
	8 (2.4)	1736	7720	1068	4751	3714	5036	99
	10 ((3.0)	2712	12064	1669	7424	6883	9333	99
	12 (3.7)	3905	17372	2403	10691	11581	15702	99
GRIDPAK® Antenna	4 (1.3)	325	1450	190	840	351	475	60
Without Ice KP Series	6 (2.0)	820	3650	430	1910	1342	1824	60
	8 (2.4)	1180	5250	600	2670	2200	2990	60
	10 (3.0)	1825	8120	1020	4540	3869	5259	60
	13 (4.0)	3135	13940	1750	7780	8022	10903	60

*PAR series use deep reflectors on 6 ft - 8 ft only.

Antenna Weight and Center of Gravity



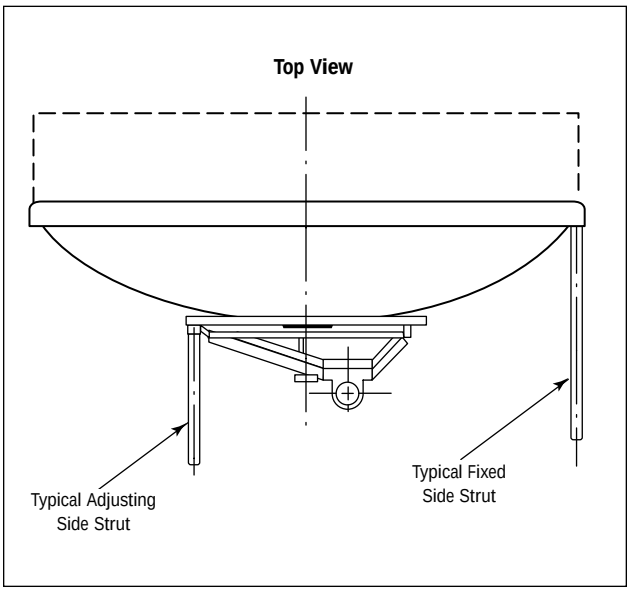
For parabolic antennas, the center of gravity is referenced to the centerline of the antenna mounting pipe as illustrated. Dimension X, the transverse offset, can be found on pages 100 to 110. Dimension Z_{CG} and antenna weights with and without ice are tabulated below.

Antenna Weight and Center of Gravity, Parabolic Antenna Including Mount and Side Struts

Antenna Type	Antenna Dia. ft (m)	Without Ice		With 1/2" (12 mm) Radial Ice	
		Weight, lb (kg)	Z_{CG}, in (mm)	Weight, lb (kg)	Z_{CG}, in (mm)
Shielded Antenna	1 (0.3)	22.9 (10.4)	3.9 (98)	30.6 (13.9)	5.1 (130)
One-Piece Reflector	2 (0.6)	41 (18.5)	9.6 (244)	77 (35)	10.7 (272)
with Planar Radome	2.5 (0.8)	78 (35.5)	6.9 (175)	96 (43.5)	8.5 (215)
(except "Other Shielded"	4 (1.2)	170 (77)	11.1 (282)	280 (127)	14.6 (371)
shown below)	6 (1.8)	281 (127)	20.0 (508)	501 (227)	22.8 (579)
	8 (2.4)	447 (203)	26.5 (673)	974 (430)	28.7 (729)
	10 (3.0)	541 (245)	30.2 (767)	1234 (560)	32.2 (818)
	12 (3.7)	850 (386)	31.2 (792)	1874 (850)	35.8 (909)
Shielded Antenna	8 (2.4)	460 (209)	27.0 (686)	989 (449)	28.8 (732)
Two-Piece Reflector	10 (3.0)	560 (254)	30.7 (780)	1254 (569)	32.3 (820)
with Planar Radome	12 (3.7)	860 (390)	31.8 (808)	1885 (855)	36.0 (914)
	15 (4.6)	1780 (807)	51.4 (1306)	2777 (1260)	54.0 (1372)
Other Shielded, with Planar Radome					
VHP1	1 (0.3)	22.9 (10.4)	3.9 (98)	30.6 (13.9)	5.1 (130)
VHP2	2 (0.6)	68 (31)	6.9 (175)	86 (39)	8.5 (215)
VHP4	4 (1.2)	140 (64)	12.5 (317)	282 (128)	16.7 (424)
VHP6	6 (1.8)	380 (173)	20.0 (508)	620 (282)	33.3 (848)
HDX8S-59	8 (2.4)	470 (213)	25.8 (655)	1010 (458)	28.2 (716)
UMX10-459	10 (3.0)	705 (320)	46.0 (1168)	1310 (594)	51.0 (1295)
HDX10-107	10 (3.0)	555 (252)	30.7 (780)	1275 (578)	32.7 (831)
HDX10S-59	10 (3.0)	560 (254)	29.6 (752)	1270 (576)	32.0 (813)
UMX12-459	12 (3.7)	895 (406)	44.0 (1118)	1660 (753)	49.0 (1245)
UMX12-465	12 (3.7)	960 (435)	29.9 (759)	2025 (919)	31.0 (787)
UHX12-59	12 (3.7)	890 (404)	33.3 (846)	1815 (823)	39.3 (998)
HDX12S-59	12 (3.7)	890 (404)	30.3 (770)	1940 (880)	35.1 (892)
Standard Antenna	2 (0.6)	14 (7)	6.5 (165)	58 (26)	7.9 (201)
One-Piece Reflector	4 (1.2)	104 (47)	7.0 (178)	175 (79)	10.9 (277)
without Radome	6 (1.8)	143 (61)	10.0 (254)	294 (133)	13.5 (343)
	8 (2.4)	251 (114)	13.5 (343)	536 (243)	16.8 (427)
	10 (3.0)	317 (144)	18.0 (457)	784 (356)	21.7 (551)
	12 (3.7)	540 (245)	19.0 (483)	1158 (525)	22.3 (566)
Other Standard, One-Piece Reflector without Radome					
VP2	2 (0.6)	49 (22.3)	3.5 (88)	54.4 (24.3)	4.3 (110)
VP4	4 (1.2)	90 (41)	2.7 (38)	194 (88)	6.2 (157)
VP6	6 (1.8)	205 (93.2)	10 (254)	363 (165)	13.5 (343)
Standard Antenna	2 (0.6)	17 (8)	8.7 (221)	81 (37)	9.9 (251)
One-Piece Reflector	4 (1.2)	119 (54)	10.0 (254)	189 (86)	14.6 (371)
with Radome	6 (1.8)	162 (73)	13.7 (348)	321 (146)	19.6 (498)
	8 (2.4)	304 (138)	19.8 (503)	621 (282)	25.0 (635)
	10 (3.0)	402 (182)	25.8 (655)	916 (415)	31.7 (805)
	12 (3.7)	654 (297)	26.9 (683)	1356 (615)	32.8 (833)
Standard Antenna	8 (2.4)	264 (120)	14.0 (356)	550 (249)	17.3 (439)
Two-Piece Reflector	10 (3.0)	336 (152)	18.5 (470)	804 (365)	22.2 (564)
without Radome	12 (3.7)	600 (272)	19.6 (498)	1219 (553)	22.9 (582)
	15 (4.6)	1240 (562)	32.3 (820)	2269 (1029)	36.4 (925)
GRIDPAK® Antenna	4 (1.3)	51 (23)	10.0 (254)	–	–
	6 (2)	198 (90)	14.5 (368)	–	–
	8 (2.4)	282 (128)	16.0 (406)	–	–
	10 (3)	418 (190)	21.5 (546)	–	–
	13 (4)	517 (235)	25.5 (648)	–	–

Side Strut Axial Forces

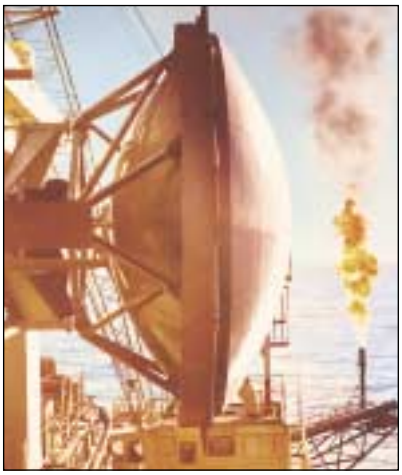
Maximum axial forces produced on support structures by antenna side struts are tabulated below. In each case, the loads are the result of a 125 mph (200 km/h) wind from the most critical direction and each side strut is positioned at the most extreme angle permitted by the specifications on page 97. The forces are components of, not in addition to, the maximum forces which are referenced to the mounting pipe on page 111.



Maximum Antenna Side Strut Axial Force, 125 mph (200 km/h) Wind

Antenna Type	Size ft (m)	Adjustable Strut Force, lb (N)	Fixed Strut Force, lb (N)
Shielded Antenna	6 (1.8)	2070 (9207)	–
(except “Other Shielded”	8 (2.4)	958 (4261)	1265 (5627)
shown below)	10 (3.0)	1320 (5871)	1987 (8838)
	12 (3.7)	1799 (8001)	2585 (11498)
	15 (4.6)	7921 (35233)	–
Other Shielded Antennas			
UHX10-59	10 (3.0)	1452 (6558)	2184 (9714)
UMX10-459	10 (3.0)	4086 (18175)	4492 (19980)
UHX12-59	12 (3.7)	2392 (10640)	3437 (15288)
UMX12-459	12 (3.7)	4137 (18401)	4545 (20216)

Antenna Options



UHX10-59	125 mph (200 km/h)
WUHX10-59	155 mph (250 km/h)
SUHX10-59	200 mph (320 km/h)

UHX10-59	Standard paint
EUHX10-59	Corrosive environment paint
WEUHX10-59	High wind and corrosive environment paint

All antenna orders require option codes to specify the details for your system. Most antennas include options for selecting feed input types, paint color, radome, packing, and environmental offerings. These option codes are unique characters placed before (prefix) or after (suffix) the base antenna type number. Prefix codes are optional. Suffix codes are required.

Prefix Option Codes

The prefix option codes include special environmental options such as high wind and corrosive environment. For additional information about special environment antennas, request Bulletin 3522.

High Wind Environment Options

High wind options that exceed the standard 125 mph (200 km/h) wind survival rating are available in 155 mph (250 km/h) and 200 mph (320 km/h) survival rating. These heavy duty antenna versions feature strong back structures for maintaining alignment accuracy in adverse and severe wind conditions.

Use the “W” prefix for 155 mph (250 km/h), and the “S” prefix for 200 mph (320 km/h) survival ratings.

Corrosive Environment Options

The corrosive environment option is available for most antennas. This option provides long term protection in marine or salt and most industrial environments including chemical and fossil fuel areas. A special epoxy paint applied at the factory provides added protection. In addition, corrosion inhibiting compounds and protective sealants are applied during installation.

Note: High wind and corrosive environment prefix codes are optional.

Suffix Option Codes

Suffix option codes are required for your antenna order. The suffix option code is made up of three characters. The first character indicates the feed input type, the second character indicates the antenna color and applicable radome information, and the third character indicates the packing options.

The option code's first character, indicating connector or flange type, has no default. You must specify a flange type for each antenna ordered. The remaining option codes, indicating antenna color, radome, and packing, are optional. If you do not specify a code for the second and third characters you will receive the default.

Note: Not all connector and flange types listed are applicable for all antennas. Refer to the antenna input options listed in each antenna ordering table. Additional options available. Contact Andrew.

Antenna Input Option Codes

Coaxial Applications	
Connector Type	**Option Code**
7/8" EIA	E
"F" Flange Female	F
7/16 DIN Female	H
Type N Female	N
Waveguide Applications	
Flange Type	**Option Code**
PBR	B
PDR	D
WR75	C
CPR	P
UG*	U

* Compatible with choke or cover

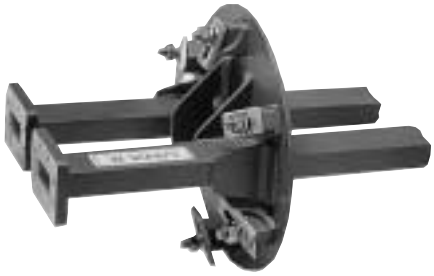
Antenna Color/Radome Option Codes

Antenna Color	Radome Type/Color*	Option Code
Gray	Hypalon/White	1
Gray	TEGLAR®/White	3
Gray	Not Available	7
Unpainted	Not Available	W (for GRIDPAK®)
Gray**	Molded/Gray	X

* All radomes listed have Andrew logo.
** UNIPAK includes the radome and antenna in a single container.
Solid reflectors available for 2 ft to 10 ft, not available for 12 ft, 15 ft or any split two piece reflectors.
For additional color information see pages 116-117.
For additional radome information see pages 116-119.

Packing Option Codes

Packing	Option Code
Standard Global Pack	A
Standard Global Pack for Two-Piece Split Reflector or GRIDPAK®	M



Type Number with Option Code:	UHX10-59-**P**
Description:	UHX10-59 antenna with CPR flange

Type Number with Option Code:	UHX10-59-**P3**
Description:	UHX10-59 antenna with CPR flange, painted gray with white TEGLAR radome

Type Number with Option Code:	UHX10-59-**P3A**
Description:	UHX10-59 antenna with CPR flange, painted gray with white TEGLAR radome, Standard Global Pack

Radomes

Radomes

Radomes are available for most Andrew antennas. Radomes reduce wind loading to the tower while providing added protection for the feed from the elements. There are two types of radomes, flexible and molded. Flexible radomes are provided on shielded antennas and molded radomes are options to standard and focal plane antennas. All radomes have a standard minimum wind survival of 125 mph (200 km/h).

Flexible Radomes

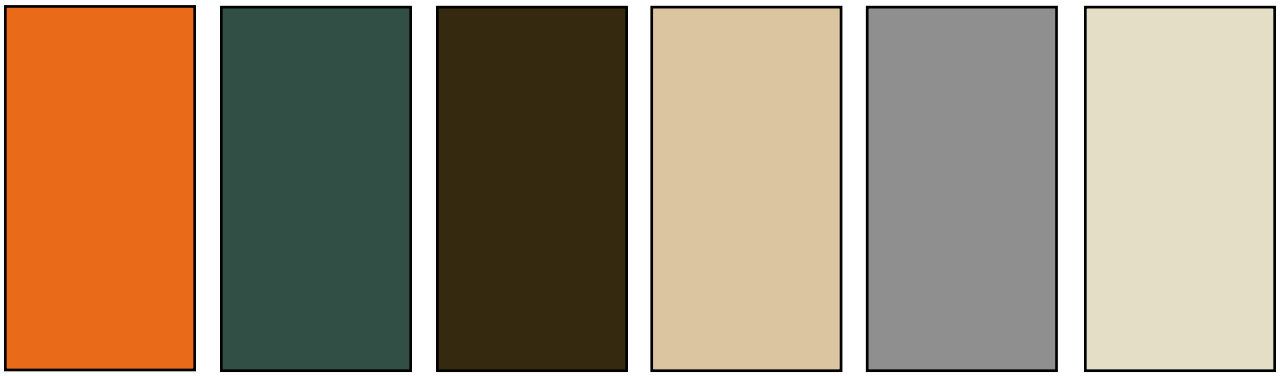
Flexible radomes are either Hypalon or TEGLAR® material. These materials are stretched and tensioned across the opening of the shield.* The radome flexes slightly in the wind, shedding ice and snow in most environments.

Hypalon is a rubber coated nylon material that is durable and suited for most normal environments. The standard color is white. Field painting is optional.

TEGLAR® is a polymer coated fiberglass material that provides the greatest protection in harsh environments. A special version of the TEGLAR radome is available with high wind series antennas. The standard color is white. Optional colors are available. TEGLAR radomes cannot be field painted.

* FPHP antennas include molded radomes. 4 ft (1.2 m) TEGLAR radome is pre-tensioned.

Optional Colors

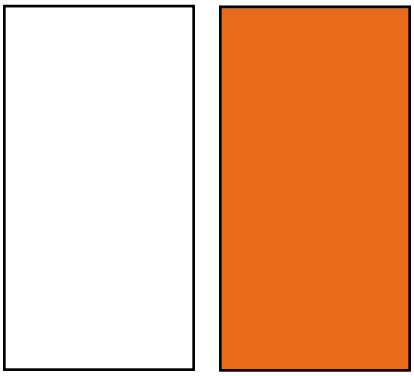


Aviation Orange | **Green** | **Brown** | **Light Tan** | **Gray** | **Beige**

Molded Radomes

Molded radomes are made from fiberglass or ABS plastic. They directly bolt to the reflector rim. The standard color is dark gray. Optional colors are available. Field painting is optional.

Optional Colors



Most other colors available on request

Aviation White **Aviation Orange**

Pre-Tensioned Radomes

The new global offering for 4 ft (1.2 m) shielded antennas includes the pre-tensioned radome. This radome, made from TEGLAR® material is bonded to a support ring. The radome and ring are directly bolted to the shield assembly. Pre-tensioned radomes replace the previously offered spring tensioned design radomes.

Radome Applications

Antenna Types	Antenna Series	Included Radome	Standard Color	Optional Radomes
Ultra High Performance	UHP®, UHX®, HDX, HSX	TEGLAR	white	–
UMX Multiband	UMX®	TEGLAR	white	–
High Performance	HP, HPX, HDH, HDV	Hypalon	white	TEGLAR
Standard	P, PX, PL, PXL, PAR	None	gray	Standard molded Extra strength molded, 10 and 12 ft (3.0 and 3.7 m)
Focal Plane	FP, FPX	None	gray	Standard molded Extra strength molded, 10 and 12 ft (3.0 and 3.7 m)

Radome Electrical Characteristics

Planar Radomes. The electrical characteristics of the planar radome are incorporated into the electrical performance specifications of the shielded antenna.

Molded Radomes. The use of a molded radome on standard (P-Series) or focal plane (FP-Series) antennas may slightly impact maximum antenna VSWR. Attenuation and system VSWR effects are listed in the table below. To determine the maximum VSWR across the band for the antenna/radome combination, add the figure from the table to the maximum antenna VSWR specification.

10 ft and 12 ft standard molded radomes are rated for 125 mph (200 km/h) while 4 ft, 6 ft and 8 ft standard radomes are rated for 150 mph (240 km/h); extra strength molded radomes for 10 ft and 12 ft which are rated for 150 mph (240 km/h) are also available.

Typical Molded Radome Attenuation and VSWR

Radome Type	Diameter ft (m)	Attenuation, dB 2 GHz	6 GHz	8 GHz	11 GHz	13 GHz	15 GHz	18 GHz	Add to Antenna VSWR 2 GHz	6 GHz	11 GHz and above
Standard Antenna Radomes											
Standard	2 (0.6)	0.1	0.4	0.6	1.0	1.2	1.5	2.7	0.02	0.03	0.05
Standard	4 (1.2)	0.1	0.4	0.7	1.2	1.5	2.0	2.9	0.02	0.03	0.05
Standard	6 (1.8)	0.1	0.5	0.9	1.4	1.7	2.1	2.9	0.02	0.03	0.03
Standard	8 (2.4)	0.1	0.6	1.0	1.5	1.8	2.2	–	0.02	0.03	0.03
Standard	10 (3.0)	0.2	0.9	1.3	1.8	2.1	2.5	–	0.02	0.03	0.03
Standard	12 (3.7)	0.2	1.0	1.3	1.9	2.2	2.6	–	0.02	0.03	0.03
Extra Strength	10 (3.0)	0.3	1.2	1.5	2.0	2.2	2.6	–	0.02	0.03	0.03
Extra Strength	12 (3.7)	0.03	1.4	1.7	2.0	2.3	2.6	–	0.02	0.03	0.03
Focal Plane Antenna Radomes											
Standard	4 (1.2)	0.1	0.4	–	–	–	–	–	0.03	0.03	–
Standard	6 (1.8)	0.1	0.5	–	–	–	–	–	0.03	0.03	–
Standard	8 (2.4)	0.1	0.6	–	–	–	–	–	0.03	0.03	–
Standard	10 (3.0)	0.2	0.9	–	–	–	–	–	0.03	0.03	–
Standard	12 (3.7)	0.2	1.0	–	–	–	–	–	0.03	0.03	–
Extra Strength	4 (1.2)	0.1	0.4	–	–	–	–	–	0.05	0.05	–
Extra Strength	6 (1.8)	0.2	0.8	–	–	–	–	–	0.05	0.05	–
Extra Strength	8 (2.4)	0.2	0.9	–	–	–	–	–	0.05	0.05	–
Extra Strength	10 (3.0)	0.3	1.2	–	–	–	–	–	0.05	0.05	–
Extra Strength	12 (3.7)	0.3	1.4	–	–	–	–	–	0.05	0.05	–

Current Model Antennas

Shielded antennas. All shielded antennas include a Hypalon or TEGLAR® radome. Several antennas (HP and HPX) can be upgraded to TEGLAR for a minimal fee.

Standard and focal plane antennas. Standard and focal plane antennas* do not include a molded radome but in order to reduce wind loading, one can be added to the antenna crate. The radome can be shipped with the antenna using the UNIPAK shipping option. Specify the type number from the table below.

* FPHP antennas include radome

Older Model Antennas

Radome clip kits. Standard antennas (P-Series) reflector with a rolled rim manufactured prior to: September 1987 for 4 ft (1.2 m) and 10 ft (3.0 m), February 1991 for 8 ft (2.4 m), and July 1991 for 6 ft (1.8 m) diameters require the additional clip kit listed in the table below.

Pre-tensioned radomes. For shielded 4 ft (1.2 m), TEGLAR spring-type attachment radomes have been replaced by pre-tensioned TEGLAR radomes that are directly attached to the rim of the shield. Field drilling is required. **Type Number 520093-9**

Standard molded radomes. The 2 ft (0.6 m) standard molded radome has changed in design. For antennas shipped prior to June 1998, request **Type Number R2E**.

Flexible planar radome replacement kits. These kits include one radome and hardware to replace an existing Andrew planar radome. Specify the type number from the table below.

Edge protection kit for TEGLAR® radomes. This kit prevents damage to the untensioned radome edge between J-bolt anchor points caused by unusually high gusting winds. Kit includes stainless steel edge protector strips and attachment hardware. The strips are fastened in pairs to form a band around the edge of the radome. Specify the type number from the table below.

Radome Ordering Information

Reflector Diameter ft (m)	Standard Molded	Extra Strength Molded	Focal Plane Molded	Extra Strength Focal Plane Molded	Clip Kit	Hypalon	TEGLAR	Edge Protection Kit (TEGLAR)
2 (0.6)	R2E, VR2, VR2-WH	–	–	–	–	–	207150***	–
4 (1.2)	R4E	R4E	FR4	FR4-E	207844-1	–	207106** 520093-9*	–
6 (2.0)	R6E	R6E	FR6	FR6-E	207844-2	520434-1	45665-1	205866-3
8 (2.4)	R8F	R8F	FR8	FR8-E	207844-3	520434-2	45665-2	205866-4
10 (3.0)	R10G	39193B	FR10	FR10-E	207844-4	520434-3	45665-3	205866-1
12 (3.7)	R12F	39194	FR12	FR12-E	–	520434-4	45665-4	205866-2
15 (4.6)	–	–	–	–	–	520434-5	45665-5	205866-5

* Pre-tensioned radome

** Spring tensioned radome for older style antennas

***Except 2 ft is gray

Antenna Packing

Heavy Duty Export Pack

Standard Pack

Dual Pack

Packing Type

Standard Pack. In most cases, Andrew standard packing is suitable for export. Antennas are shipped as one unit. GRIDPAK® antennas and mounts are shipped in one carton or crate. 4-12 foot (1.2-3.7 m) radomes are shipped in wood crates.

Heavy Duty Export Pack. For your convenience, Andrew also offers a heavy duty export packing option, which includes plywood sheathing of the entire antenna crate. This packing is suitable for ocean, container or air shipment. Multiple packing is also available which will provide considerable savings to the customer.

Dual Pack. Two antennas are packaged together in one crate, reducing overall shipping volume.

4 ft Shielded Antenna Pack

Packing Quantity

10-foot (3.0 m) and larger antennas and molded radomes may require special handling in shipping, depending on destination and routing. For systems requiring a large number of antennas, special packs can be quoted to reduce shipping volume. For example, it is often convenient to pack all antennas for the same site in the same box. Andrew can also provide bulk transport and on-site assembly of antennas.

For more details about crate dimensions and approximate weights, consult the price list for this catalog.

4 - 6 - 8 ft Standard Radome Pack

6 ft Shielded Antenna Pack

8 - 10 ft Shielded Antenna Pack

KP Series GRIDPAK® Antenna Pack

12 ft (split) Antenna Pack

UNIPAK

GRIDPAK® disassembled

One piece reflector

Two piece reflector

Reflector Type

One and Two-Piece Antennas. Antennas are supplied with one-piece reflectors or with two-piece reflectors split through the center and bolted together at the site. GRIDPAK® and Mini-GRIDPAK antennas are supplied with reflectors that are completely disassembled. Standard and optional reflector types are dependent on antenna size and type. Refer to the table.

Special Purpose Mounts

In addition to the standard mounts listed on page 96, Andrew can provide horizontal and vertical tilt mounts and other mount options to meet most special requirements. Contact Andrew for further information.

Standard and Optional Reflectors

Antenna Diameter	Reflector Type Standard	Optional
Solid Antennas - Standard, High Performance and Ultra High Performance		
2-6 ft (0.3-1.8 m)	One-Piece	–
8-10 ft (2.4-3.0 m)	One-Piece	Two-Piece
12 ft (3.7 m)	Two-Piece	One-Piece
15 ft (4.6 m)	Two-Piece	–
GRIDPAK and Mini GRIDPAK Antennas - KP, KPR, MKP Series		
All	Reflector shipped Disassembled	–

Additional Struts for Microwave Antennas

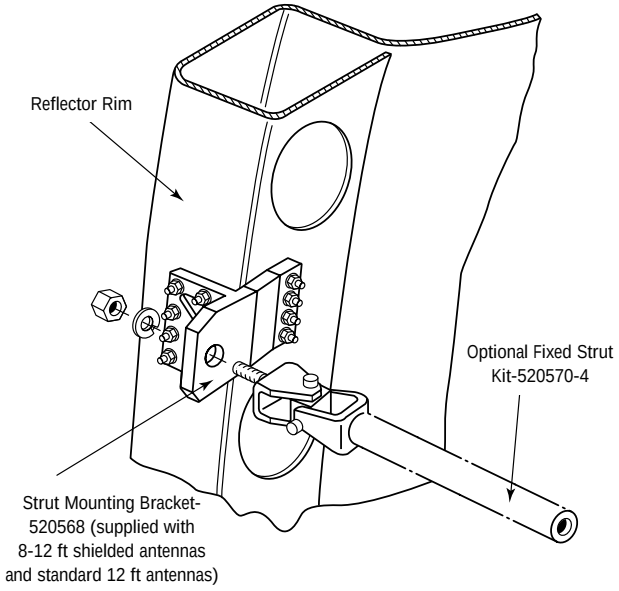
Fixed and Adjustable Side Struts provide increased rigidity. They can be added to any of the antennas, as indicated in the table, as a first or second strut.

Bottom Struts are recommended for high ice load environments. Requires mounting pipe which extends to bottom edge of antenna.

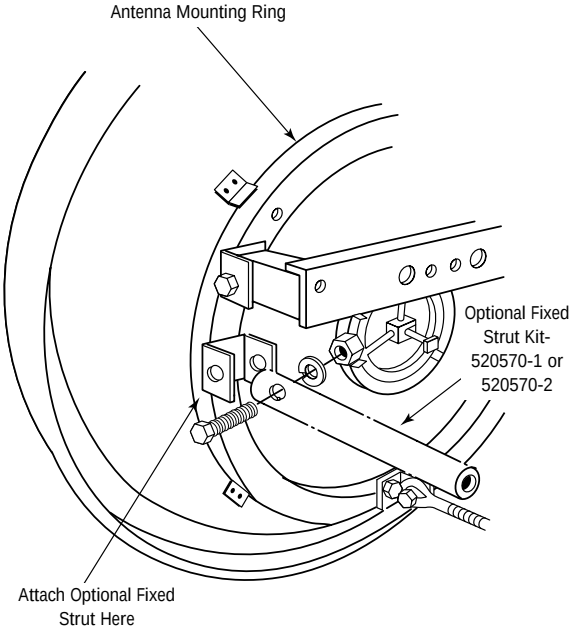
Attachment of Strut to Antenna

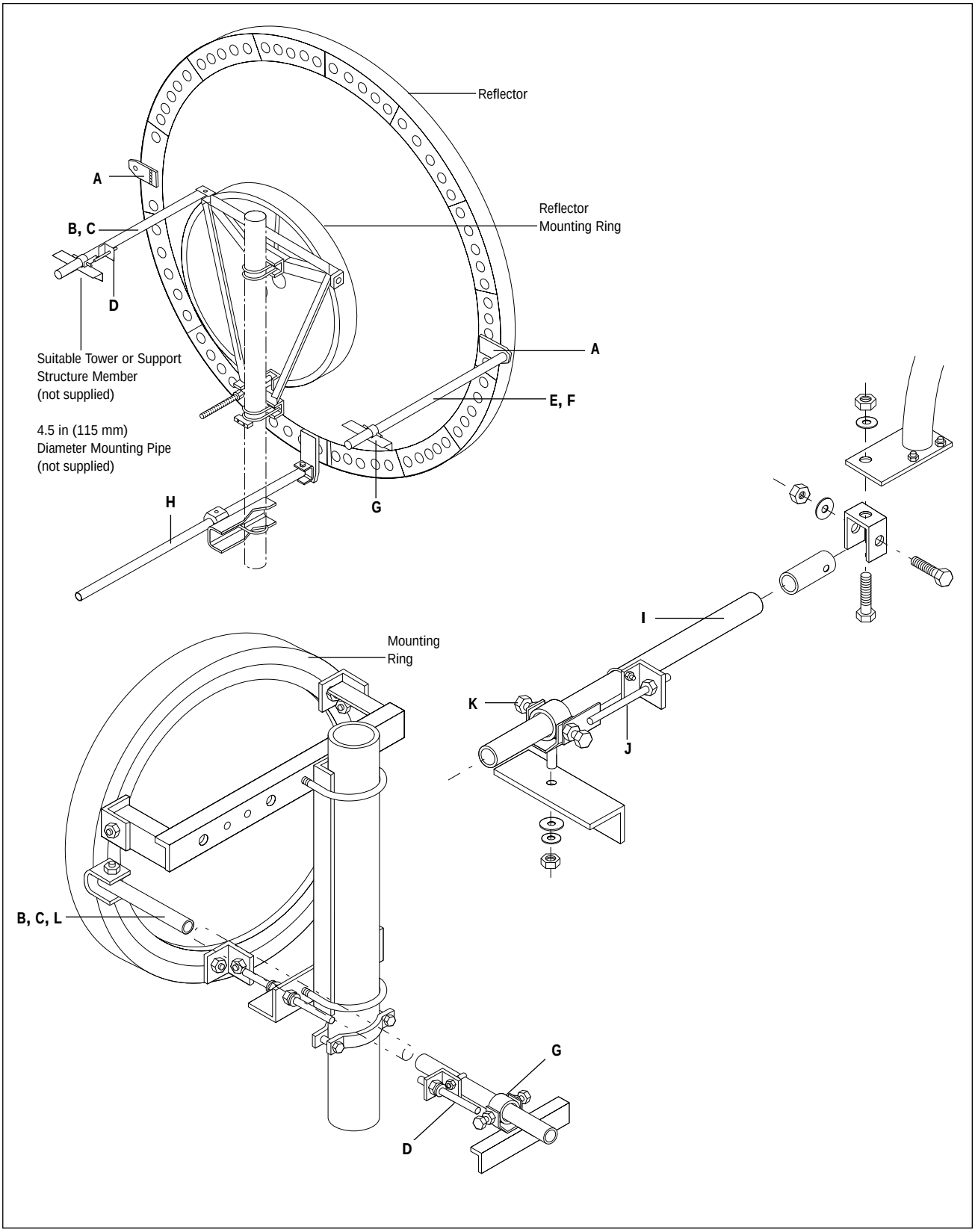
The strut attaches either to a bracket at the antenna rim or to the antenna mounting ring. See illustration.

Attachment at Antenna Rim
8 through 12 ft Sizes



Attachment at Antenna Mounting Ring
4 and 6 ft Sizes




Reflector
A
B, C
Reflector
Mounting Ring
D
A
Suitable Tower or Support
Structure Member
(not supplied)
E, F
4.5 in (115 mm)
Diameter Mounting Pipe
(not supplied)
H
G
I
Mounting
Ring
K
J
B, C, L
G
D

A Reflector Strut Brackets, Type Number 520568 (replaces 44695)

Two brackets attach to the edge of 8 ft, 10 ft, and 12 ft reflectors to provide an attachment point for the fixed side strut. Brackets are cast aluminum and the kit contains all (metric) stainless steel hardware for attachment to the reflector. Quantity: 2 per kit.

B Adjustable Inboard Strut Kit, Type Number 520570-1 (replaces 221865) Solid reflector for the 12 ft.

Azimuth wind brace with threaded rod adjustment assembly allows for fine antenna alignment and lock down. Galvanized steel pipe and brackets include all (metric) galvanized hardware for attachment to antenna mount or reflector mounting ring. Also includes item D, and G for tower end attachment. Strut pipe is schedule 80, and 10.5 ft (3.2 m) in length.

C Inboard Strut Kit (less azimuth adjustment), Type Number 520570-2

Typically used as an optional side strut for 4 ft (1.2 m) and 6 ft (1.8 m) reflectors same as B less item D. Includes strut and strut collar assembly (G).

D Azimuth Adjustment Kit, Type Number 520569 (replaces 40186-2)

Attaches to inboard side strut (and strut collar assembly) to allow fine movement of the antenna during final alignment. Straight (metric) threaded rod assembly and associated hardware included. Order strut collar clamp (G) separately.

E Outboard Strut Kit, Type Number 520570-3

Galvanized fixed side strut provides increased rigidity. Kit includes universal joint and (metric) hardware for attachment to reflector strut bracket (item A) included. Strut collar assembly (item G) also included to provide interface to tower. Strut pipe is schedule 80 and 10.5 ft (3.2m) in length.

F Outboard Strut Replacement Kit, Type Number 520570-4 (replaces 38891A)

Includes item G less item A reflector bracket.

G Strut Collar Assembly, Type Number 520477 (replaces 222944)

Provides tower interface and strut securement point. Galvanized clamp assembly includes stainless and galvanized hardware. (See tower interface options).

H Bottom Strut Kit, Type Number 520570-5 (replaces 40604)

Provides additional support to antennas due to weight of high ice loads. Reflector strut bracket, galvanized strut pipe, strut collar assembly, and (pipe mount) angle interface bracket included. All associated (metric) hardware is galvanized. Strut is schedule 80 and 5.0 ft (1.52 m) in length. Existing (extended) antenna pipe mount is required for strut attachment.

I Grid Strut Kit (KP Series only), Type Number 100232-7 (for 8, 10 and 13 ft only)

Provides added support in either the azimuth or elevation plane. Reflector strut bracket, strut pipe, strut collar assembly and hardware. All parts are galvanized including hardware. Strut is schedule 80 and 10.0 ft (3.05 m) in length. Order adjustment assembly separately, item J.

J Fine Azimuth Adjustment Assembly for Grid Strut and Collar Clamp Assembly, Type Number 100093-2

All parts galvanized including hardware.

K Grid Clamp Assembly, Type Number 100094

For replacement of item I and use with item J. All parts are galvanized including hardware.

L Short Strut Assembly, Type Number 520570-7

Short strut assembly for 6 ft (2.0 m) standard antennas allows strut packed within shipping crate. Includes hardware for attachment to antenna and tower. Strut is 83.5 in (1212 mm).

Termination Load

Attachment of Strut to Tower

Direct bolt attachment of the side strut clamp to angle members is recommended. An 11/16" (18 mm) hole should be drilled in the appropriate strut support member. Note: Holes should not be drilled without prior approval of the tower manufacturer. Type 223740 round member clamp (order separately) can be used on members having a diameter of 1 to 3 in (25-76 mm). See illustration.

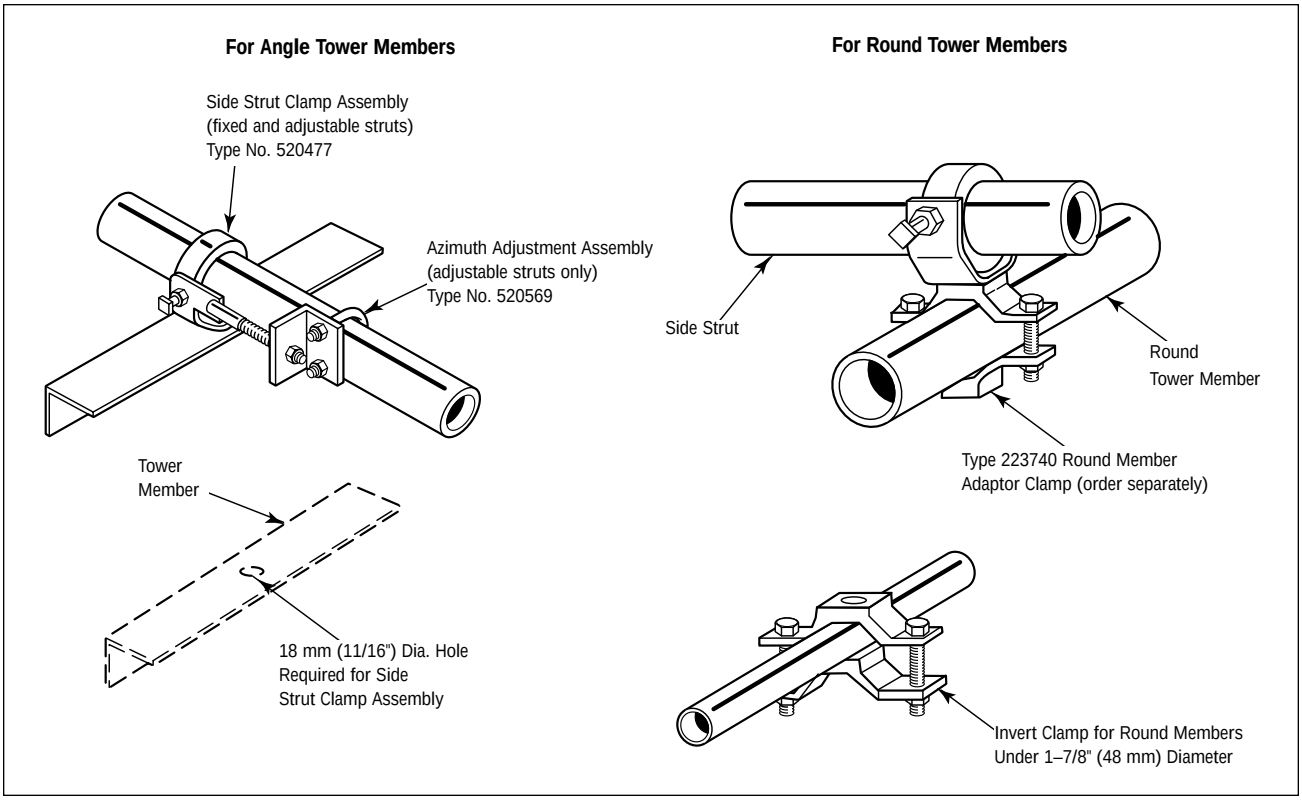
Termination Loads

When both ports of a dual polarized antenna are not being used, Andrew recommends using a termination load to ensure your antenna meets the stated Andrew specifications. Refer to page 212.

Replacement Components

Andrew can also supply the following replacement components for your Andrew antennas:

- *Reflectors*
- *Radomes (see page 119)*
- *Major hardware kits*
- *Universal guy wire kit*
- *Struts (see page 123)*
- *Feeds*
- *Shield absorber kits*
- *Mounts (see page 95)*
- *Shields*



A Cost-Effective Antenna Solution for Today's Terrestrial Microwave Systems

ValuLine® antennas provide a cost-effective solution for all terrestrial microwave systems operating at frequencies between 7 GHz and 60 GHz. The ValuLine range includes both High Performance shielded antennas (VHP Series) and Standard performance unshielded antennas (VP Series). These antennas are available in both single and dual polarized configurations and in sizes from 1 ft (0.3 m) to 6 ft (1.8 m) in diameter.

Andrew ValuLine antennas economically satisfy the requirements of the cellular, PCS/PCN, broadcast, and private user microwave applications, while still delivering the superior performance and overall quality expected of Andrew. ValuLine antennas meet the regulatory requirements of FCC, ETSI, RA, and BAPT and are qualified in many countries including Russia, Brazil, and Poland. The antennas meet the requirements of the EIA195 and 222 standards for electrical, mechanical, and structural characteristics, and are backed by a three-year warranty.

Fast, easy installation is made possible by the use of simple pole mounts, which can be attached to pipes with diameters ranging from 1.9 inches (48 mm) to 4.5 inches (115 mm), depending on antenna type. Radome installation on the 4 ft (1.2 m) and 6 ft (1.8 m) antennas is dramatically simplified by the use of rigid plastic radomes. Optionally, Andrew can supply these radomes painted to match local surroundings, minimizing their environmental impact.

Low Profile Antennas

To meet increasing demand for low visibility antenna systems, the ValuLine product range has been extended to include a new range of low profile shielded antennas (VHLP Series) offering excellent electrical performance in an antenna with minimal environmental impact. Low profile antennas are available in frequencies from 13 GHz to 38 GHz and in sizes from 1 ft (0.3 m) to 4 ft (1.2 m) in diameter.

Flat Plate Antennas

The new ValuLine Flat Plate antennas provide the ultimate solution for operators who require low visibility antennas for short haul communications in areas such as congested inner city sites. These antennas provide excellent pattern performance, normally only achieved by shielded antennas, in a package less than 2 inches (46 mm) deep. This very low profile antenna, weighing less than 8 pounds (3.6 kg), reduces tower wind loading and is a cost-effective package for worldwide shipping.

Products are available in the 23 GHz, 27 GHz and 38 GHz 136 frequency bands.

Contact Andrew for further details.

Direct Antenna Radio Integration

Andrew has worked with the world's leading radio houses to develop antennas that can be directly integrated with the radio outdoor unit. These integrated antennas are available in all frequencies from 7 GHz to 38 GHz and in sizes from 1 ft (0.3 m) to 6 ft (1.8 m) in diameter. These integrated solutions, currently available for over 20 major radio suppliers, provide a significant benefit in overall system cost.

Multiple Manufacturing Locations

In order to reduce shipping costs to sites worldwide, ValuLine antennas are available from Andrew locations in Scotland, U.S.A., Brazil, and Australia. Standard Andrew designs and process controls ensure product consistency and quality throughout the world.

ValuLine® Antenna Nomenclature

Andrew uses an alphanumeric numbering system for identifying and ordering ValuLine antennas. Andrew type numbers describe the antenna type, size, regulatory compliance, frequency band, catalog revision, and other available options including flange type and VSWR specifications, antenna and radome color, and packing and assembly information. This system is known worldwide and Andrew terminology is often used to specify antenna within procurement documents.

Example:

VHP	2	A	-	220	A	-	2	4	1
1	2	3		4	5		6	7	8

1 Antenna Type. The prefix is two, three, or four letters that describe the antenna type.

Use:	To indicate:
VHP	Shielded, Single Polarized
VHPX	Shielded, Dual Polarized
VP	Unshielded, Single Polarized
VHLP	Low Profile, Single Polarized

2 Antenna Size. The number indicates the antenna diameter in feet.

Use:	To indicate:
1	1 ft (0.3 m)
2	2 ft (0.6 m)
2.5	2.5 ft (0.8 m)
4	4 ft (1.2 m)
6	6 ft (1.8 m)

3 Regulatory Compliance.

Use:	To indicate:
A	Non-compliant to UK RA Specification
blank	Compliant to UK RA Specification

4 Frequency Band. The numbers following the first hyphen are an abbreviated designation for the operating frequency band.

Use:	To indicate:
71	7.125-7.75 GHz
71W	7.125-8.5 GHz
74	7.425-7.9 GHz
77	7.725-8.5 GHz
102	10.2-10.7 GHz
105	10.5-10.7 GHz
107	10.7-11.7 GHz
117	11.7-12.2 GHz
130	12.75-13.25 GHz
142	14.25-15.35 GHz
159	15.9-16.5 GHz
173	17.3-17.7 GHz
1823	17.7-19.7 GHz/21.2-23.6 GHz
180	17.7-19.7 GHz
220	21.2-23.6 GHz
240	24.25-26.5 GHz
240W	24.25-29.5 GHz
275	27.5-29.5 GHz
275W	27.5-29.5 GHz/31.0-31.3 GHz
310	31.0-31.8 GHz
370	37.0-40.0 GHz
490	49.2-50.2 GHz
540	54.25-57.2 GHz
570	57.2-58.2 GHz

5 Catalog Revision. This letter identifies product revisions. A change in revision letter indicates a change in electrical or mechanical specifications that affect antenna performance or the interface with other system equipment.

In addition, contact Andrew for details about these options:

6 Antenna Flange Type and VSWR Specification. See table on page 130.

7 Antenna Appearance. This number identifies the antenna color, radome color, and the presence of the Andrew flash.

8 Packing Type and Assembly Option.

In the example above, VHP2A-220A-241 is:

1. ValuLine High Performance, shielded, single polarized
2. 2 ft (0.6 m) in diameter
3. Non-compliant to UK RA specifications
4. 21.2-23.6 GHz band
5. A Revision
6. PBR220, 1.20 VSWR
7. White Antenna, white radome, no flash
8. Standard packing

E-Series ValuLine® Antennas

for Use in Extreme Environments

ValuLine® antennas are now available in upgraded versions that allow them to be used in locations subjected to high wind load or corrosive environments.

These antennas, available in diameters of 1 ft (0.3 m), 2 ft (0.6 m), 2.5 (0.8 m), 4 ft (1.2 m), and 6 ft (1.8 m), are mechanically upgraded to withstand 155 mph (250 km/h) through the use of additional struts and strengthened reflectors.

The antennas also include additional treatments that will provide long-term protection in marine, urban, and most industrial environments:

- *Factory applied epoxy painting*
- *Hot-dip galvanizing*
- *Stainless steel hardware*
- *Corrosion inhibiting compounds*

Contact Andrew for more information.

Antenna Specifications and Ordering Information

Our ValuLine® antennas are presented in the tables on pages 131-137. The tables are arranged by operating frequency band, in ascending order. Within the tables, antennas are grouped by antenna type and by diameter.

Basic Antenna

The type numbers listed in the tables define the basic antenna, less options and accessories. The numbers correspond with those appearing on the Radiation Pattern Envelopes published by Andrew (see page 48) and also define the electrical performance parameters of the antenna.

Input Flanges

ValuLine antennas can be supplied with many different EIA and IEC flange types. The recommended flanges are identified in the table below.

Contact Andrew for information about other flange options.

Radomes

Radomes are used to protect microwave antennas against accumulation of ice, snow, and dirt and to reduce wind loading. ValuLine shielded antennas are supplied with molded planar polymer radomes.

Radome Applications

Antenna Type	Antenna Series	Included Radome	Optional Radomes
ValuLine	VHP, VHPX	Polymer	–
	VP, VPX	–	Molded plastic (VR Series)

The VR Series of plastic radomes are designed to offer maximum protection to VP and VPX Series unshielded ValuLine antennas in diameters ranging from 2 ft (0.6 m) to 6 ft (1.8 m). The material is highly resistant to ultraviolet rays and provides high reliability under severe environmental conditions. Their aerodynamic shape dramatically reduces the wind loading on the tower.

These radomes are available as standard in gray or white. Bulk pack options are also available on request.

Contact Andrew for more information.

VR Series Radomes for Unshielded ValuLine Antennas

Antenna Diameter	Gray Radome with Andrew flash	Gray Radome without Andrew flash	White Radome with Andrew flash	White Radome without Andrew flash
2 ft (0.6 m)	**VR2-1**	**VR2-2**	**VR2-1-WH**	**VR2-2-WH**
4 ft (1.2 m)	**VR4-1**	**VR4-2**	**VR4-1-WH**	**VR4-2-WH**
6 ft (1.8 m)	**VR6-1**	**VR6-2**	**VR6-1-WH**	**VR6-2-WH**

Input Flanges

Frequency Band	Recommended EIA Flange	Recommended IEC Flange	Frequency Band	Recommended EIA Flange	Recommended IEC Flange
-71	CPR112G	PDR84	-1823	UG-595/U Modified	PBR220
-71W	CPR112G	PDR84	-180	UG-595/U Modified	PBR220
-74	CPR112G	PDR84	-220	UG-595/U Modified	PBR220
-77	CPR112G	PDR84	-240	UG-595/U Modified	PBR220
-102	CPR90G	PDR100	-240W	—	PBR260
-105	CPR90G	PDR100	-275	UG-599/U Modified	PBR320
-107	CPR90G	PDR100	-275W	UG-599/U Modified	PBR320
-117	WR75	PDR120	-310	UG-599/U Modified	PBR320
-130	WR75	PDR120	-370	UG-599/U Modified	PBR320
-142	UG-541A/U	PBR140	-490	UG-385-25	—
-159	—	PDR180	-540	UG-385-25	—
-173	—	PDR180	-570	UG-385-25	—

Refer to pages 177 and 179 for Elliptical Waveguide ordering information

7.125 - 7.75 GHz (WR112 / R84)

Type Number	Diameter ft (m)	Gain, dBi Bottom	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)	Fine Adjustment degrees Azimuth	Fine Adjustment degrees Elevation	Survival Wind Speed mph (km/h)	Net Weight lb (kg)
VP2-71	2 (0.6)	30.6	31.0	31.4	4.9	30	40	1.15 (23.1)*	±15	±50	155 (250)	19 (8.5)
VP4-71	4 (1.2)	36.8	37.2	37.5	2.4	32	45	1.15 (23.1)*	±15	±20	125 (200)	79 (36.0)
VP6-71	6 (1.8)	40.5	40.9	41.3	1.6	32	49	1.15 (23.1)*	±5	±5	125 (200)	160 (72.5)
VHP2-71	2 (0.6)	29.8	30.1	30.4	4.9	30	53	1.15 (23.1)*	±15	±50	155 (250)	33 (15.0)
VHP4-71	4 (1.2)	36.0	36.4	36.7	2.4	32	60	1.15 (23.1)*	±15	±20	125 (200)	126 (57.0)
VHP6-71	6 (1.8)	39.8	40.2	40.6	1.6	32	64	1.15 (23.1)*	±5	±5	125 (200)	347 (157.5)
VHPX2-71	2 (0.6)	29.2	29.5	29.8	4.8	30	53	1.30 (17.7)**	±15	±50	155 (250)	33 (15.0)
VHPX4-71	4 (1.2)	35.9	36.3	36.6	2.4	32	60	1.15 (23.1)*	±15	±20	125 (200)	126 (57.0)
VHPX6-71	6 (1.8)	39.7	40.1	40.5	1.6	32	64	1.15 (23.1)*	±5	±5	125 (200)	347 (157.5)

* 1.10 (26.4) available on request ** 1.25 (19.1) available on request

7.125 - 8.5 GHz (WR112 / R84)

Type Number	Diameter ft (m)	Gain, dBi Bottom	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)	Fine Adjustment degrees Azimuth	Fine Adjustment degrees Elevation	Survival Wind Speed mph (km/h)	Net Weight lb (kg)
VP2-71W	2 (0.6)	30.6	31.4	32.1	4.8	30	40	1.20 (20.8)	±15	±50	155 (250)	19 (8.5)
VP4-71W	4 (1.2)	36.8	37.5	38.3	2.3	32	45	1.15 (23.1)	±15	±20	125 (200)	79 (36.0)
VP6-71W	6 (1.8)	40.5	41.3	42.0	1.5	32	49	1.15 (23.1)	±5	±5	125 (200)	160 (72.5)
VHP2-71W	2 (0.6)	29.8	30.4	31.1	4.9	30	54	1.15 (23.1)	±15	±50	155 (250)	33 (15.0)
VHP4-71W	4 (1.2)	36.0	36.6	37.5	2.4	32	62	1.15 (23.1)	±15	±20	125 (200)	126 (57.0)
VHP6-71W	6 (1.8)	39.7	40.5	41.2	1.7	32	66	1.15 (23.1)	±5	±5	125 (200)	347 (157.5)
VHPX2-71W	2 (0.6)	29.2	29.8	30.4	4.8	30	53	1.30 (17.7)	±15	±50	155 (250)	33 (15.0)
VHPX4-71W	4 (1.2)	35.9	36.7	37.4	2.4	32	60	1.20 (20.8)	±15	±20	125 (200)	126 (57.0)
VHPX6-71W	6 (1.8)	39.7	40.5	40.7	1.7	32	64	1.20 (20.8)	±5	±5	125 (200)	347 (157.5)

7.425 - 7.9 GHz (WR112 / R84)

Type Number	Diameter ft (m)	Gain, dBi Bottom	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)	Fine Adjustment degrees Azimuth	Fine Adjustment degrees Elevation	Survival Wind Speed mph (km/h)	Net Weight lb (kg)
VP2-74	2 (0.6)	31.0	31.2	31.5	4.8	30	40	1.15 (23.1)*	±15	±50	155 (250)	19 (8.5)
VP4A-74	4 (1.2)	37.2	37.4	37.7	2.3	32	45	1.15 (23.1)*	±15	±20	125 (200)	79 (36.0)
VHP2-74	2 (0.6)	30.1	30.4	30.6	4.8	30	54	1.15 (23.1)*	±15	±50	155 (250)	33 (15.0)
VHP4A-74	4 (1.2)	36.4	36.6	36.9	2.3	32	62	1.15 (23.1)*	±15	±20	125 (200)	126 (57.0)
VHP4-74	4 (1.2)	36.2	36.4	36.7	2.3	32	62	1.15 (23.1)*	±15	±20	125 (200)	126 (57.0)
VHP6A-74	6 (1.8)	40.2	40.4	40.6	1.5	32	64	1.15 (23.1)*	±5	±5	125 (200)	347 (157.5)
VHPX2A-74	2 (0.6)	29.5	29.7	29.9	4.7	30	53	1.30 (17.7)**	±15	±50	155 (250)	33 (15.0)
VHPX4A-74	4 (1.2)	36.3	36.5	36.8	2.4	32	60	1.15 (23.1)*	±15	±20	125 (200)	126 (57.0)
VHPX6A-74	6 (1.8)	40.1	40.3	40.5	1.5	32	64	1.15 (23.1)*	±5	±5	125 (200)	347 (157.5)

* 1.10 (26.4) available on request ** 1.25 (19.1) available on request

7.75 - 8.5 GHz (WR112 / R84)

Type Number	Diameter ft (m)	Gain, dBi Bottom	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)	Fine Adjustment degrees Azimuth	Fine Adjustment degrees Elevation	Survival Wind Speed mph (km/h)	Net Weight lb (kg)
VP2-77	2 (0.6)	31.3	31.7	32.1	4.6	30	40	1.15 (23.1)*	±15	±50	155 (250)	19.0 (8.5)
VP4-77	4 (1.2)	37.5	37.9	38.3	2.2	32	45	1.15 (23.1)*	±15	±20	125 (200)	79.0 (36.0)
VP6-77	6 (1.8)	41.3	41.7	42.0	1.5	32	50	1.15 (23.1)*	±5	±5	125 (200)	160 (72.5)
VHP2-77	2 (0.6)	30.4	30.8	31.1	4.6	30	54	1.15 (23.1)*	±15	±50	155 (250)	33 (15.0)
VHP4-77	4 (1.2)	36.7	37.1	37.5	2.2	32	62	1.15 (23.1)*	±15	±20	125 (200)	126 (57.0)
VHP6-77	6 (1.8)	40.6	40.7	40.8	1.5	32	64	1.15 (23.1)*	±5	±5	125 (200)	347 (157.5)
VHPX2-77	2 (0.6)	29.8	30.1	30.4	4.6	30	53	1.30 (17.7)**	±15	±50	155 (250)	33 (15.0)
VHPX4-77	4 (1.2)	36.6	37.0	37.4	2.2	32	60	1.15 (23.1)*	±15	±20	125 (200)	126 (57.0)
VHPX6-77	6 (1.8)	40.5	40.6	40.7	1.5	32	64	1.15 (23.1)*	±5	±5	125 (200)	347 (157.5)

* 1.10 (26.4) available on request ** 1.25 (19.1) available on request

10.2 - 10.7 GHz (WR112 / R84)

Type Number	Diameter ft (m)	Gain, dBi Bottom	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)	Fine Adjustment degrees Azimuth	Fine Adjustment degrees Elevation	Survival Wind Speed mph (km/h)	Net Weight lb (kg)
VHP2-102	2 (0.6)	33.5	33.7	33.9	3.5	32	59	1.20 (20.8)*	±15	±50	155 (250)	33 (15.0)
VHP4-102	4 (1.2)	39.6	39.8	40.0	1.8	32	65	1.20 (20.8)*	±15	±20	125 (200)	126 (57.0)
VHP6-102	6 (1.8)	42.8	43.0	43.2	1.2	32	68	1.20 (20.8)*	±5	±5	125 (200)	347 (157.5)
VHPX2-102	2 (0.6)	33.2	33.4	33.6	3.5	32	59	1.25 (19.1)**	±15	±50	155 (250)	33 (15.0)
VHPX4-102	4 (1.2)	39.4	39.6	39.8	1.8	32	65	1.25 (19.1)**	±15	±20	125 (200)	126 (57.0)
VHPX6-102	6 (1.8)	42.7	42.9	43.1	1.2	32	68	1.25 (19.1)**	±5	±5	125 (200)	347 (157.5)

* 1.15 (23.1) available on request ** 1.20 (20.8) available on request

10.5 - 10.7 GHz (WR90 / R100)

Type Number	Diameter ft (m)	Gain, dBi Bottom	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)	Fine Adjustment degrees Azimuth	Fine Adjustment degrees Elevation	Survival Wind Speed mph (km/h)	Net Weight lb (kg)
VHP2-105	2 (0.6)	34.0	34.1	34.2	3.4	32	55	1.20 (20.8)*	±15	±50	155 (250)	33 (15.0)
VHP4-105	4 (1.2)	39.8	39.9	40.0	1.8	32	60	1.20 (20.8)*	±15	±20	125 (200)	126 (57.0)
VHP6-105	6 (1.8)	43.1	43.2	43.3	1.1	32	67	1.20 (20.8)*	±5	±5	125 (200)	347 (157.5)

* 1.15 (23.1) available on request

10.7 - 11.7 GHz (WR90 / R100)

Type Number	Diameter ft (m)	Gain, dBi Bottom	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)	Fine Adjustment degrees Azimuth	Fine Adjustment degrees Elevation	Survival Wind Speed mph (km/h)	Net Weight lb (kg)
VHP4-107	4 (1.2)	40.1	40.5	40.9	1.8	32	60	1.20 (20.8)*	±15	±20	125 (200)	126 (57.0)
VHP6-107	6 (1.8)	43.3	43.6	43.9	1.1	32	67	1.20 (20.8)*	±5	±5	125 (200)	347 (157.5)

* 1.15 (23.1) available on request

11.7 - 12.2 GHz (WR75 / R120)

Type Number	Diameter ft (m)	Gain, dBi Bottom	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)	Fine Adjustment degrees Azimuth	Fine Adjustment degrees Elevation	Survival Wind Speed mph (km/h)	Net Weight lb (kg)
VHP4-117	4 (1.2)	40.9	41.0	41.1	1.7	32	60	1.20 (20.8)*	±15	±20	125 (200)	126 (57.0)

* 1.15 (23.1) available on request

Refer to pages 185 and 187 for Elliptical Waveguide ordering information

12.7 - 13.25 GHz (WR75 / R120)

Type Number	Diameter ft (m)	Gain, dBi Bottom	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)	Fine Adjustment degrees Azimuth	Fine Adjustment degrees Elevation	Survival Wind Speed mph (km/h)	Net Weight lb (kg)
VHP1-130	1 (0.3)	29.0	29.2	29.4	5.0	30	56	1.20 (20.8)*	±15	±50	155 (250)	21 (9.7)
VHP2-130	2 (0.6)	35.1	35.3	35.5	2.8	32	61	1.20 (20.8)*	±15	±50	155 (250)	33 (15.0)
VHP2.5-130	2.5 (0.8)	37.7	37.9	38.1	2.1	32	63	1.20 (20.8)*	±15	±50	125 (200)	78 (35.5)
VHP4-130	4 (1.2)	41.2	41.4	41.6	1.3	32	67	1.20 (20.8)*	±15	±20	125 (200)	126 (57.0)
VHP4A-130	4 (1.2)	41.2	41.4	41.6	1.3	32	63	1.20 (20.8)*	±15	±20	125 (200)	126 (57.0)
VHP6-130	6 (1.8)	44.8	45.0	45.1	0.9	32	70	1.20 (20.8)*	±5	±5	125 (200)	347 (157.5)
VHP6A-130	6 (1.8)	44.8	45.0	45.1	0.9	32	66	1.20 (20.8)*	±5	±5	125 (200)	347 (157.5)
VHPX2-130	2 (0.6)	34.5	34.7	34.9	2.8	32	61	1.25 (19.1)**	±15	±50	155 (250)	33 (15.0)
VHPX2.5-130	2.5 (0.8)	37.2	37.5	37.7	2.1	32	63	1.25 (19.1)**	±15	±50	125 (200)	78 (35.5)
VHPX4-130	4 (1.2)	41.0	41.2	41.3	1.3	32	67	1.25 (19.1)**	±15	±20	125 (200)	126 (57.0)
VHPX4A-130	4 (1.2)	41.0	41.2	41.3	1.3	32	63	1.25 (19.1)**	±15	±20	125 (200)	126 (57.0)
VHPX6-130	6 (1.8)	44.6	44.8	44.9	0.9	32	70	1.25 (19.1)**	±5	±5	125 (200)	347 (157.5)
VHPX6A-130	6 (1.8)	44.6	44.8	44.9	0.9	32	66	1.25 (19.1)**	±5	±5	125 (200)	347 (157.5)
VHLP2-130	2 (0.6)	35.3	35.5	35.7	2.5	30	61	1.30 (17.7)	±15	±50	155 (250)	25 (11.3)
VHLP2.5-130	2.5 (0.8)	37.6	37.8	38.0	2.1	30	63	1.30 (17.7)	±15	±50	125 (200)	69 (31.2)
VHLP4-130	4 (1.2)	41.3	41.5	41.7	1.3	30	67	1.30 (17.7)	±15	±20	125 (200)	115 (52.0)
VP2A-130	2 (0.6)	35.3	35.5	35.7	2.8	32	45	1.20 (20.8)*	±15	±50	155 (250)	19.0 (8.5)
VP4A-130	4 (1.2)	41.4	41.6	41.8	1.3	32	52	1.20 (20.8)*	±15	±20	125 (200)	79.0 (36.0)
VP6A-130	6 (1.8)	45.0	45.2	45.3	0.9	32	58	1.20 (20.8)*	±5	±5	125 (200)	160 (72.5)

* 1.15 (23.1) available on request ** 1.20 (20.8) available on request

14.25 - 15.35 GHz (WR62 / R140)

Type Number	Diameter ft (m)	Gain, dBi Bottom	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)	Fine Adjustment degrees Azimuth	Fine Adjustment degrees Elevation	Survival Wind Speed mph (km/h)	Net Weight lb (kg)
VHP1-142	1 (0.3)	30.8	31.1	31.4	4.5	30	50	1.20 (20.8)*	±15	±50	155 (250)	21 (9.7)
VHP2-142	2 (0.6)	36.2	36.5	36.8	2.4	32	62	1.20 (20.8)*	±15	±50	155 (250)	33 (15.0)
VHP2.5-142	2.5 (0.8)	38.8	39.1	39.4	1.8	32	64	1.20 (20.8)*	±15	±50	125 (200)	78 (35.5)
VHP4-142	4 (1.2)	42.2	42.5	42.8	1.2	32	68	1.20 (20.8)*	±15	±20	125 (200)	126 (57.0)
VHP4A-142	4 (1.2)	42.2	42.5	42.8	1.2	32	64	1.20 (20.8)*	±15	±20	125 (200)	126 (57.0)
VHP6-142	6 (1.8)	45.7	46.0	46.3	0.8	32	71	1.20 (20.8)*	±5	±5	125 (200)	347 (157.5)
VHP6A-142	6 (1.8)	45.7	46.0	46.3	0.8	32	67	1.20 (20.8)*	±5	±5	125 (200)	347 (157.5)
VHPX2-142	2 (0.6)	36.0	36.3	36.6	2.4	32	62	1.25 (19.1)**	±15	±50	155 (250)	33 (15.0)
VHPX2.5-142	2.5 (0.8)	38.6	38.9	39.2	1.8	32	64	1.25 (19.1)**	±15	±50	125 (200)	78 (35.5)
VHPX4-142	4 (1.2)	42.0	42.3	42.6	1.2	32	68	1.25 (19.1)**	±15	±20	125 (200)	126 (57.0)
VHPX4A-142	4 (1.2)	42.0	42.3	42.6	1.2	32	64	1.25 (19.1)**	±15	±20	125 (200)	126 (57.0)
VHPX6-142	6 (1.8)	45.5	45.8	46.1	0.8	32	71	1.25 (19.1)**	±5	±5	125 (200)	347 (157.5)
VHPX6A-142	6 (1.8)	45.5	45.8	46.1	0.8	32	67	1.25 (19.1)**	±5	±5	125 (200)	347 (157.5)
VHLP1-142	1 (0.3)	31.6	31.9	32.3	3.8	30	53	1.30 (17.7)	±15	±50	155 (250)	18 (8.3)
VHLP2-142	2 (0.6)	36.3	36.6	36.9	2.2	30	64	1.30 (17.7)	±15	±50	155 (250)	25 (11.3)
VHLP2.5-142	2.5 (0.8)	38.6	38.9	39.3	1.8	30	67	1.30 (17.7)	±15	±50	125 (200)	69 (31.2)
VHLP4-142	4 (1.2)	42.3	42.6	42.9	1.2	30	70	1.30 (17.7)	±15	±20	125 (200)	115 (52.0)
VP2A-142	2 (0.6)	36.4	36.7	37.0	2.4	32	45	1.20 (20.8)*	±15	±50	155 (250)	19.0 (8.5)
VP4A-142	4 (1.2)	42.4	42.7	43.0	1.2	32	53	1.20 (20.8)*	±15	±20	125 (200)	79.0 (36.0)
VP6A-142	6 (1.8)	45.8	46.1	46.4	0.8	32	56	1.20 (20.8)*	±5	±5	125 (200)	160 (72.5)

* 1.15 (23.1) available on request ** 1.20 (20.8) available on request

15.9 - 16.5 GHz (WR51 / R180)

Type Number	Diameter ft (m)	Gain, dBi Bottom	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)	Fine Adjustment degrees Azimuth	Fine Adjustment degrees Elevation	Survival Wind Speed mph (km/h)	Net Weight lb (kg)
VP2-159	2 (0.6)	37.6	37.8	38.0	2	32	45	1.20 (20.8)	±15	±50	155 (250)	19.0 (8.5)

17.3 - 17.7 GHz (WR51 / R180)

Type Number	Diameter ft (m)	Gain, dBi Bottom	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)	Fine Adjustment degrees Azimuth	Fine Adjustment degrees Elevation	Survival Wind Speed mph (km/h)	Net Weight lb (kg)
VHP1-173	1 (0.3)	32.4	32.5	32.6	3.8	30	58	1.20 (20.8)*	±15	±50	155 (250)	21 (9.7)
VHP2-173	2 (0.6)	38.0	38.1	38.2	2.3	32	64	1.20 (20.8)*	±15	±50	155 (250)	33 (15.0)
VP4-173	4 (1.2)	44.1	44.2	44.3	1.0	32	55	1.20 (20.8)*	±15	±20	125 (200)	79.0 (36.0)
VP6-173	6 (1.8)	47.5	47.6	47.7	0.8	32	58	1.20 (20.8)*	±5	±5	125 (200)	160 (72.5)

* 1.15 (23.1) available on request

17.7 - 19.7 GHz (WR42 / R220)

Type Number	Diameter ft (m)	Gain, dBi Bottom	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)	Fine Adjustment degrees Azimuth	Fine Adjustment degrees Elevation	Survival Wind Speed mph (km/h)	Net Weight lb (kg)
VHP1-180	1 (0.3)	32.6	33.1	33.5	3.6	30	58	1.20 (20.8)*	±15	±50	155 (250)	21 (9.7)
VHP2-180B	2 (0.6)	38.2	38.7	39.1	1.9	32	60	1.20 (20.8)*	±15	±50	155 (250)	33 (15.0)
VHP2.5-180	2.5 (0.8)	40.7	41.2	41.6	1.5	32	66	1.20 (20.8)*	±15	±50	125 (200)	78 (35.5)
VHP4-180A	4 (1.2)	44.1	44.6	45.1	0.9	32	65	1.20 (20.8)*	±15	±20	125 (200)	126 (57.0)
VHP6-180A	6 (1.8)	47.5	48.0	48.5	0.7	32	70	1.20 (20.8)*	±5	±5	125 (200)	347 (157.5)
VHPX1-180	1 (0.3)	32.4	32.9	33.3	3.6	30	58	1.25 (19.1)**	±15	±50	155 (250)	21 (9.7)
VHPX2-180A	2 (0.6)	38.0	38.4	38.8	1.9	32	60	1.25 (19.1)**	±15	±50	155 (250)	33 (15.0)
VHPX2.5-180	2.5 (0.8)	40.5	41.0	41.4	1.5	32	66	1.25 (19.1)**	±15	±50	125 (200)	78 (35.5)
VHPX4-180A	4 (1.2)	44.0	44.5	45.0	0.9	32	65	1.25 (19.1)**	±15	±20	125 (200)	126 (57.0)
VHPX6-180A	6 (1.8)	47.4	47.9	48.4	0.7	32	70	1.25 (19.1)**	±5	±5	125 (200)	347 (157.5)
VP2-180A	2 (0.6)	38.4	38.9	39.3	1.9	32	52	1.20 (20.8)*	±15	±50	155 (250)	19.0 (8.5)
VP4-180A	4 (1.2)	44.3	44.8	45.3	0.9	32	53	1.20 (20.8)*	±15	±20	125 (200)	79.0 (36.0)
VP6-180A	6 (1.8)	47.7	48.2	48.7	0.7	32	57	1.20 (20.8)*	±5	±5	125 (200)	160 (72.5)
VHLP1-180	1 (0.3)	33.5	34.0	34.4	3.0	30	55	1.30 (17.7)	±15	±50	155 (250)	18 (8.3)
VHLP2-180	2 (0.6)	38.2	38.7	39.1	1.8	30	67	1.30 (17.7)	±15	±50	155 (250)	25 (11.3)
VHLP2.5-180	2.5 (0.8)	40.5	41.0	41.4	1.5	30	69	1.30 (17.7)	±15	±50	125 (200)	69 (31.2)
VHLP4-180	4 (1.2)	44.2	44.7	45.1	0.9	30	73	1.30 (17.7)	±15	±20	125 (200)	115 (52.0)

* 1.15 (23.1) available on request * 1.20 (20.8) available on request

17.7 - 19.7 GHz / 21.2 - 23.6 GHz (WR42 / R220) Multiband Antennas

Type Number	Diameter ft (m)	Gain, dBi Bottom	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)	Fine Adjustment degrees Azimuth	Fine Adjustment degrees Elevation	Survival Wind Speed mph (km/h)	Net Weight lb (kg)
VHP2-1823												
17.7 - 19.7 GHz	(0.6)	37.6	38.1	38.6	1.9	30	67	1.30 (17.7)	±15	±50	155 (250)	33 (15.0)
21.2 - 23.6 GHz	(0.6)	39.2	39.6	40.0	1.5	30	64	1.30 (17.7)				
VHP4-1823												
17.7 - 19.7 GHz	4 (1.2)	43.7	44.2	44.7	0.9	30	68	1.30 (17.7)	±15	±20	125 (200)	126 (57.0)
21.2 - 23.6 GHz	4 (1.2)	45.2	45.7	46.2	0.8	30	70	1.30 (17.7)				

Refer to pages 191 and 193 for Elliptical Waveguide ordering information

21.2 - 23.6 GHz (WR42 / R220)

Type Number	Diameter ft (m)	Gain, dBi Bottom	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)	Fine Adjustment degrees Azimuth	Fine Adjustment degrees Elevation	Survival Wind Speed mph (km/h)	Net Weight lb (kg)
VHP1-220	1 (0.3)	34.3	34.8	35.2	2.8	30	60	1.20 (20.8)*	±15	±50	155 (250)	21 (9.7)
VHP2-220A	2 (0.6)	39.6	40.1	40.5	1.6	32	66	1.20 (20.8)*	±15	±50	155 (250)	33 (15.0)
VHP2.5-220	2.5 (0.8)	42.1	42.6	43.1	1.4	32	68	1.20 (20.8)*	±15	±50	125 (200)	78 (35.5)
VHP4-220A	4 (1.2)	45.6	46.1	46.6	0.8	32	72	1.20 (20.8)*	±15	±20	125 (200)	126 (57.0)
VHP4A-220A	4 (1.2)	45.6	46.1	46.6	0.8	32	63	1.20 (20.8)*	±15	±20	125 (200)	126 (57.0)
VHP6-220A	6 (1.8)	48.9	49.4	49.9	0.5	32	75	1.20 (20.8)*	±5	±5	125 (200)	347 (157.5)
VHP6A-220A	6 (1.8)	48.9	49.4	49.9	0.5	32	72	1.20 (20.8)*	±5	±5	125 (200)	347 (157.5)
VHPX1-220	1 (0.3)	33.7	34.2	34.6	2.8	30	60	1.25 (19.1)**	±15	±50	155 (250)	21 (9.7)
VHPX2-220A	2 (0.6)	39.4	39.9	40.3	1.6	32	66	1.25 (19.1)**	±15	±50	155 (250)	33 (15.0)
VHPX2.5-220	2.5 (0.8)	41.9	42.4	42.9	1.4	32	68	1.25 (19.1)**	±15	±50	125 (200)	78 (35.5)
VHPX4-220A	4 (1.2)	45.5	46.0	46.5	0.8	32	72	1.25 (19.1)**	±15	±20	125 (200)	126 (57.0)
VHPX4A-220A	4 (1.2)	45.5	46.0	46.5	0.8	32	63	1.25 (19.1)**	±15	±20	125 (200)	126 (57.0)
VHPX6-220A	6 (1.8)	48.8	49.3	49.8	0.5	32	75	1.25 (19.1)**	±5	±5	125 (200)	347 (157.5)
VHPX6A-220A	6 (1.8)	48.8	49.3	49.8	0.5	32	72	1.25 (19.1)**	±5	±5	125 (200)	347 (157.5)
VP2-220	2 (0.6)	39.8	40.3	40.7	1.6	32	54	1.20 (20.8)*	±15	±50	155 (250)	19.0 (8.5)
VP4A-220	4 (1.2)	45.8	46.3	46.8	0.8	32	58	1.20 (20.8)*	±15	±20	125 (200)	79.0 (36.0)
VHLP1-220	1 (0.3)	34.4	34.9	35.4	2.8	30	61	1.30 (17.7)	±15	±50	155 (250)	18 (8.3)
VHLP2-220	2 (0.6)	39.6	40.1	40.6	1.6	30	66	1.30 (17.7)	±15	±50	155 (250)	25 (11.3)
VHLP4-220	4 (1.2)	45.5	46.0	46.5	0.7	30	72	1.30 (17.7)	±15	±20	125 (200)	115 (52.0)

* 1.15 (23.1) available on request ** 1.20 (20.8) available on request

24.25 - 26.5 GHz (WR42 / R220)

Type Number	Diameter ft (m)	Gain, dBi Bottom	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)	Fine Adjustment degrees Azimuth	Fine Adjustment degrees Elevation	Survival Wind Speed mph (km/h)	Net Weight lb (kg)
VHP1-240A	1 (0.3)	35.5	35.9	36.3	2.5	30	61	1.20 (20.8)*	±15	±50	155 (250)	21 (9.7)
VHP2-240A	2 (0.6)	40.6	41.0	41.4	1.4	32	67	1.20 (20.8)*	±15	±50	155 (250)	33 (15.0)
VHP2.5-240	2.5 (0.8)	43.2	43.6	44.0	1.1	32	69	1.20 (20.8)*	±15	±50	125 (200)	78 (35.5)
VHP4-240	4 (1.2)	46.5	46.9	47.2	0.7	32	73	1.20 (20.8)*	±15	±20	125 (200)	126 (57.0)
VHPX1-240A	1 (0.3)	35.3	35.7	36.1	2.5	30	61	1.25 (19.1)**	±15	±50	155 (250)	21 (9.7)
VHPX2-240A	2 (0.6)	40.4	40.8	41.2	1.4	32	67	1.25 (19.1)**	±15	±50	155 (250)	33 (15.0)
VHPX2.5-240	2.5 (0.8)	43.0	43.4	43.8	1.1	32	69	1.25 (19.1)**	±15	±50	125 (200)	78 (35.5)
VHPX4-240	4 (1.2)	46.3	46.7	47.0	0.7	32	73	1.25 (19.1)**	±15	±20	125 (200)	126 (57.0)
VHLP1-240	1 (0.3)	35.6	36.0	36.4	2.5	30	62	1.30 (17.7)	±15	±50	155 (250)	18 (8.3)
VHLP2-240	2 (0.6)	40.7	41.1	41.5	1.4	30	67	1.30 (17.7)	±15	±50	155 (250)	25 (11.3)
VHLP4-240	4 (1.2)	46.5	46.9	47.2	0.6	30	73	1.30 (17.7)	±15	±20	125 (200)	115 (52.0)
VP2-240	2 (0.6)	40.8	41.2	41.6	1.5	32	52	1.20 (20.8)*	±15	±50	155 (250)	19.0 (8.5)

* 1.15 (23.1) available on request ** 1.20 (20.8) available on request

24.25 - 29.5 GHz (WR34 / R260)

Type Number	Diameter ft (m)	Gain, dBi Bottom	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)	Fine Adjustment degrees Azimuth	Fine Adjustment degrees Elevation	Survival Wind Speed mph (km/h)	Net Weight lb (kg)
VHP1-240W	1 (0.3)	35.8	36.5	37.1	2.5	30	62	1.20 (20.8)*	±15	±50	155 (250)	21 (9.7)
VHP2-240W	2 (0.6)	40.6	41.3	41.9	1.4	32	68	1.20 (20.8)*	±15	±50	155 (250)	33 (15.0)

* 1.15 (23.1) available on request

27.5 - 29.5 GHz (WR28 / R320)

Type Number	Diameter ft (m)	Gain, dBi Bottom	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)	Fine Adjustment degrees Azimuth	Fine Adjustment degrees Elevation	Survival Wind Speed mph (km/h)	Net Weight lb (kg)
VHP1-275	1 (0.3)	36.3	36.6	36.9	2.2	30	62	1.20 (20.8)*	±15	±50	155 (250)	21 (9.7)
VHP2-275	2 (0.6)	41.2	41.5	41.8	1.2	32	68	1.20 (20.8)*	±15	±50	155 (250)	33 (15.0)
VP2-275	2 (0.6)	42.0	42.3	42.6	1.2	32	53	1.20 (20.8)*	±15	±50	155 (250)	19.0 (8.5)
VP2A-275	2 (0.6)	42.0	42.3	42.6	1.2	32	53	1.20 (20.8)*	±15	±50	155 (250)	19.0 (8.5)
VHLP1-275	1 (0.3)	36.6	36.9	37.2	2.2	30	63	1.30 (17.7)	±15	±50	155 (250)	18 (8.3)
VHLP2-275	2 (0.6)	41.6	41.9	42.2	1.2	30	68	1.30 (17.7)	±15	±50	155 (250)	25 (11.3)
VHLP4-275	4 (1.2)	47.8	48.1	48.4	0.5	30	73	1.30 (17.7)	±15	±20	125 (200)	115 (52.0)

* 1.15 (23.1) available on request

27.5 - 29.5 GHz / 31.0 - 31.3 GHz (WR28 / R320) Multiband Antennas

Type Number	Diameter ft (m)	Gain, dBi Bottom	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)	Fine Adjustment degrees Azimuth	Fine Adjustment degrees Elevation	Survival Wind Speed mph (km/h)	Net Weight lb (kg)
VHLP1A-275W												
27.5 - 29.5 GHz	1 (0.3)	36.6	36.9	37.2	2.2	30	63	1.30 (17.7)	±15	±50	155 (250)	18 (8.3)
31.0 - 31.3 GHz	1 (0.3)	–	37.5	–	1.7	30	63	1.40 (15.56)				
VHLP2A-275W												
27.5 - 29.5 GHz	2 (0.6)	41.6	41.9	42.2	1.2	30	68	1.30 (17.7)	±15	±50	155 (250)	25 (11.3)
31.0 - 31.3 GHz	2 (0.6)	–	43.1	–	1.0	30	68	1.40 (15.56)				

27.5 - 31.8 GHz (WR28 / R320)

Type Number	Diameter ft (m)	Gain, dBi Bottom	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)	Fine Adjustment degrees Azimuth	Fine Adjustment degrees Elevation	Survival Wind Speed mph (km/h)	Net Weight lb (kg)
VHP1-275W	1 (0.3)	36.0	36.6	37.1	1.2	30	62	1.30 (17.7)	±15	±50	155 (250)	21 (9.7)

31.0 - 31.8 GHz (WR28 / R320)

Type Number	Diameter ft (m)	Gain, dBi Bottom	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)	Fine Adjustment degrees Azimuth	Fine Adjustment degrees Elevation	Survival Wind Speed mph (km/h)	Net Weight lb (kg)
VHP1-310	1 (0.3)	36.8	36.9	37.0	2.3	30	62	1.20 (20.8)*	±15	±50	155 (250)	21 (9.7)
VHP2-310	2 (0.6)	42.0	42.2	42.4	1.4	32	68	1.20 (20.8)*	±15	±50	155 (250)	33 (15.0)

* 1.15 (23.1) available on request

37.0 - 40.0 GHz (WR28 / R320)

Type Number	Diameter ft (m)	Gain, dBi Bottom	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)	Fine Adjustment degrees Azimuth	Fine Adjustment degrees Elevation	Survival Wind Speed mph (km/h)	Net Weight lb (kg)
VHP1-370A	1 (0.3)	39.2	39.5	39.8	1.7	30	60	1.20 (20.8)*	±15	±50	155 (250)	21 (9.7)
VHP2-370A	2 (0.6)	44.0	44.3	44.6	1.0	32	63	1.20 (20.8)*	±15	±50	155 (250)	33 (15.0)
VHPX2-370	2 (0.6)	44.0	44.3	44.6	1.0	32	63	1.25 (19.1)	±15	±50	155 (250)	33 (15.0)
VHLP1-370	1 (0.3)	39.4	39.7	40.0	1.7	30	60	1.30 (17.7)	±15	±50	155 (250)	18 (8.3)
VHLP2-370	2 (0.6)	44.2	44.5	44.8	1.0	30	63	1.30 (17.7)	±15	±50	155 (250)	25 (11.3)
VHLP4-370	4 (1.2)	50.4	50.7	51.0	0.4	30	71	1.30 (17.7)	±15	±20	125 (200)	115 (52.0)

* 1.15 (23.1) available on request

49.2 - 50.2 GHz (WR19 / R500)

Type Number	Diameter ft (m)	Gain, dBi Bottom	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)	Fine Adjustment degrees Azimuth	Fine Adjustment degrees Elevation	Survival Wind Speed mph (km/h)	Net Weight lb (kg)
VHP1-490	1 (0.3)	41.3	41.4	41.5	1.3	30	60	1.30 (17.7)	±15	±50	155 (250)	21 (9.7)

54.25 - 57.2 GHz (WR19 / R500)

Type Number	Diameter ft (m)	Gain, dBi Bottom	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)	Fine Adjustment degrees Azimuth	Fine Adjustment degrees Elevation	Survival Wind Speed mph (km/h)	Net Weight lb (kg)
VHP1-540	1 (0.3)	42.2	42.4	42.6	1.2	30	61	1.30 (17.7)	±15	±50	155 (250)	21 (9.7)

57.2 - 58.2 GHz (WR19 / R500)

Type Number	Diameter ft (m)	Gain, dBi Bottom	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)	Fine Adjustment degrees Azimuth	Fine Adjustment degrees Elevation	Survival Wind Speed mph (km/h)	Net Weight lb (kg)
VHP1-570	1 (0.3)	42.6	42.7	42.8	1.1	30	62	1.30 (17.7)	±15	±50	155 (250)	21 (9.7)

Antenna Mechanical Specifications

All ValuLine® antennas include a vertical tower mount. Standard mounting information is shown below. Dimensional information and illustrations for installation are shown on pages 139-147.

Mounting Pipe. Vertical tower mounts attached to a tower supported vertical pipe of the diameter specified in the table below. The mounting pipe is not included with the antenna. It is normally purchased as part of the tower.

Mount Construction. Structural members are hot-dip galvanized steel or aluminum.

Hardware. Fixed hardware is hot-dip galvanized steel. Adjusting hardware, including adjusting rods, is stainless steel.

Azimuth and Elevation Adjustments. The adjustment ranges are indicated in the table below. Some mounts, as noted in the table, use a swivel clamp for azimuth adjustment. Adjustment range for these is 360 degrees. All ValuLine antenna mounts have threaded fine elevation adjustment.

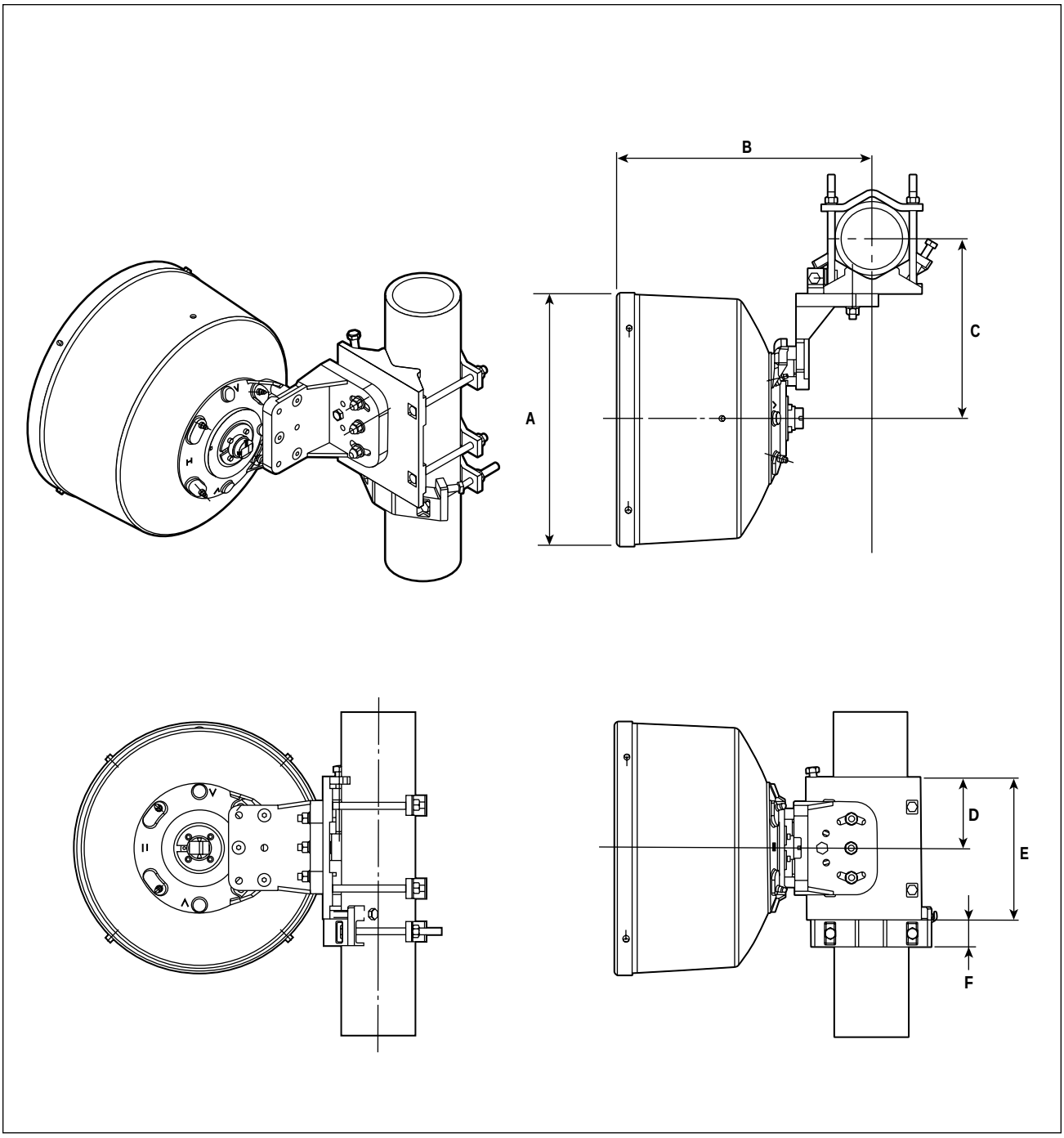
Side Struts. Some ValuLine antennas include a side strut. The side strut includes a stainless steel threaded rod fine azimuth adjustment. See page 123 for information about side strut positioning.

Vertical Tower Mounts

Antenna Size ft (m)	Replacement Mount Type Number Metric Standard Hardware	Mounting Pipe Dia. in (mm)	Center Offset* in (mm)	Fine Azimuth Adjustment Degrees	Fine Elevation Adjustment Degrees	Side Struts Included
1 (0.3)	**Integral**	1.9-4.5 (48-115)	10.9 (278)	± 15°	± 50°	–
2 (0.6)	**Integral**	1.9-4.5 (48-115)	11.5 (292)	± 15°	± 50°	–
2.5 (0.8)	**Integral**	2.5-4.5 (65-115)	12.4 (315)	± 15°	± 50°	–
4 (1.2)	**Integral**	4.5 (115)	10.4 (264)	± 15°	± 20°	1
6 (1.8)	**46770A-3**	4.5 (115)	5.4 (137)	± 15°	± 5°	1

* With respect to the mounting pipe viewed from the rear of the antenna. Can be reversed by inverting the mount or antenna.
Note: Integral mounts consist of multiple type numbers. Contact Andrew for type numbers.

1-ft ValuLine® Antenna Dimensions

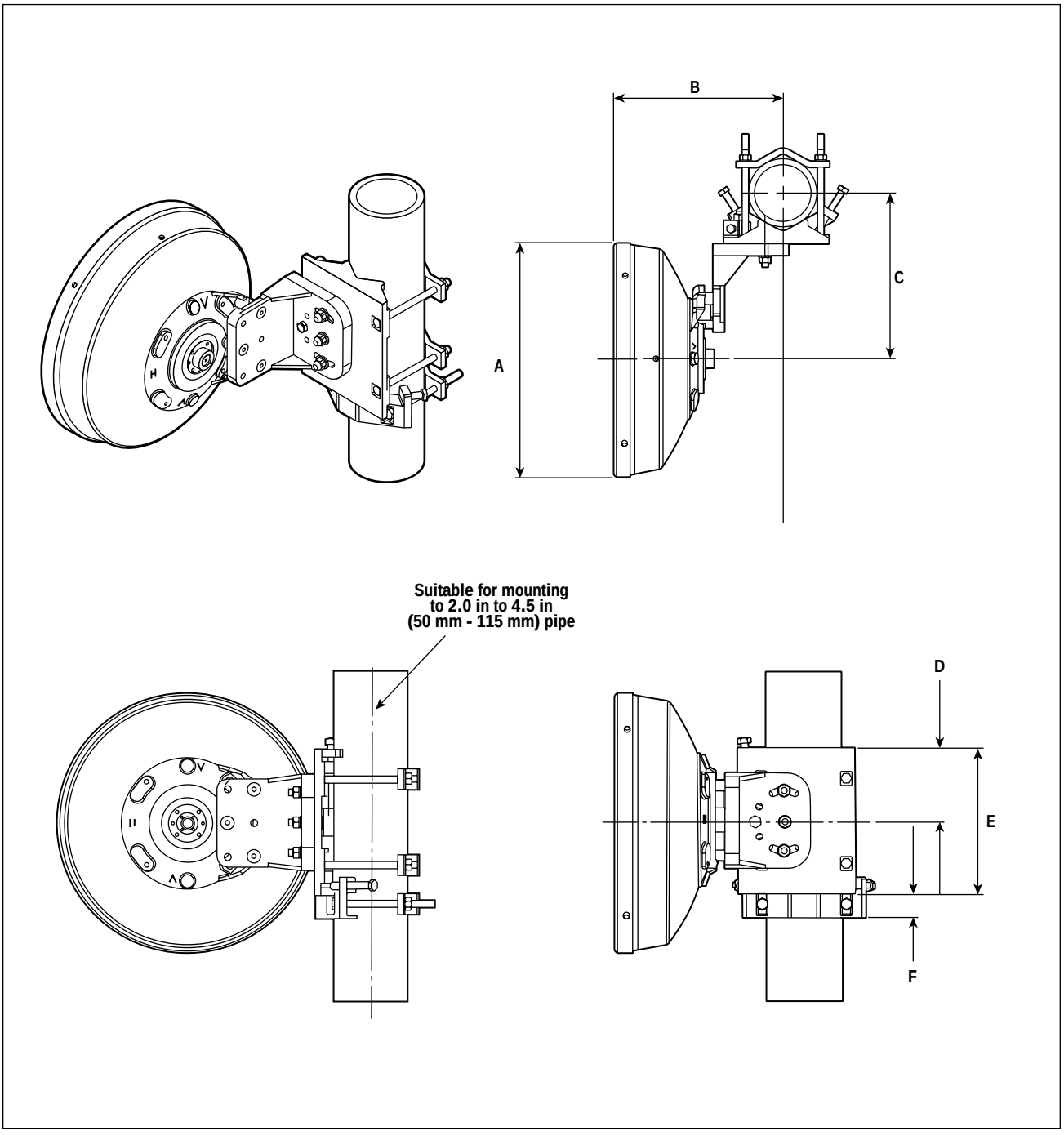


Dimensions in Inches (mm)

Antenna Size, ft (m)	A	B	C	D	E	F
1 (0.3)	15.6 (398)	15.5 (393)	10.9 (278)	4.3 (110)	8.7 (220)	1.65 (42)

All dimensions based on 4.5 in (115 mm) pipe.

1-ft ValuLine® Low Profile Antenna Dimensions



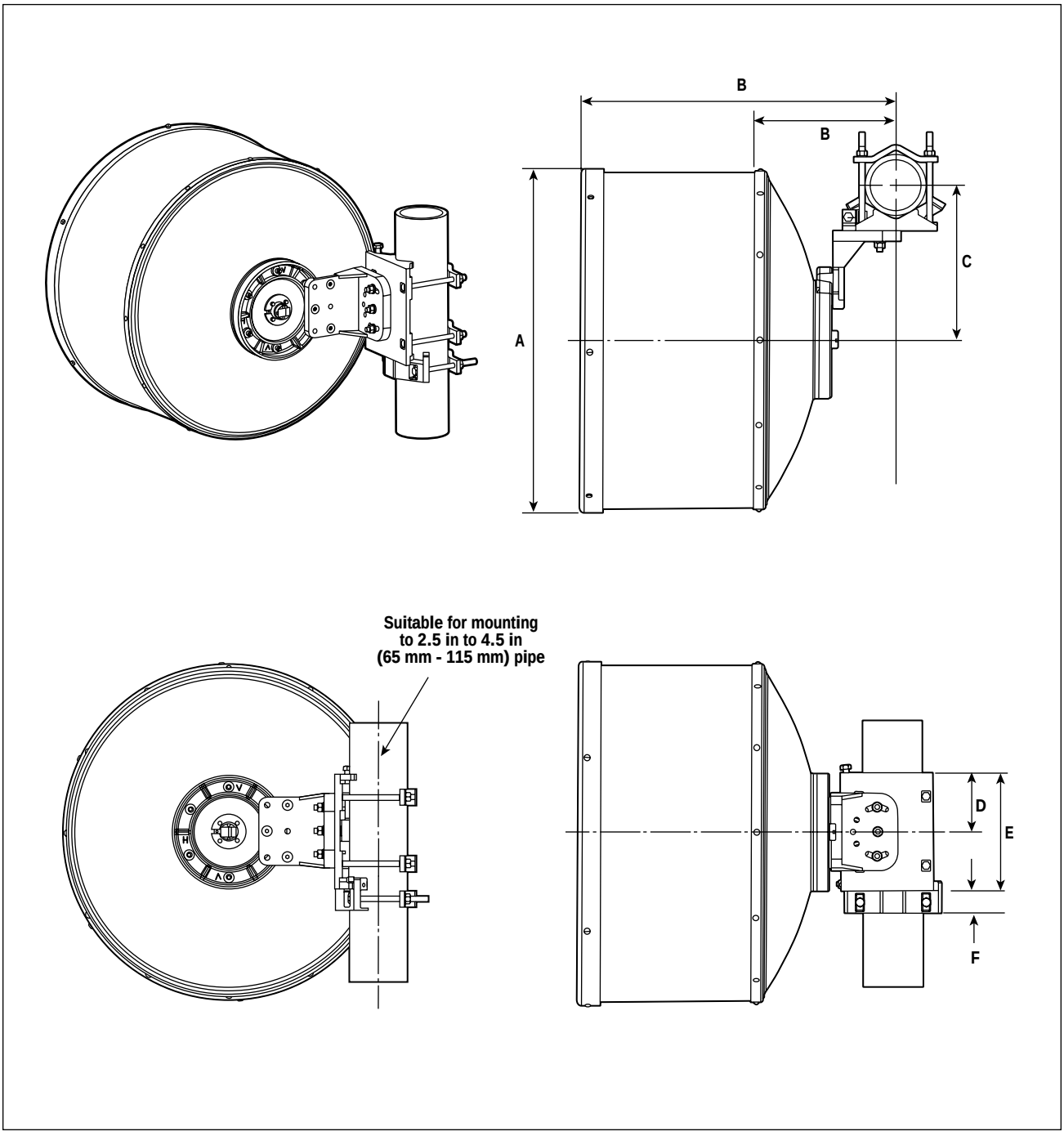
Dimensions in Inches (mm)

Antenna Size, ft (m)	A	B*	C	D	E	F
1 (0.3)	15.6 (398)	11.4 (289)	10.9 (278)	4.3 (110)	8.7 (220)	1.65 (42)

* 12.4 (314 mm) for VHLP1-220 antenna

All dimensions based on 4.5 in (115 mm) pipe

2-ft ValuLine® Shielded and Standard Antenna Dimensions

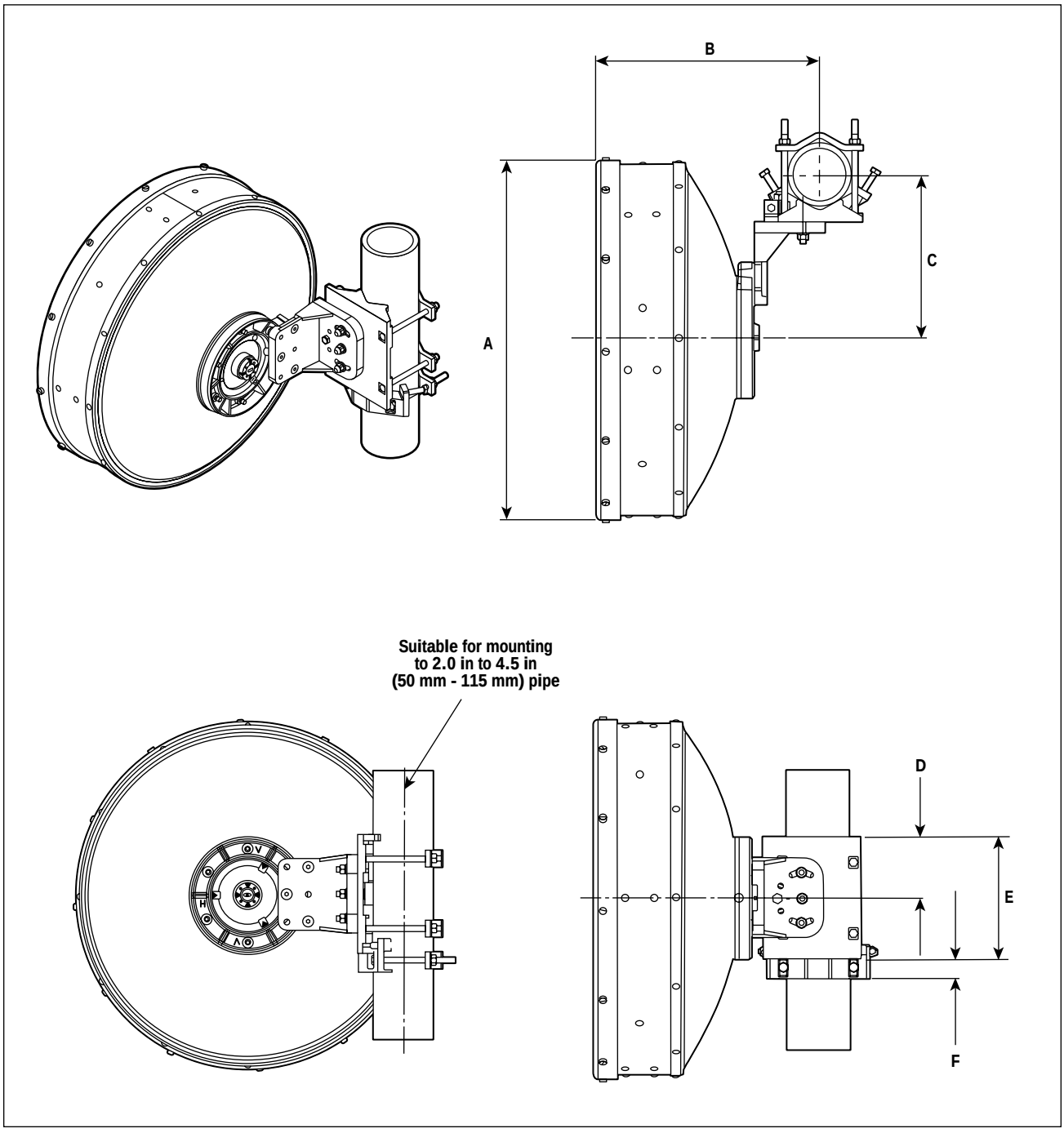


Dimensions in Inches (mm)

Antenna Size, ft (m)	A	B	C	D	E	F
2.0 (0.6) Shielded	25.6 (651)	27.5 (699)	11.5 (292)	4.3 (110)	8.7 (220)	1.65 (42)
2.0 (0.6) Standard	25.0 (637)	10.5 (266)	11.5 (292)	4.3 (110)	8.7 (220)	1.65 (42)

All dimensions based on 4.5 in (115 mm) pipe.

2-ft ValuLine® Low Profile Antenna Dimensions

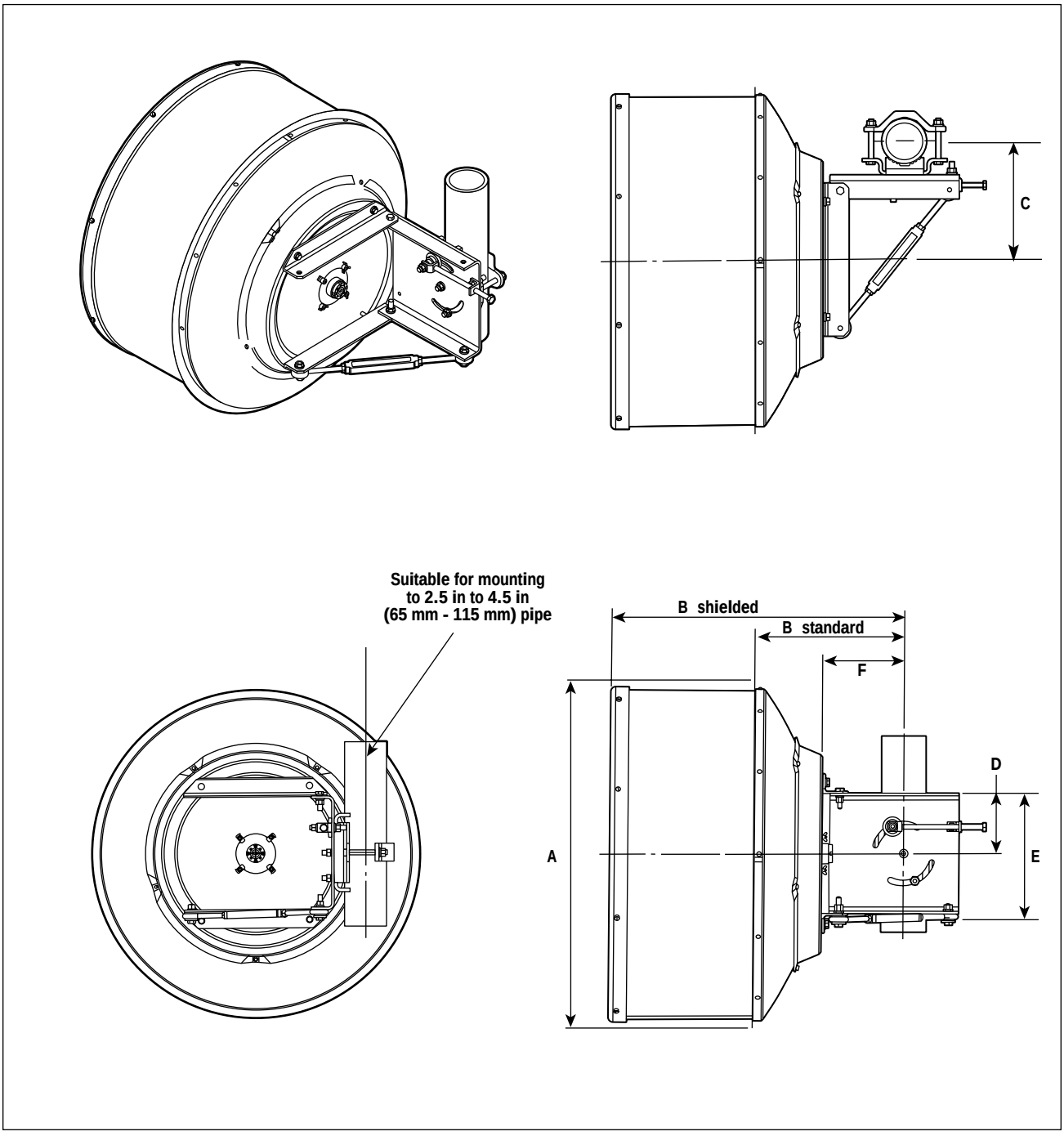


Dimensions in Inches (mm)

Antenna Size, ft (m)	A	B	C	D	E	F
2 (0.6)	25.6 (651)	16.1 (410)	11.5 (292)	4.3 (110)	8.7 (220)	1.65 (42)

All dimensions based on 4.5 in (115 mm) pipe

2.5-ft ValuLine® Shielded and Standard Antenna Dimensions

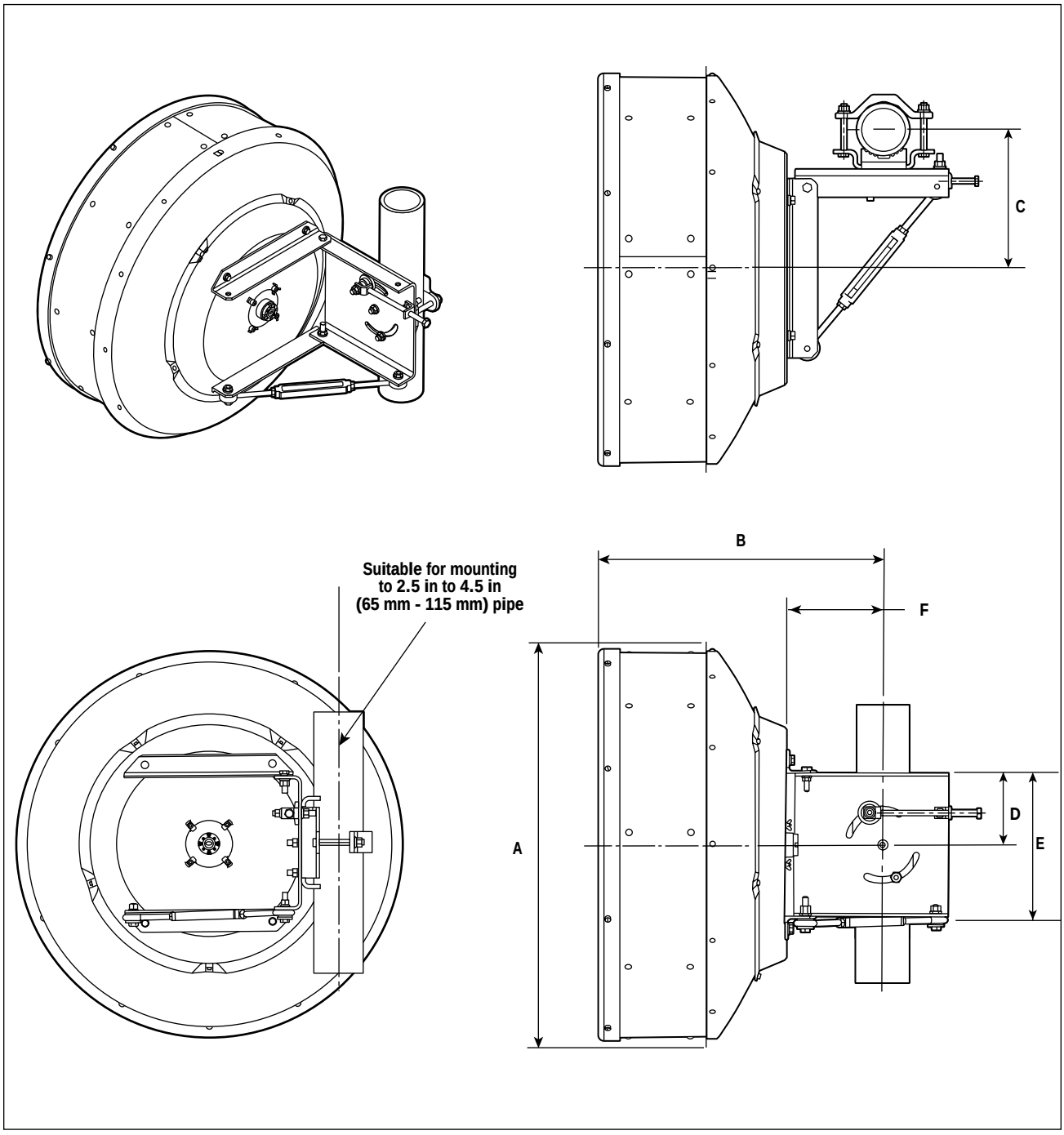


Dimensions in Inches (mm)

Antenna Size, ft (m)	A	B	C	D	E	F
2.5 (0.8) Shielded	35 (889)	29.6 (752)	11.9 (301)	6 (153)	13.3 (338)	8.2 (208)
2.5 (0.8) Standard	35 (889)	15.2 (385)	11.9 (301)	6 (153)	13.3 (338)	8.2 (208)

All dimensions based on 4.5 in (115 mm) pipe.

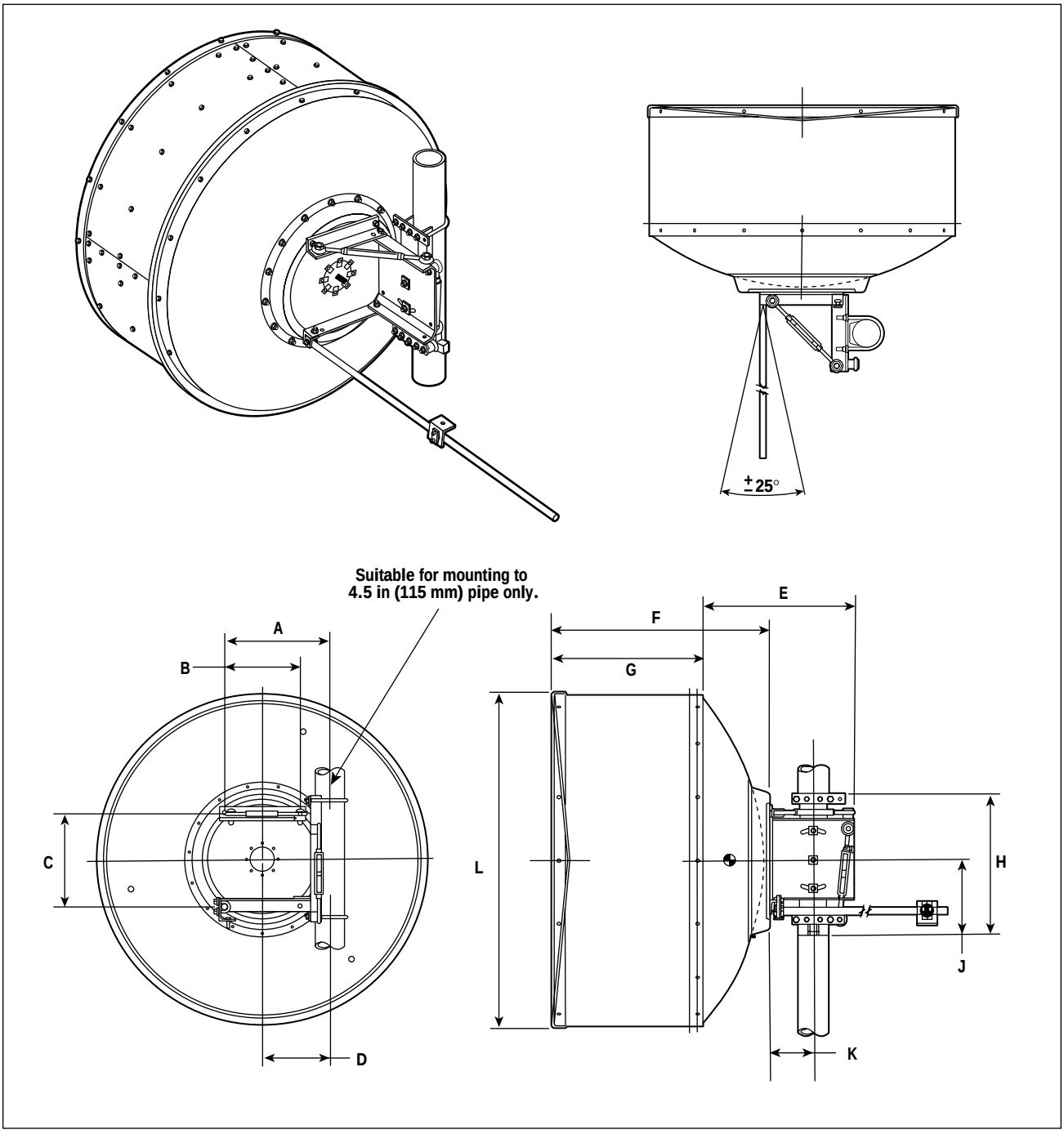
2.5-ft ValuLine® Low Profile Antenna Dimensions



Dimensions in Inches (mm)

Antenna Size, ft (m)	A	B	C	D	E	F
2.5 (0.8)	35 (889)	24.5 (622)	11.9 (301)	6 (153)	13.3 (338)	8.2 (208)

All dimensions based on 4.5 in (115 mm) pipe.

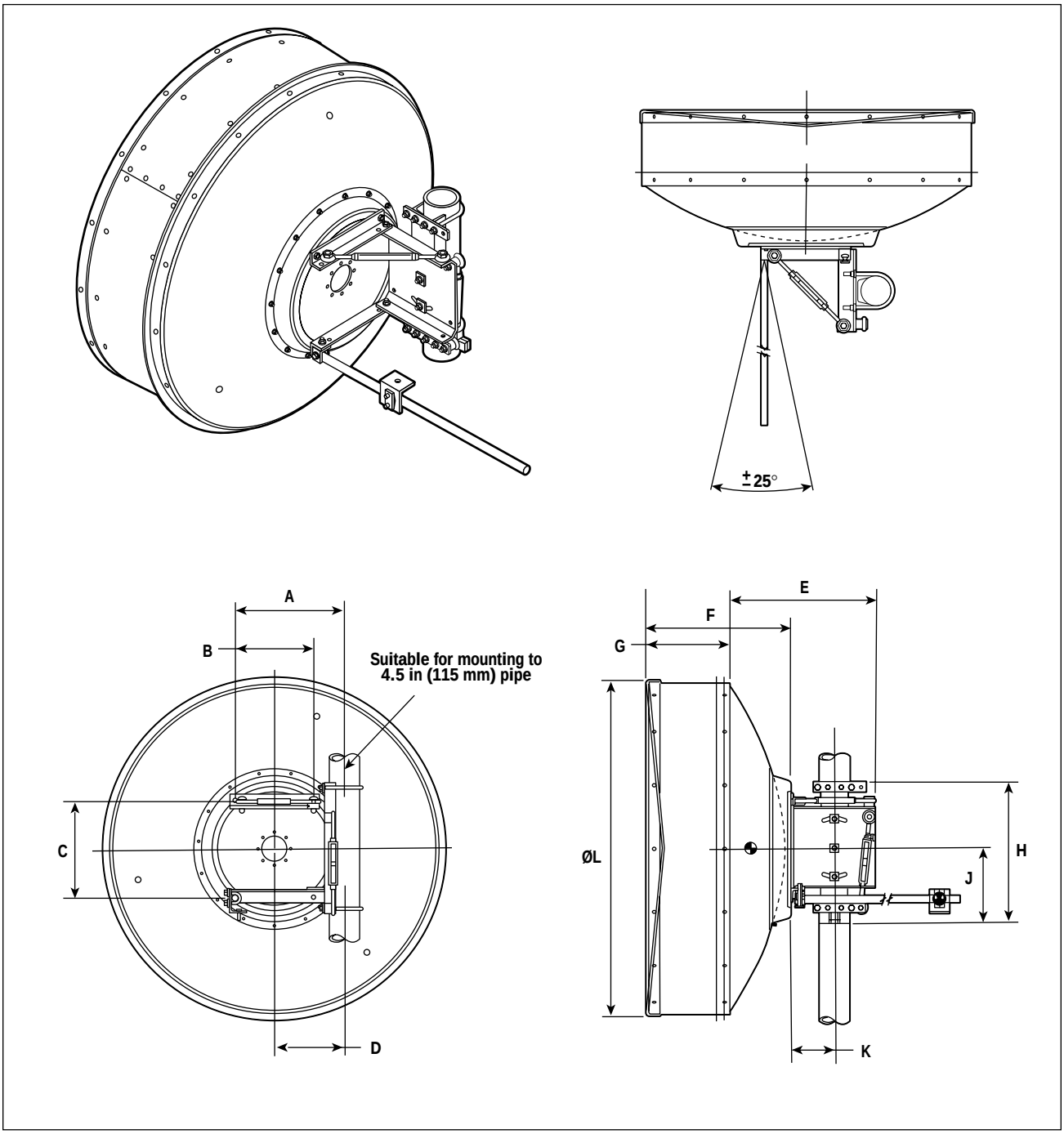


Dimensions in Inches (mm)

Antenna Size, ft (m)	A	B	C	D	E	F*	G*
4 (1.2)	16.2 (411)	11.6 (295)	14.2 (361)	10.4 (264)	21.4 (544)	30.0 (762)	21.3 (541)
	H	J	K	L			
	20.8 (528)	11.1 (288)	6.5 (165)	49.1 (1247)			

* Applicable only for VHP Series (shielded) antennas.

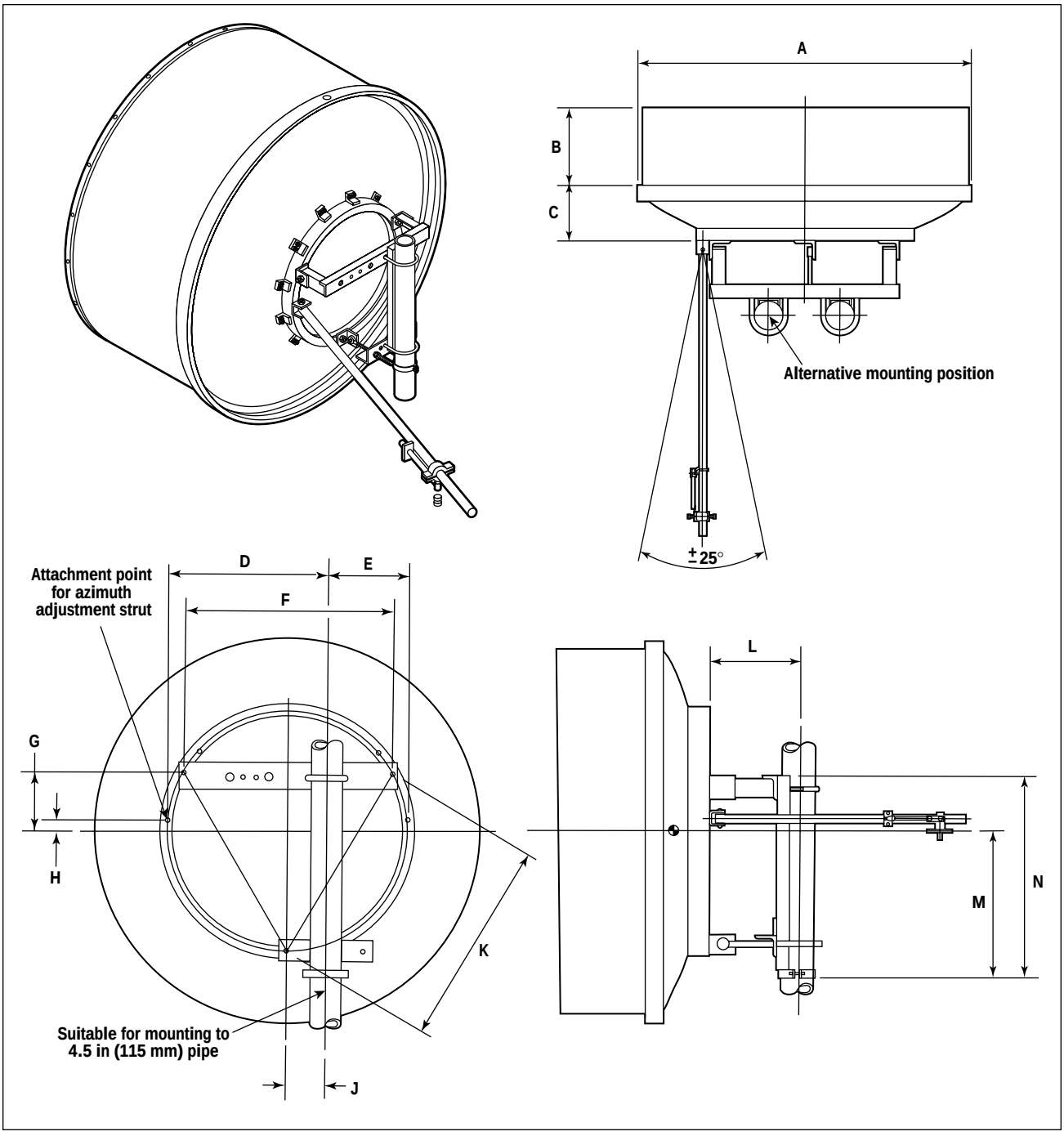
4-ft ValuLine® Low Profile Antenna Dimensions



Dimensions in Inches (mm)

Antenna Size, ft (m)	A	B	C	D	E	F	G
4 (1.2)	16.2 (411)	11.6 (295)	14.2 (361)	10.4 (264)	21.4 (544)	23.4 (594)	14.7 (373)
	H	J	K	L			
	20.8 (528)	11.1 (288)	6.5 (165)	49.1 (1247)			

6-ft ValuLine® Antenna Dimensions



Dimensions in Inches (mm)

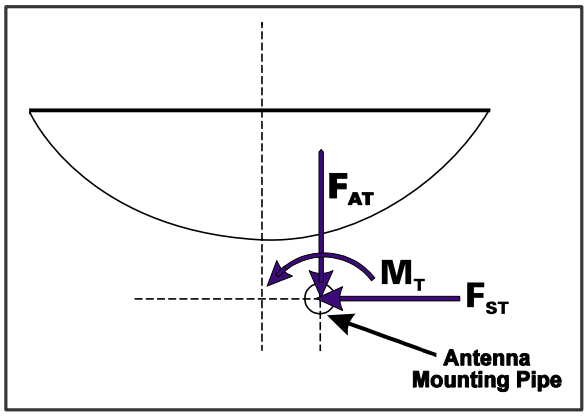
Antenna Size, ft (m)	A	B	C	D	E	F	G
6 (1.8)	76.5 (1945)	34.7 (881)	12.75 (325)	18.8 (476)	9.7 (246)	26.5 (675)	7.65 (195)
	H	J	K	L	M	N	
	2.25 (60)	5.4 (137)	26.5 (675)	11.75 (300)	19.1 (488)	29.1 (740)	

Forces and Twisting Moments Due to Wind Loads

The axial, side, and twisting moment forces shown below are maximum values exerted on a supporting structure. They are the result of wind from the most critical direction for each parameter. The individual maximums may not occur simultaneously.

Andrew Software, included on the Powertools CD-ROM and downloadable from www.andrew.com, calculates the forces produced by winds from any angle.

See page 44 for more information.



Forces and Twisting Moments Due to Wind Loads

Forces/ Moments	Wind Speed 70 mph 110 km/h 31 m/s	125 mph 200 km/h 56 m/s	150 mph 250 km/h 69 m/s
1 ft (0.3 m) VHLP, VHLPX			
F_{AT} max., lb (N)	23 (102)	75 (334)	108 (481)
F_{ST} max., lb (N)	9 (41)	30 (135)	44 (194)
M_T max., lb-ft (N•m)	18 (24)	58 (79)	84 (114)
1 ft (0.3 m) VHP, VHPX			
F_{AT} max., lb (N)	23 (102)	75 (334)	108 (481)
F_{ST} max., lb (N)	10 (46)	34 (150)	49 (216)
M_T max., lb-ft (N•m)	19 (26)	63 (85)	90 (122)
2 ft (0.6 m) VP, VPX			
F_{AT} max., lb (N)	66 (294)	216 (960)	311 (1382)
F_{ST} max., lb (N)	18 (80)	59 (262)	85 (377)
M_T max., lb-ft (N•m)	62 (84)	204 (276)	293 (397)
2 ft (0.6 m) VHLP, VHLPX			
F_{AT} max., lb (N)	51 (226)	166 (740)	240 (1066)
F_{ST} max., lb (N)	27 (121)	89 (394)	127 (567)
M_T max., lb-ft (N•m)	44 (60)	145 (196)	208 (282)
2 ft (0.6 m) VHP, VHPX			
F_{AT} max., lb (N)	51 (226)	166 (740)	240 (1066)
F_{ST} max., lb (N)	32 (141)	103 (460)	149 (662)
M_T max., lb-ft (N•m)	60 (81)	195 (264)	280 (380)
2 ft (0.6 m) VP, VPX with Molded Radome			
F_{AT} max., lb (N)	33 (147)	108 (482)	156 (694)
F_{ST} max., lb (N)	20 (91)	67 (297)	96 (428)
M_T max., lb-ft (N•m)	29 (39)	94 (128)	136 (184)
2.5 ft (0.8 m) VP, VPX			
F_{AT} max., lb (N)	103 (459)	337 (1501)	–
F_{ST} max., lb (N)	28 (125)	92 (410)	–
M_T max., lb-ft (N•m)	105 (143)	345 (468)	–
2.5 ft (0.8 m) VHLP, VHLPX			
F_{AT} max., lb (N)	76 (337)	248 (1102)	–
F_{ST} max., lb (N)	34 (150)	110 (491)	–
M_T max., lb-ft (N•m)	70 (95)	229 (311)	–
2.5 ft (0.8 m) VHP, VHPX			
F_{AT} max., lb (N)	76 (337)	248 (1102)	–
F_{ST} max., lb (N)	38 (167)	123 (546)	–
M_T max., lb-ft (N•m)	78 (106)	255 (346)	–

Forces/ Moments	Wind Speed 70 mph 110 km/h 31 m/s	125 mph 200 km/h 56 m/s	150 mph 250 km/h 69 m/s
2.5 ft (0.8 m) VP, VPX with Molded Radome			
F_{AT} max., lb (N)	52 (231)	170 (754)	–
F_{ST} max., lb (N)	32 (142)	104 (464)	–
M_T max., lb-ft (N•m)	49 (66)	160 (217)	–
4 ft (1.2 m) VP, VPX			
F_{AT} max., lb (N)	264 (1176)	864 (3843)	–
F_{ST} max., lb (N)	72 (321)	236 (1049)	–
M_T max., lb-ft (N•m)	194 (263)	633 (858)	–
4 ft (1.2 m) VHLP, VHLPX			
F_{AT} max., lb (N)	194 (863)	634 (2821)	–
F_{ST} max., lb (N)	86 (383)	281 (1251)	–
M_T max., lb-ft (N•m)	181 (245)	590 (800)	–
4 ft (1.2 m) VHP, VHPX			
F_{AT} max., lb (N)	194 (863)	634 (2821)	–
F_{ST} max., lb (N)	96 (428)	314 (1398)	–
M_T max., lb-ft (N•m)	202 (274)	659 (894)	–
4 ft (1.2 m) VP, VPX with Molded Radome			
F_{AT} max., lb (N)	133 (591)	434 (1930)	–
F_{ST} max., lb (N)	77 (342)	251 (1118)	–
M_T max., lb-ft (N•m)	175 (237)	571 (774)	–
6 ft (1.8 m) VP, VPX			
F_{AT} max., lb (N)	595 (2646)	1944 (8647)	–
F_{ST} max., lb (N)	162 (722)	531 (2360)	–
M_T max., lb-ft (N•m)	547 (742)	1789 (2425)	–
6 ft (1.8 m) VHP, VHPX			
F_{AT} max., lb (N)	437 (1942)	1427 (6348)	–
F_{ST} max., lb (N)	216 (962)	707 (3144)	–
M_T max., lb-ft (N•m)	499 (676)	1629 (2209)	–
6 ft (1.8 m) VP, VPX with Molded Radome			
F_{AT} max., lb (N)	299 (1329)	976 (4343)	–
F_{ST} max., lb (N)	184 (818)	601 (2673)	–
M_T max., lb-ft (N•m)	521 (707)	1703 (2309)	–

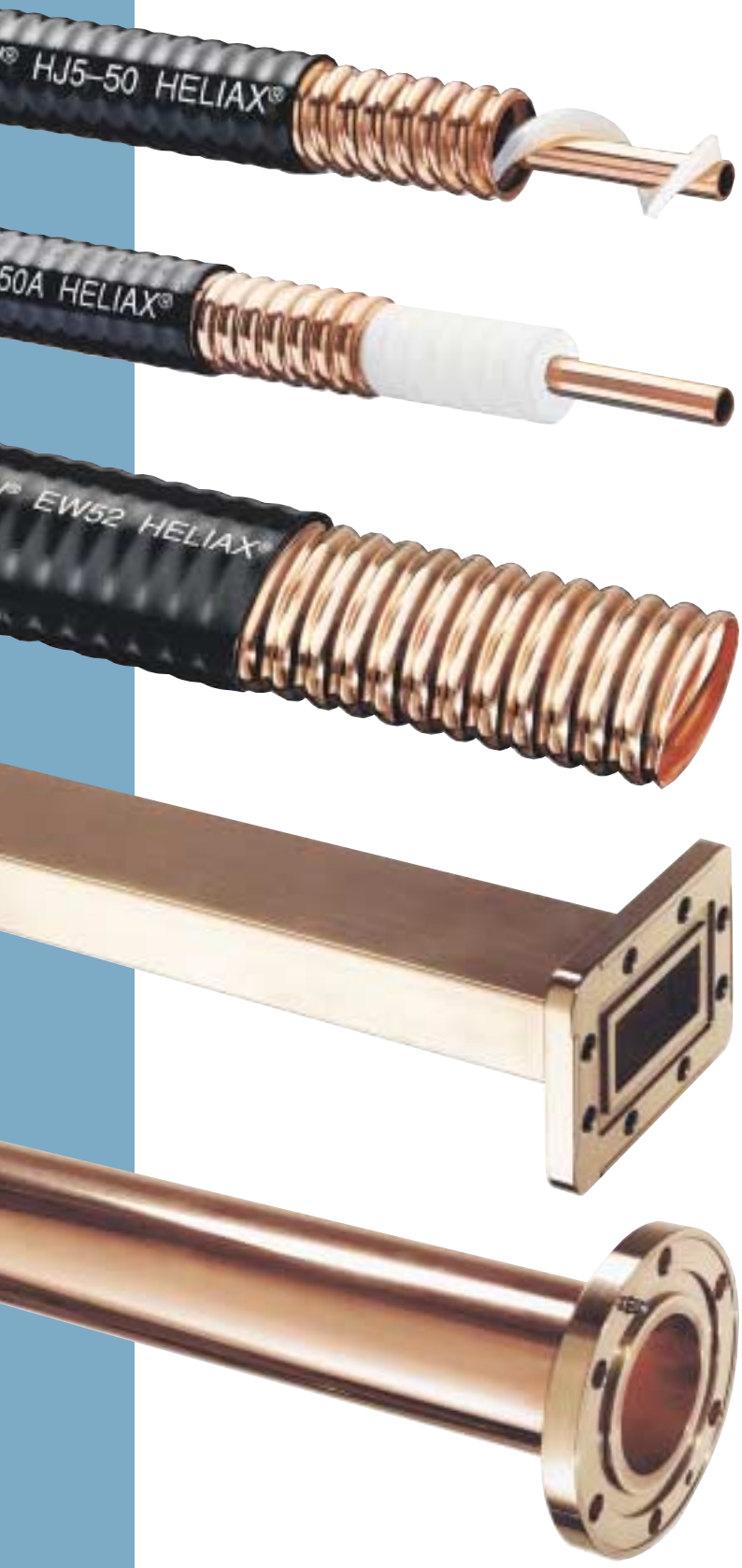
Standard VHP4 Packing

Pre-Assembled VHP4 Packing

1 ft (0.3 m), 2 ft (0.6 m), and 2.5 ft (0.8 m) ValuLine antennas are shipped as standard in totally recyclable cardboard packaging. 4 ft (1.2 m) and 6 ft (1.8 m) antennas are supplied in wire-bound crates. For shipment to more remote areas of the world, heavy duty packing is available.

Contact Andrew for details.

Standard VHP1 and VHP2 Packing



Widest Selection

of microwave transmission lines in the industry. Andrew offers sizes and types that are optimized for nearly every application.

HELIAX® Coaxial Cables and Elliptical Waveguides

have been, for many years, the standard transmission lines of the microwave industry. HELIAX cables and waveguides are proven performers in thousands of applications worldwide. Use of these products ensures the ultimate in quality, reliability and performance.

Andrew Circular Waveguides

offer lowest possible attenuation for long vertical runs and can result in antenna and tower cost savings.

Low VSWR

Andrew offers all types of microwave transmission lines in low VSWR versions for minimum group delay distortion and system noise.

How to Select Transmission Lines

Andrew offers a complete range of HELIAX elliptical, rigid rectangular and rigid circular waveguides for use in terrestrial microwave and earth station antenna systems. HELIAX coaxial cables are offered for systems operating in microwave bands below 3 GHz.

The selector chart on page 151 lists recommended transmission lines by frequency band. Several options are listed for each band. The choice is typically based on evaluation of the features of each as described below.

Low VSWR HELIAX Air-Dielectric Coaxial Cable is the recommended feeder for antennas with air-dielectric feeds for 2.7 GHz and below. HELIAX cable is available in long continuous lengths for ease of installation and maintenance-free service. 7/8", 1-5/8" and 2-1/4" are the sizes typically used. HELIAX air-dielectric cables for microwave applications are described on pages 154 and 155.

Low VSWR HELIAX Foam-Dielectric Coaxial Cable is recommended for use with antennas having unpressurized feeds. 1/2", 7/8", 1-1/4" and 1-5/8" LDF series are the sizes typically used. HELIAX foam-dielectric cables for microwave applications are described on pages 152 and 153.

HELIAX Elliptical Waveguide is the recommended feeder for most microwave antenna systems in the 3.4 to 26.5 GHz frequency range. Long, continuous, flexible lengths result in easier and less costly system planning and installation compared with rigid waveguides. The performance and reliability of HELIAX elliptical waveguide have been

proven in thousands of microwave systems. The corrugated copper walls give HELIAX® elliptical waveguide excellent crush strength and good flexibility. A rugged black polyethylene jacket provides protection during handling and installation. Assemblies consist of waveguide cut to a specified length and terminated with connectors. Alternatively, bulk lengths may be ordered and individual feeders cut to length on site prior to installation.

Low VSWR, premium (EWP Series) assemblies are recommended for long-haul or high channel density systems. Standard VSWR (EW Series) assemblies are recommended for short and medium-haul radio relay systems with low and medium channel densities and medium-haul color television microwave relay systems. Super premium versions are available for selected sizes and offer lowest VSWR. HELIAX elliptical waveguides are described on pages 156-201.

Circular Waveguide minimizes feeder attenuation and is particularly suited for long vertical waveguide runs to tower-mounted antennas. A single waveguide run can carry two polarizations with 30 dB minimum isolation. Circular waveguide is recommended for systems where lower attenuation is critical or where multiband capability is needed. The economic choice between elliptical and circular waveguides depends on total antenna and feeder system equipment, transportation, installation and tower costs. Circular waveguides are described on pages 202-218.

Rectangular Waveguide Components such as elbows, twists, pressure windows, and flex-twists are used in elliptical and circular waveguide systems for connections with the antenna and radio equipment. Rectangular waveguide also may be used for short feeder systems where space is limited. A full range of components for bands in the 3.4 - 40 GHz frequency range is offered. Rectangular waveguides are described on pages 219-230.

Transmission Line Selector Chart

Frequency Band, GHz	HELIAX Coaxial Cable Air Dielectric	HELIAX Coaxial Cable Foam Dielectric	HELIAX Elliptical Waveguide Type	Pages	Rectangular Waveguide (See Pages 202)	Circular Waveguide (See Pages 219)
Below 1.427	HJ( )-50 Series	LDF( )-50 Series	–	–	–	–
1.427-1.535	HJ( )-50 Series	LDF( )P-50 Series	–	–	–	–
1.7-2.3	HJ( )P-50 Series	LDF( )P-50 Series	EW17, EWP17	160	–	–
2.5-2.7	HJ( )P-50 Series	LDF( )P-50 Series	EW20	162	–	–
2.9-3.4			EW28	164	–	–
3.4-4.2	–	–	EW34, EWP34, EW37, EWP37	166	WR229	WC281
			& EWP37S	168	–	–
4.4-5.0	–	–	EW43 & EWP43	170	WR187	–
5.6-6.425	–	–	EW52, EWP52	172	WR159, WR137	–
5.925-6.425	–	–	EW52, EWP52 & EWP52S	172	WR159, WR137	WC281, WC166
6.425-7.125	–	–	EW63, EWP63 & EWP63S	174	WR137	WC281, WC166
7.125-7.750	–	–	EW64, EWP64	176	WR137, WR112	WC166
7.125-8.5	–	–	EW77, EWP77	178	WR112	WC166
8.5-9.8	–	–	EW85	180	WR90, WR112	–
10.5-10.7	–	–	EW90, EWP90	182	WR90	–
10.7-11.7	–	–	EW90, EWP90 & EWP90S	182	WR90	WC109
11.7-13.25	–	–	EW127A, EWP127A	184	WR75	WC109
14.0-14.5	–	–	EW132, EWP132	186	WR75	–
14.5-15.35	–	–	EW132, EWP132	186	WR62	–
17.7-19.7	–	–	EW180, EWP180	188	WR42	WC109
21.2-23.6	–	–	EW220	190	WR42	–
24.25-26.50	–	–	EW240	192	WR42	–
26.5-40	–	–	–	*	WR51, 28	–

HJ( )-50 Series Size	Type	HJ( )P-50 Series Pages	Type	Pages	LDF( )-50 Series Type	Pages	LDF( )P-50 Series Type	Pages
1/2"	**HJ4-50**	535	–	–	**LDF4-50A**	496	**LDF4P-50A**	496
7/8"	**HJ5-50**	555	**HJ5P-50**	555	**LDF5-50A**	506	**LDF5P-50A**	506
1-1/4"	–	–	–	–	**LDF6-50**	513	**LDF6P-50**	513
1-5/8"	**HJ7-50A**	560	**HJ7P-50A**	560	**LDF7-50A**	520	**LDF7P-50A**	520
			HJ7SP-50A	560				

* On request

Microwave Cables
Foam Dielectric

Low VSWR

Minimize group delay distortion and system noise.

Low Attenuation

Low loss foam for efficient signal transfer.

Long Continuous Lengths

Simplifies installation, eliminates the need for splices and provides for convenient stocking on site. Also, fewer joints mean increased reliability.

Foam-Dielectric Cables

Eliminates the need for pressurization equipment for easier installation and lower maintenance costs.

HELIAX® low-VSWR, foam-dielectric coaxial cables are the industry standard for use in unpressurized microwave radio relay systems. These cables are for use with the "F" series antennas operating from 1427 to 2700 MHz listed on pages 54-59. Type LDF6P-50 has a pressure path through the inner conductor and is also suitable for use with air-dielectric feed antennas. For applications below 1427 MHz, the standard HELIAX cables described on pages 496-526 are recommended.

Cables and fitted connectors are available for any standard U. S., Canadian, or CCIR frequency band. Other frequency bands are available on special order. Every assembly is guaranteed not to exceed the maximum VSWR specified.

Accessories described on pages 529-625 apply to low-VSWR HELIAX cable.

Low-VSWR HELIAX Jumper Assemblies

LDF series foam jumper assemblies offer low attenuation, low VSWR, complete RF shielding, flexibility, and high mechanical strength for equipment room connections. Low-VSWR, 1/2", 50 ohm HELIAX cable and connectors are used. Every assembly is guaranteed not to exceed the maximum VSWR specified. Type N Plug (male) connectors have gold-plated inner contact pins and silver-plated external surfaces. Other connectors and cable lengths are also available.

Weatherproof. Connector O-ring seals, in conjunction with the annular corrugations of the cable, provide a longitudinal moisture block. To eliminate differential expansion, the dielectric is mechanically locked to the outer conductor and bonded to the inner conductor.

Self-Flaring. This patented* innovation results in simplified assembly, excellent electrical contact and high resistance to connector pull-off and twist-off. Each connector is designed for low VSWR up to the cut-off frequency of the cable.

* U.S. Patent 4,046,451.

To Order. Specify cable type number including frequency band code, connector type numbers, "first-off" connector and cable length in feet or meters. See sample order on page 473.

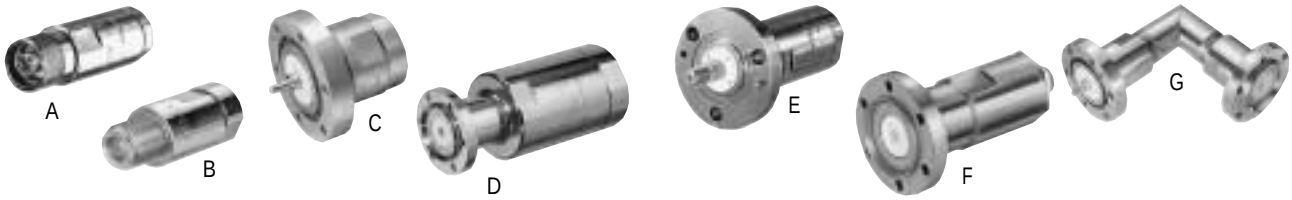
Characteristics - LDF Series Foam-Dielectric HELIAX Cable Assemblies

Size	1/2"	5/8"	7/8"	1-1/4"	1-5/8"	2-1/4"
Type No.	**LDF4P-50A**	**LDF4.5P-50**	**LDF5P-50A-(*)**	**LDF6P-50-(*)**	**LDF7P-50A-(*)**	**LDF12P-50**
Impedance, ohms	50	50	50	50	50	50
Low VSWR, Max, (RL)	Refer to Page 498	Refer to Page 501	Refer to Page 508	Refer to Page 515	Refer to Page 522	Refer to Page 525
Attenuation at 2 GHz** dB/100 ft (dB/100 m)	3.25 (10.7)	2.44 (8.02)	1.86 (6.11)	1.35 (4.43)	1.16 (3.81)	0.994 (3.26)
Velocity, percent	88	89	89	89	88	88
Diameter over Jacket, in (mm)	0.63 (16)	0.86 (21.9)	1.09 (28)	1.55 (39.4)	1.82 (46.3)	2.35 (59.7)
Minimum Bending Radius, in (mm)	5 (125)	8 (200)	10 (250)	15 (380)	20 (508)	24 (610)
Cable Weight, lb/ft (kg/m)	0.15 (0.22)	0.27 (0.40)	0.33 (0.49)	0.66 (0.98)	0.92 (1.37)	1.29 (1.91)

* Insert frequency band code in Type Number when ordering. See referenced page. ** For other frequencies, refer to pages 496-520.

Type No.	Frequency MHz	Length feet (m)	VSWR Max. (R.L.)
Type N Plug/Type N Plug Connectors			
L4P4-PNMNM-3	1427 - 1535	3 (0.9)	1.10 (26.4)
L4P4-PNMNM-6	1427 - 1535	6 (1.8)	1.10 (26.4)
L4P3-PNMNM-3	940 - 2700	3 (0.9)	1.12 (24.9)
L4P3-PNMNM-6	940 - 2700	6 (1.8)	1.12 (24.9)
48695A-3	2300 - 2700	3 (0.9)	1.10 (26.4)
48695A-6	2300 - 2700	6 (1.8)	1.10 (26.4)
L4P3-PNMNM-3	2300 - 2700	3 (0.9)	1.10 (26.4)
L4P3-PNMNM-6	2300 - 2700	6 (1.8)	1.10 (26.4)

Type No.	Frequency MHz	Length feet (m)	VSWR Max. (R.L.)
7/8" EIA Flange/N Plug Connectors			
200834A-3	1700 - 2300	3 (0.9)	1.06 (30.7)
200834A-6	1700 - 2300	6 (1.8)	1.06 (30.7)
202638A-3	2500 - 2700	3 (0.9)	1.10 (26.4)
202638A-6	2500 - 2700	6 (1.8)	1.10 (26.4)
"F" Flange Male/"F" Flange Male Connectors			
L4P3-FMFM-3	1700 - 2300	3 (0.9)	1.15 (23.1)
L4P3-FMFM-6	1700 - 2300	6 (1.8)	1.15 (23.1)



Connectors and Components

	Interface	For 1/2" LDF4P-50A	For 7/8" LDF5P-50A	For 1-1/4" LDF6P-50	For 1-5/8" LDF7P-50A	For 2-1/4" LDF12P-50A	Components
A	N Plug (male), mates with UG-23	**L4PNM-RC**	**L5PNM-RPC**	**L6PNM-RPC***	**L7PNM-RPC**	–	–
B	N Jack (female), mates with UG-21	**L4PNF-RC**	**L5PNF-RPC**	**L6PNF-RPC***	**L7PNF-RPC**	**L12PNF**	–
C	"F" Flange (male), for attachment to "F" series antennas	**L44F**	**L45F**	**L46F**	**L47F**	–	–
D	"F" Flange (female), use with jumper cables having "F" Flange (male) connectors.	**209865**	**48041**	–	**201942**	–	–
E	7/8" EIA Flange, includes inner Conductor, No gas barrier.	**L44R**	**L45R**	**L46S***	**L47S**	–	–
F	Adapter "F" Flange (female), Type N Jack (female). Allows testing of feeders terminated with "F" Flange male connectors.	–	–	–	–	–	**104300-2**
G	Elbow, "F" Flange (male), "F" Flange (female)	–	–	–	–	–	**203361**

* For pressure port and pipe plug, order type number L6PNM-PR or L6PNF-PR

Microwave Cables
Air Dielectric

Low VSWR

Minimum group delay distortion and minimum noise

Low Attenuation

Lowest loss for efficient signal transfer

Long Continuous Lengths

Simplifies installation, eliminates the need for splices and provides for convenient stocking on site. Also, fewer joints mean increased reliability.

Air-Dielectric Cables

Provide pressure path to pressurizable antenna feeds.

HELIAX® low-VSWR, air-dielectric coaxial cables are the industry standard for use in pressurized microwave antenna systems. These cables are for use with the air-dielectric feeds operating from 1700 to 2700 MHz listed on pages 54-59.

Cables and fitted connectors are available for any standard U.S., Canadian, or CCIR frequency band. Other frequency bands are available on special order. All cable assemblies are sweep tested at the factory to ensure low VSWR performance across the specified operating band.

Accessories described on pages 592-625 apply to low-VSWR HELIAX cable.

Characteristics - Air-Dielectric HELIAX Cable Assemblies

Size	Frequency Band Code	7/8"	1-5/8"	1-5/8"	2-1/4"
Type No.		HJ5P-50-(**)	HJ7SP-50A-(**)	HJ7P-50A-(**)	HJ12P-50-(**)
VSWR, (R.L.) Maximum (with recommended connectors)	–	1.08 (28.3)	1.10 (26.4)†	1.15 (23.1)	1.15 (23.1)
Attenuation at 2 GHz dB/100 ft (dB/100 m)	–	1.91 (6.26)	1.04 (3.42)	1.04 (3.42)	0.80 (2.89)
Impedance, ohms	–	50	50	50	50
Frequency, MHz,	-17L	1700 - 1900	1700 - 1900	1700 - 1900	1700 - 1900
	-18	1850 - 1990	1850 - 1990	1850 - 1990	1850 - 1990
	-21	2110 - 2200	2110 - 2200	2110 - 2200	2110 - 2200
	-17	1700 - 2110	1700 - 2110	1700 - 2110	1700 - 2110
	-19	1900 - 2300	1900 - 2300	1900 - 2300	1900 - 2300
	-23W	2300 - 2700	–	2300 - 2700	–
Velocity, percent	–	91.6	92.1	92.1	93.1
Diameter over Jacket, in (mm)	–	1.1 (28)	1.98 (50.3)	1.98 (50.3)	2.38 (60.4)
Minimum Bending Radius, in (mm)	–	10 (250)	20 (508)	20 (508)	22 (560)
Cable Weight, lb/ft (kg/m)	–	0.54 (0.80)	1.04 (1.55)	1.04 (1.55)	1.16 (1.73)

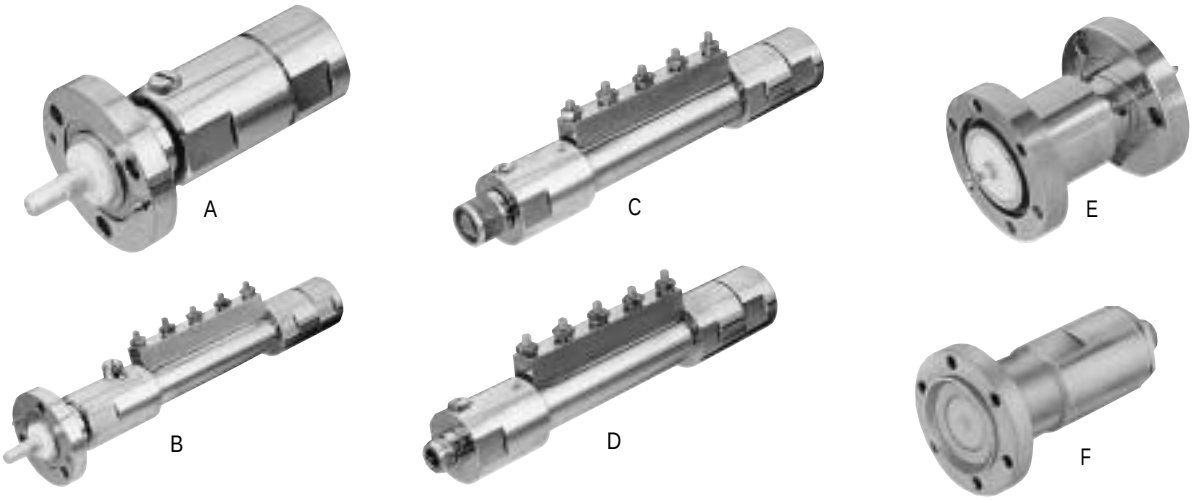
** Insert frequency band code in Type Number when ordering. † 1.12 (24.8) with H7NM-T and H7NF-T

Recommended Connectors

Cable Type	Bandwidth	7/8" EIA Flange No Gas Barrier	7/8" EIA Flange Gas Barrier	Type N Plug (male)	Type N Jack (female)
HJ5P-50	Up to 200 MHz	**75AR**	**75AG**	**H5NM-T**	**H5NF-T**
	200 - 410 MHz	**75ART**	**75AGT**	**H5NM-T**	**H5NF-T**
HJ7SP-50A	Up to 410 MHz	**87ST**	**87SGT**	**H7NM-T**	**H7NF-T**
HJ7P-50A	Up to 150 MHz	**87S**	**87SG**	**H7NM-T**	**H7NF-T**
	150 - 410 MHz	**87ST**	**87SGT**	**H7NM-T**	**H7NF-T**
HJ12P-50	Up to 410 MHz	**82S**	–	–	**H12NF**

Selection of Connectors

Some applications, depending on bandwidth and cable type, require tunable connectors to achieve the specified VSWR ratings. Refer to the table on page 154 for connector recommendations. For example, tunable Type N or non-tunable 7/8" EIA connectors are recommended for use with Type HJ5P-50 cable operating in the 1850 - 1990 MHz band (under 200 MHz bandwidth).



Connectors and Components

	Interface	For 7/8" HJ5P-50	For 1-5/8" HJ7P-50A and HJSP-50A	For 2-1/4" HJ12P-50	Components
A	7/8" EIA Flange, no gas barrier at interface	**75AR**	**87S**	**82S**	–
A	7/8" EIA Flange, gas barrier	**75AR**	**87SG**	–	–
B	Tunable 7/8" EIA Flange, no gas barrier at interface	**75ART**	**87ST**	–	–
B	Tunable 7/8" EIA Flange, gas barrier	**75AGT**	**87SGT**	–	–
C	Tunable N Plug (male), mates with UG-23	**H5NM-T**	**H7NM-T**	–	–
D	Tunable* N Jack (female), mates with UG-21	**H5NF-T**	**H7NF-T**	**H12PNF***	–
E	Adapter, 7/8" EIA, "F" Flange (male). For attaching air-dielectric HELIAX® cable with 7/8" EIA Flange to "F" Series antenna, includes gas barrier.	–	–	–	**33682**
F	Adapter, "F" Flange (female), Type N Jack (female). Allows testing of feeders terminated with "F" Flange male connectors.	–	–	–	**104300-2**

* H12PNF not tunable

To Order. Specify cable type number including frequency band code, connector type numbers, "first-off" connector and cable length in feet or meters. See sample order on page 473.

HELIAX® Elliptical Waveguide

General Information

HELIAX elliptical waveguide is the optimum choice for most microwave antenna feeder systems. HELIAX is precision-formed from corrugated high-conductivity copper and has an elliptical cross section. The corrugated wall gives the waveguide excellent crush strength, light weight and good flexibility for ease of handling. A rugged black polyethylene jacket provides protection during handling and installation. A full range of waveguide sizes is available for application from 1.7 to 26.5 GHz.

High Performance

Low Loss. HELIAX elliptical waveguides are optimized for lowest loss in specific user bands. Attenuation is significantly lower than that of standard rectangular waveguides for these bands. You get highly efficient signal transfer which optimizes overall system performance.

Low Signal Distortion. The elliptical cross section propagates the $_eTE_{11}$ dominate mode, which is similar to the TE_{10} mode in rectangular waveguide, and operates below the cutoff frequencies of higher order modes. Operating in the frequency band where only the dominant mode can exist eliminates signal distortion due to mode conversion and minimizes VSWR.

Guaranteed VSWR Performance. All factory assemblies are guaranteed to meet stated VSWR specifications. You get the performance you expect. No surprises, no risk.

Advanced Connector Design. Fixed-tuned premium connector design provides low VSWR performance, eliminating the need for field tuning.

Long Service Life Means Cost-Effective Performance

Solid Copper Corrugated Wall gives the waveguide excellent crush strength, light weight and good flexibility.

Rugged Black Polyethylene Jacket provides protection during handling and installation. The jacket is weatherproof and ultraviolet stabilized to prevent deterioration. Standard jacketing material is suitable for operation down to -54°C (-65°F) and installation down to -40°C (-40°F).

Investment Cast Silicon Brass and Forged Brass connector material, for most sizes, ensures long lasting pressure tightness and corrosion resistance. Connector hardware is stainless steel for corrosion protection and long life.

Advanced Design Accessories are integral HELIAX system components and are engineered for long term reliability.

Minimum Installation Cost and Simplified System Planning

HELIAX elliptical waveguide minimizes the cost of detailed waveguide system planning and has lower installation cost compared with other types of waveguide.

Good Flexibility of the corrugated copper construction provides ease of handling during installation. Saves time and labor.

One-Stop Shopping. A broad range of accessories and components is available from Andrew, all engineered to work together as a system. With Andrew you can avoid the costly problems of out of sequence deliveries and non-compliant material which can result from dealing with multiple vendors.

Long Continuous Length availability is a major advantage of HELIAX elliptical waveguide. It can be easily cut to length for any waveguide run eliminating the need for multiple joints and elbows of flex sections. The result: lower installation cost, easier system planning and increased reliability. Long lengths also permit convenient stocking at the site.

Connector Attachments are designed so that special tools or compounds are not required.

Easy to Use Flaring Tools are available for most sizes. Special training is not required.

Additional Services Make the Andrew Difference

Andrew offers a broad range of services including delivery, installation, and testing of antenna/transmission line systems. We are also prepared to handle all of the other details necessary for complete site construction.

Fast Delivery. Rapid product availability allows Andrew to be a real problem solver for you at installation time. With schedules to meet, you need to avoid delivery delays, contain costs and get your system operating on time. With HELIAX elliptical waveguide from Andrew, you can do it.

Applications Engineering Support. Andrew offers applications engineering support to solve system design problems and ensure that your waveguide system is properly designed. We can provide expert assistance to make sure that your waveguide investment will provide a cost-effective return.

VSWR Characteristics

Recommended waveguide and connector assemblies for the commonly used frequency bands are listed in the tables on pages 160-193. VSWR characteristics shown are guaranteed for factory assemblies within the indicated bands. They are also typical for assemblies with field-installed connectors. Performance data for other bands are available on request.

HELIAX® elliptical waveguide is available in standard VSWR, premium (low VSWR) and super premium (lowest VSWR) versions. Selection of waveguide is completed by VSWR testing which is an integral part of the manufacturing process. For this reason, standard, premium and super premium versions all carry the EW marking. Except for attainable VSWR, standard, premium and super premium waveguides have the same electrical and mechanical characteristics.

All waveguide is tested as part of the manufacturing process, and is verified to be at least 0.01 better than the published VSWR specifications. This ensures that the published specifications will be maintained upon delivery to the site. See page 201 for details of the high directivity Andrew Hybrid Reflectometer.

Cutting Tolerance

Waveguide lengths are measured from connector flange face to connector flange face. Standard cutting tolerance is +2%, -0%. Closer tolerances are available on special order.

Elliptical Waveguide Connectors

Connectors are tapered or multi-step transitions from elliptical to rectangular waveguide cross sections and mate with industry standard rectangular waveguide flanges. Each connector includes a pressure inlet with a 1/8" female pipe thread, flange gasket, flange hardware and assembly instructions. “M” suffix connectors, such as 143SEM, have IEC154 compliant flanges, and are supplied with metric flange hardware and gasket.

Connector Types Available

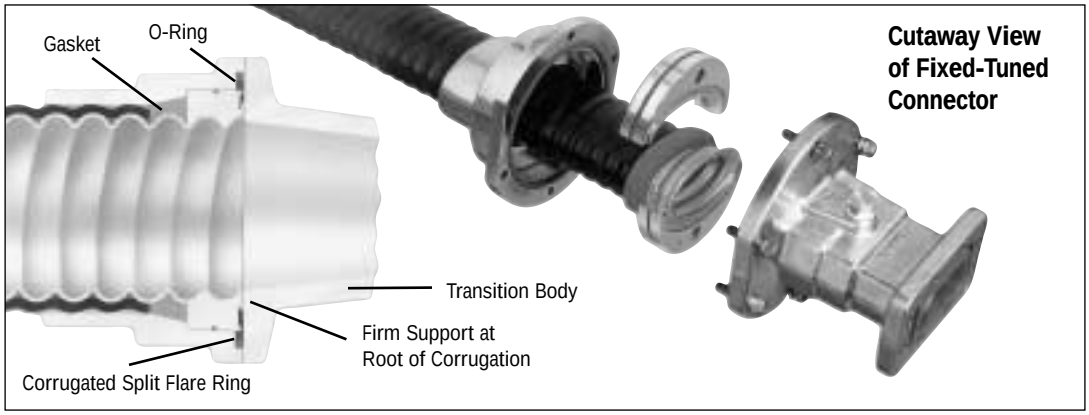
Non-Tunable Connectors are tapered transitions which do not include tuning screws. They are recommended for use with standard HELIAX elliptical waveguide and have designations such as 163DE.

Tunable Connectors are tapered transitions which include tuning screws to minimize assembly VSWR. Tunable connectors are identified by a “T” suffix. For example, 163DET is a tunable version of the 163DE non-tunable connector mentioned above.

When ordered as part of a premium or super premium factory assembly, the connectors are factory attached and tuned. Tunable connectors are suitable for field attachment when the capability for field tuning exists. Tunable connectors are recommended for use with premium and super premium HELIAX elliptical waveguide.

Fixed-Tuned Connectors have a multi-step mating section which is precisely machined to provide low VSWR over a broad bandwidth without the use of tuning screws. Fixed-tuned connectors are recommended for use with standard and premium HELIAX elliptical waveguide. The connectors have designations which include an “S” after the series number. Types are: 143SEM, 163SEM*, 164SEM*, 290SC**, 1220ASC* and 2180SEM.

* Patented United States 4,540,959; Australia 565,511; Canada 1,221,751.
** Patented United States 4,642,585; Australia 578,507; Canada 1,224,897.



Cutaway View of Fixed-Tuned Connector

HELIAX® Elliptical Waveguide
General Information

Connector Materials

All connectors except for the 117, 120 and 128 series, are constructed of brass. 117, 120 and 128 series are silicone impregnated, nickel plated aluminum. Both materials are long lasting, pressure tight and compatible with the waveguide material to prevent corrosion. A precision molded silicone rubber gasket conforms to the shape of the waveguide corrugations and provides a reusable pressure seal without the need for sealing compounds. All hardware is stainless steel for corrosion protection and long life.

Connectors Are Easy to Attach

All connectors, except those for EW17, 20, 28 and 85, incorporate a corrugated split flare ring to accurately position the elliptical waveguide relative to the transition. When used with the new compact flaring tool kit, this allows consistent VSWR to be achieved for connectors which do not require field tuning.

Saw Guide. Split flare ring connectors include a disposable plastic saw guide to assure a square cut of the waveguide and the proper length for flaring.

Integral Flare Aid. The corrugated split flare ring functions as a flare aid. This innovation results in:

- *Improved electrical performance through optimum positioning of the corrugation runout relative to the electrical axis of the waveguide.*
- *Firm support throughout the corrugation allowing high mating pressure at the point of electrical contact to eliminate intermodulation distortion.*
- *Fast, accurate field connector attachment.*
- *Field attachment with standard hand tools.*

Compact Flaring Tool

New compact flaring tool** kits are now available exclusively from Andrew with many advantages over other flaring tools. See page 198.

HELIAX Elliptical Waveguide Assemblies*

Assemblies consist of waveguide cut to length and terminated with connectors on each end. Connectors are transitions from the elliptical to rectangular cross section and are described in detail above.

Assemblies are available in standard and premium versions. Super premium (lowest VSWR) versions are available for certain sizes.

Standard Assemblies consist of standard waveguide and non-tunable, fixed tuned or pre-tuned connectors.

* HELIAX is the registered trademark under which flexible elliptical wave guides are sold by Andrew.

** Patented United States 4,590,785

Premium Assemblies consist of premium waveguide and tunable connectors or fixed-tuned premium connectors. Premium waveguide has excellent VSWR characteristics for very low group delay distortion and noise.

Super Premium Assemblies consist of super premium waveguide and tunable connectors. Super premium assemblies offer the lowest available VSWR for minimum group delay distortion and noise.

Factory or Field Assemblies

All of the above assembly types can be configured as factory or field assemblies. VSWR specifications given in this catalog are guaranteed for factory assemblies and are typical for field fitted assemblies.

For long bulk lengths of premium elliptical waveguide it is not possible to verify the return loss performance along the entire length. Therefore, when possible, premium waveguide should be ordered in the lengths in which it will be used.

Field-Fitted Assemblies. Bulk lengths may be ordered and individual feeders cut to length and connectors installed on site for minimum waste. Connectors can be attached without need of special tools or compounds. Compact flaring tools are available to ensure consistent VSWR performance. Fixed-tuned premium connectors are recommended for field-fitted applications requiring low VSWR without field tuning.

Factory Assemblies. When specific lengths are known, waveguide can be cut to the desired length and connectors factory attached and, where applicable, tuned.

Optional Fire-Retardant Jacket

Selected sizes of HELIAX elliptical waveguide are available with a fire-retardant, non-halogenated jacket to avoid the need for costly conduit.

For use in the United States, these fire-retardant jacketed elliptical waveguides are UL listed as Type CATVR and marked accordingly on the gray jacket. The Type CATVR rating permits installation in building risers.

This jacketing material is intended for installation indoors or in other confined areas where there is limited exposure to sunlight or ultra-violet radiation.

The CATVP elliptical waveguide is available in selected sizes. Products with this rating are found in ducts, plenums or other spaces used for environmental air. Types of unjacketed CATVP waveguide pass the most stringent fire resistance tests and are tagged as “UL® Type CATVP.”

Typical Systems

Example microwave antenna systems using HELIAX elliptical waveguide are described on pages 26-34. Typical components and mounting accessories are illustrated.

Pressurization

The waveguide should be maintained under dry air or dry nitrogen pressure to prevent moisture condensation. All sizes are pressurizable to 10 lb/in^2 (70 kPa) maximum.

Installation

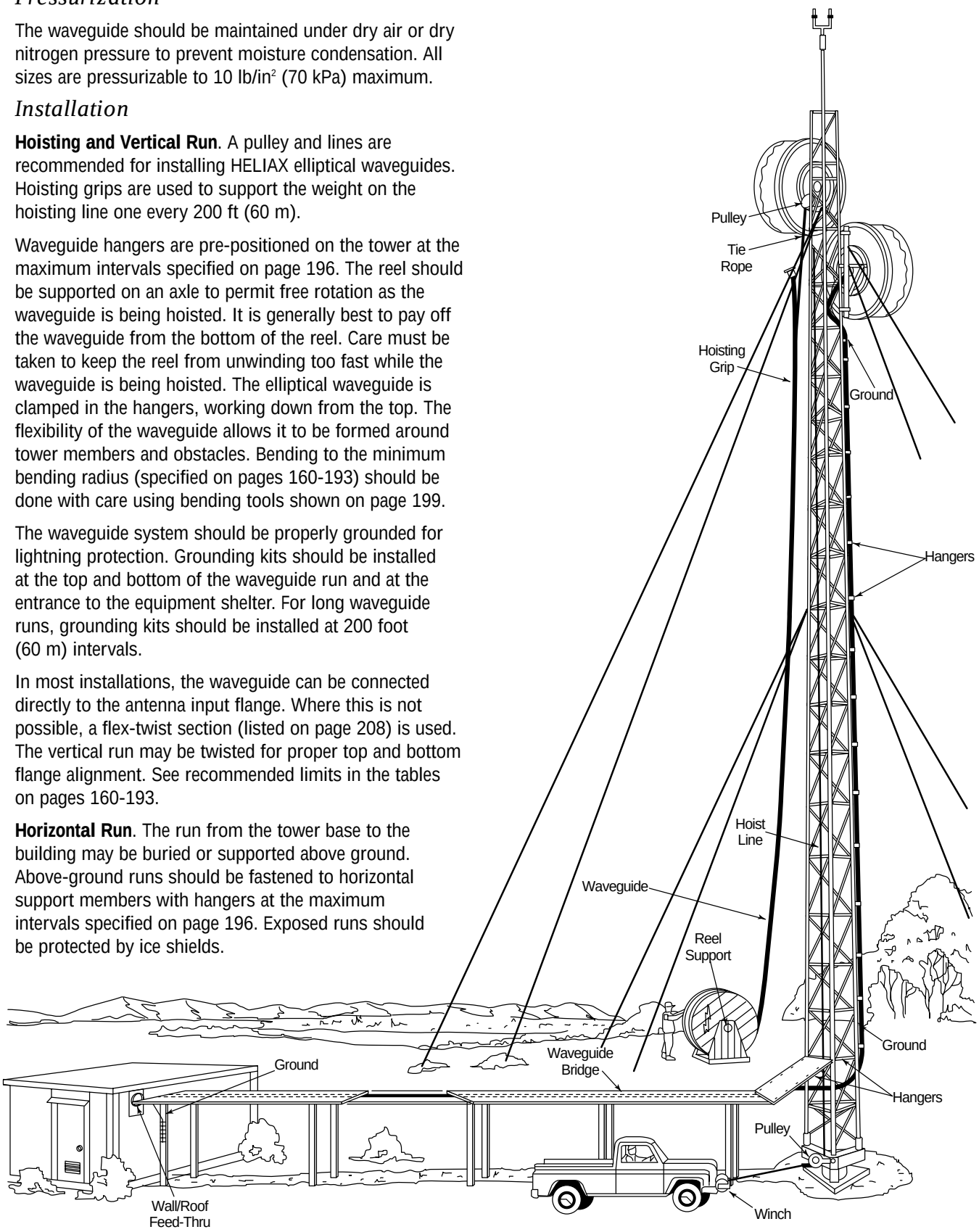
Hoisting and Vertical Run. A pulley and lines are recommended for installing HELIAX elliptical waveguides. Hoisting grips are used to support the weight on the hoisting line one every 200 ft (60 m).

Waveguide hangers are pre-positioned on the tower at the maximum intervals specified on page 196. The reel should be supported on an axle to permit free rotation as the waveguide is being hoisted. It is generally best to pay off the waveguide from the bottom of the reel. Care must be taken to keep the reel from unwinding too fast while the waveguide is being hoisted. The elliptical waveguide is clamped in the hangers, working down from the top. The flexibility of the waveguide allows it to be formed around tower members and obstacles. Bending to the minimum bending radius (specified on pages 160-193) should be done with care using bending tools shown on page 199.

The waveguide system should be properly grounded for lightning protection. Grounding kits should be installed at the top and bottom of the waveguide run and at the entrance to the equipment shelter. For long waveguide runs, grounding kits should be installed at 200 foot (60 m) intervals.

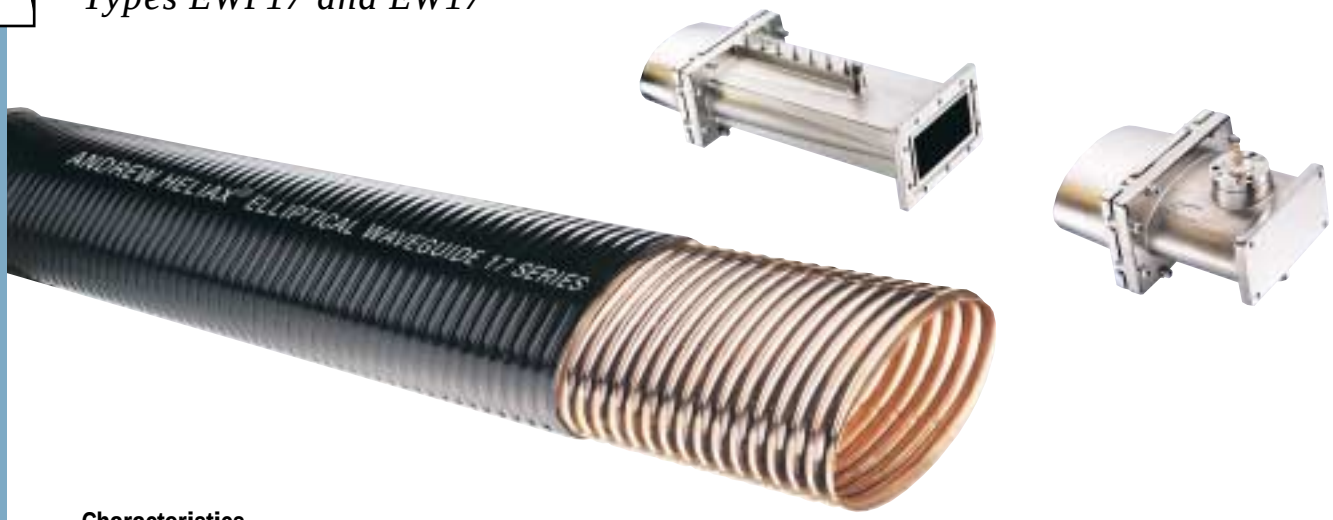
In most installations, the waveguide can be connected directly to the antenna input flange. Where this is not possible, a flex-twist section (listed on page 208) is used. The vertical run may be twisted for proper top and bottom flange alignment. See recommended limits in the tables on pages 160-193.

Horizontal Run. The run from the tower base to the building may be buried or supported above ground. Above-ground runs should be fastened to horizontal support members with hangers at the maximum intervals specified on page 196. Exposed runs should be protected by ice shields.



Elliptical Waveguide

Types EWP17 and EW17



Characteristics

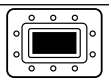
Type Numbers	
Premium Waveguide	**EWP17**
Standard Waveguide	**EW17**
Electrical	
Max. Frequency Range, GHz	1.7-2.4
$_{e}TE_{11}$ Mode Cutoff Frequency, GHz	1.364
Group Delay at 2.0 GHz, ns/100 ft (ns/100 m)	139 (456)
Peak Power Rating at 2.0 GHz, kW	
with 117E or 117ET Connectors	1036
with 117RT Connectors	90
Mechanical	
Minimum Bending Radii, without rebending, inches (mm)	
E Plane	20 (510)
H Plane	57 (1450)
Minimum Bending Radii, with rebending, inches (mm)	
E Plane	28 (710)
H Plane	81 (2060)
Maximum Twist, degrees/foot (m)	0.25 (0.75)
Dimensions over Jacket, in (mm)	5.65 x 2.99 (143.5 x 75.9)
Weight, pounds per foot (kg/m)	2.73 (4.06)

Attenuation, Average Power, Group Velocity

Frequency GHz	Attenuation dB/100 ft (dB/100 m)	Average Power Rating, kW	Group Velocity of Propagation,%
1.70	0.46 (1.51)	35.35	59.7
1.80	0.41 (1.35)	39.48	65.3
1.90	0.38 (1.25)	42.58	69.6
2.00	0.36 (1.19)	44.99	73.1
2.10	0.35 (1.14)	46.91	76.0
2.20	0.34 (1.10)	48.47	78.5
2.30	0.33 (1.07)	49.76	80.5
2.40	0.32 (1.05)	50.82	82.3

Attenuation values based on VSWR 1.0, ambient temperature 24°C (75°F) and are guaranteed within ±5%. Average power ratings based on VSWR 1.0 and 42°C (76°F) temperature rise over 40°C (104°F) ambient.

Connectors – Flange dimensions on pages 216-217

	L in (mm)	W in (mm)	A in (mm)	Weight lb (kg)
Type No. 117E, 117ET – Figure 1				
	15.9 (404)	6.9 (175)	12.0 (305)	7.0 (3.2)
Type No. 117RT – Figure 2				
	8.9 (225)	4.6 (116)	5.0 (127)	5.0 (2.3)

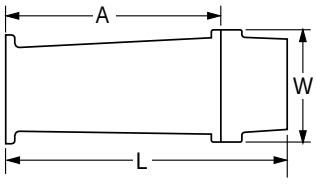


Figure 1

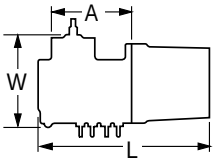


Figure 2

Connector Material: Nickel-Plated Aluminum

Ordering Information for Waveguide Assemblies

Frequency GHz*	Waveguide Type	Flange Type††	Connector Tunable	VSWR, max.** (R.L. dB) Up to 300 ft (90 m)
Premium Waveguide Assemblies				
1.7-2.1	**EWP17-17**	CPR430G	**117ET**	1.19 (21.2)
		7/8" EIA (gas block)	**117RT**	1.23 (19.7)
		7/8" EIA (gas pass)	**117RT-3**	1.23 (19.7)
1.9-2.3	**EWP17-19**	CPR430G	**117ET**	1.17 (22.1)
		7/8" EIA (gas block)	**117RT**	1.27 (18.5)
		7/8" EIA (gas pass)	**117RT-3**	1.27 (18.5)
Standard Waveguide Assemblies			**Non-Tunable**	
1.7-2.3	**EW17**	CPR430G	**117E**	1.25 (19.1)

* Contact Andrew for information on other frequency bands.

** VSWR, max. (R.L.,dB) Up to 300 ft (90 m). The indicated maximum characteristics are guaranteed for factory assemblies and are typical for field assemblies.

†† For detailed information on mating flanges, refer to pages 214-218.

Accessories – Photos and detailed descriptions on pages 194-200

Description	Type No.
Hangers and Adapters	
Hanger Kit of 10, Recommended maximum spacing for outdoor installation is 6 ft (1.83 m)*	**42396A-9**
Hardware Kit of 10, 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Angle Adapter Kit of 10. Stainless steel	**31768A**
Round Member Adapter Kit of 10. Two kits are required with each EW17 hanger kit. Stainless steel	
Member Diameter, in (mm)	
1-2 (25-50)	**31670-1**
2-3 (50-75)	**31670-2**
3-4 (75-100)	**31670-3**
4-5 (100-125)	**31670-4**
5-6 (125-150)	**31670-5**
45° Adapter Kit of 10. Galvanized steel	**42334**
Threaded Rod Support, 3/8" rod, nuts, washers, ceiling bracket	
12 in (305 mm) long, kit of 1	**31771**
12 in (305 mm) long, kit of 5	**31771-4**
24 in (610 mm) long, kit of 1	**31771-9**
24 in (610 mm) long, kit of 5	**31771-6**
Tower Standoff Kit of 10. 1 in (25 mm) standoff	
Member Diameter, in (mm)	
0.75-1.5 (20-40)	**30848-5**
1.5-3.0 (40-75)	**30848-4**
3-4 (75-100)	**30848-1**
4-5 (100-125)	**30848-2**
5-6 (125-150)	**30848-3**
Tower Standoff Kit of 10. 2.5 in (60 mm) standoff	
Member Diameter, in (mm)	
3-4 (75-100)	**41108A-1**
4-5 (100-125)	**41108A-2**
5-6 (125-150)	**41108A-3**

* Standard conditions: 125 mph (200 km/h) survival wind velocity, 0.5 in (13 mm) radial ice. For other conditions see page 196

Description	Type No.
Other Accessories	
Splice	**117Z**
Grounding Kit with factory attached lug	**204989-6**
Grounding Kit with field attachable crimp-on lug	**204989-26**
Grounding Kit with field attachable screw-on lug	**204989-36**
Crimping Tool to field attach lug to Grounding Kit	**207270**
Wall/Roof Feed-Thru	**35849A-10**
Holsting Grip	**34759**
Bending Tool Kit. One each E and H Plane tool	**33586-4**
Connector Reattachment Kit	**33544-10**

How To Order:

A sample order is shown on page 473.

Specify complete waveguide Type Number, including frequency band code, where listed, and length in feet or meters. See "Waveguide Assemblies" table.

Specify connector Type Numbers and "attached" or "unattached". See "Waveguide Assemblies" table. When attached connectors on an assembly are different, specify which is "first off" the reel.

Further Information:

For general information on HELIAX® elliptical waveguide, see pages 156-159.

Elliptical Waveguide

Type EW20

Characteristics

Type Numbers	
Standard Waveguide	**EW20**
Electrical	
Max. Frequency Range, GHz*	1.9-2.7
${}_{e}TE_{11}$ Mode Cutoff Frequency, GHz	1.57
Group Delay at 2.6 GHz, ns/100 ft (ns/100m)	127 (418)
Peak Power Rating at 2.6 GHz, kW	
with 120E Connectors	663
with E20MB-014 and E20MP-014 Connectors	90
Mechanical	
Minimum Bending Radii, without rebending, in (mm)	
E Plane	18 (460)
H Plane	50 (1270)
Minimum Bending Radii, with rebending, in (mm)	
E Plane	26 (660)
H Plane	71 (1800)
Maximum Twist, degrees/foot (m)	0.25 (0.75)
Dimension over Jacket, in (mm)	5.02 x 2.83 (127.5 x 71.9)
Weight, pounds per foot (kg/m)	1.85 (2.76)

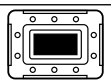
* Actual usable range is limited by the connecting rectangular waveguide

Attenuation, Average Power, Group Velocity

Frequency GHz	Attenuation dB/100 ft (dB/100 m)	Average Power Rating, kW	Group Velocity of Propagation,%
1.9	0.61 (2.01)	24.06	56.3
2.0	0.55 (1.81)	26.65	61.9
2.1	0.51 (1.69)	28.64	66.4
2.2	0.49 (1.60)	30.22	70.0
2.3	0.47 (1.53)	31.50	73.0
2.4	0.45 (1.48)	32.56	75.6
2.5	0.44 (1.45)	33.44	77.8
2.6	0.43 (1.41)	34.19	79.7
2.7	0.42 (1.39)	34.82	81.4

Attenuation values based on VSWR 1.0, ambient temperature 24°C (75°F) and are guaranteed within ±5%. Average power ratings based on VSWR 1.0 and 42°C (76°F) temperature rise over 40°C (104°F) ambient.

Connectors – Flange dimensions on pages 216-217

	L in (mm)	W in (mm)	A in (mm)	Weight lb (kg)
Type No. 120E – Figure 1				
	5.8 (147)	6.2 (157)	1.8 (46)	3.5 (1.6)
Type No. E20MB-014, E20MP-014 – Figure 2				
	9.0 (229)	4.4 (111)	4.4 (111)	4.8 (2.2)

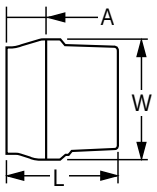


Figure 1

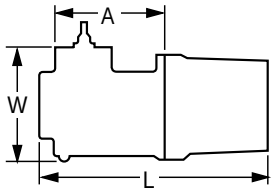


Figure 2

Connector Material: Nickel-Plated Aluminum

Ordering Information for Waveguide Assemblies

Frequency GHz*	Waveguide Type	Flange Type††	Connector Tunable	Pressure Window	VSWR, max.** (R.L. dB) Up to 300 ft (90 m)
2.5-2.7	**EW20-25**	mates with CPR340G	**120E**	**55001-340**	1.15 (23.0)
2.5-2.7	**EW20-25**	7/8" EIA (with gas barrier)	**E20MB-014**	***	1.15 (23.0)
		7/8" EIA (without gas barrier)	**E20MP-014**	–	1.15 (23.0)
2.1-2.7	**EW20-21W**	7/8" EIA (with gas barrier)	**E20MB-014**	***	1.15 (23.0)
		7/8" EIA (without gas barrier)	**E20MP-014**	–	1.15 (23.0)

* Contact Andrew for information on other frequency bands.
** VSWR, max. (R.L.,dB) Up to 300 ft (90 m). The indicated maximum characteristics are guaranteed for factory assemblies and are typical for field assemblies.
***Not applicable †† For detailed information on mating flanges, refer to pages 214-218.

Accessories – Photos and detailed descriptions on pages 194-200

Description	Type No.
Hangers and Adapters	
Hanger Kit of 10, Recommended maximum spacing for outdoor installation is 5.5 ft (1.68 m)*	**31766A-10**
Hardware Kit of 10, 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Angle Adapter Kit of 10. Stainless steel	**31768A**
Round Member Adapter Kit of 10. Two kits are required with each EW20 hanger kit. Stainless steel	
Member Diameter, in (mm)	
1-2 (25-50)	**31670-1**
2-3 (50-75)	**31670-2**
3-4 (75-100)	**31670-3**
4-5 (100-125)	**31670-4**
5-6 (125-150)	**31670-5**
45° Adapter Kit of 10. Galvanized steel	**42334**
Threaded Rod Support, 3/8" rod, nuts, washers, ceiling bracket	
12 in (305 mm) long, kit of 1	**31771**
12 in (305 mm) long, kit of 5	**31771-4**
24 in (610 mm) long, kit of 1	**31771-9**
24 in (610 mm) long, kit of 5	**31771-6**
Tower Standoff Kit of 10. 1 in (25 mm) standoff	
Member Diameter, in (mm)	
0.75-1.5 (20-40)	**30848-5**
1.5-3.0 (40-75)	**30848-4**
3-4 (75-100)	**30848-1**
4-5 (100-125)	**30848-2**
5-6 (125-150)	**30848-3**
Tower Standoff Kit of 10. 2.5 in (60 mm) standoff	
Member Diameter, in (mm)	
3-4 (75-100)	**41108A-1**
4-5 (100-125)	**41108A-2**
5-6 (125-150)	**41108A-3**

* Standard conditions: 125 mph (200 km/h) survival wind velocity, 0.5 in (13 mm) radial ice. For other conditions see page 196.

Description	Type No.
Other Accessories	
Splice	**120Z**
Grounding Kit with factory attached lug	**204989-6**
Grounding Kit with field attachable crimp-on lug	**204989-26**
Grounding Kit with field attachable screw-on lug	**204989-36**
Crimping Tool to field attach lug to Grounding Kit	**207270**
Wall/Roof Feed-Thru	**35849A-10**
Holsting Grip	**34759**
Bending Tool Kit. One each E and H Plane tool	**33586-4**
Connector Reattachment Kit	**33544-11**

How To Order:

A sample order is shown on page 473.

Specify complete waveguide Type Number, including frequency band code, where listed, and length in feet or meters. See "Waveguide Assemblies" table.

Specify connector Type Numbers and "attached" or "unattached". See "Waveguide Assemblies" table. When attached connectors on an assembly are different, specify which is "first off" the reel.

Further Information:

For general information on HELIAX® elliptical waveguide, see pages 156-159.

Elliptical Waveguide

Type EW28

Characteristics

Type Numbers	
Standard Waveguide	**EW28**
Electrical	
Max. Frequency Range, GHz*	2.6-3.4
$_eTE_{11}$ Mode Cutoff Frequency, GHz	2.20
Group Delay at 3.2 GHz, ns/100 ft (ns/100m)	137 (451)
Peak Power Rating at 3.2 GHz, kW	446
Mechanical	
Minimum Bending Radii, without rebending, in (mm)	
E Plane	22 (560)
H Plane	52 (1320)
Minimum Bending Radii, with rebending, in (mm)	
E Plane	22 (560)
H Plane	52 (1320)
Maximum Twist, degrees/foot (m)	0.25 (0.75)
Dimension over Jacket, in (mm)	3.65 x 2.33 (92.5 x 59.2)
Weight, pounds per foot (kg/m)	1.37 (2.04)

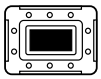
* Actual usable range is limited by the connecting rectangular waveguide

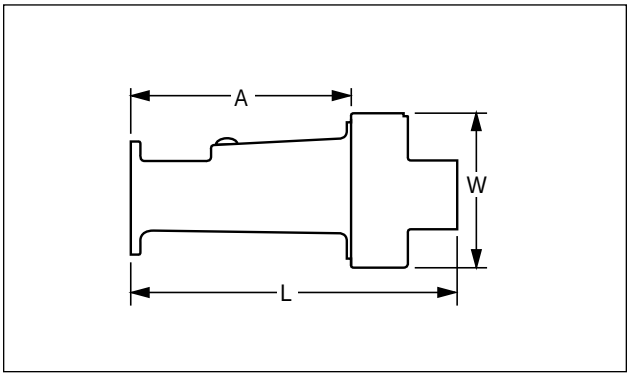
Attenuation, Average Power, Group Velocity

Frequency GHz	Attenuation dB/100 ft (dB/100 m)	Average Power Rating, kW	Group Velocity of Propagation,%
2.6	0.87 (2.87)	12.75	53.3
2.7	0.78 (2.56)	14.28	58.0
2.8	0.72 (2.36)	15.50	61.9
2.9	0.68 (2.22)	16.51	67.0
3.0	0.64 (2.11)	17.35	69.6
3.1	0.62 (2.03)	18.07	71.9
3.2	0.60 (1.96)	18.68	74.0
3.3	0.58 (1.90)	19.22	75.8
3.4	0.57 (1.86)	19.69	77.4

Attenuation values based on VSWR 1.0, ambient temperature 24°C (75°F) and are guaranteed within ±5%. Average power ratings based on VSWR 1.0 and 42°C (76°F) temperature rise over 40°C (104°F) ambient.

Connectors – Flange dimensions on pages 216-217

	L in (mm)	W in (mm)	A in (mm)	Weight lb (kg)
Type No. 128AE				
	12.7 (322)	5.0 (127)	10.0 (254)	7.3 (3.3)



Connector Material: Nickel-Plated Aluminum

Ordering Information for Waveguide Assemblies

Frequency GHz*	Waveguide Type	Flange Type††	Connector Tunable	Pressure Window	VSWR, max.** (R.L. dB) Up to 300 ft (90 m)
2.9-3.1	**EW28**	CPR284G	**128AE**	**55001-284**	1.20 (20.8)
3.1-3.4	**EW28**	CPR284G	**128AE**	**55001-284**	1.15 (23.0)

* Contact Andrew for information on other frequency bands.
** VSWR, max. (R.L.,dB) Up to 300 ft (90 m). The indicated maximum characteristics are guaranteed for factory assemblies and are typical for field assemblies.
†† For detailed information on mating flanges, refer to pages 214-218.

Accessories – Photos and detailed descriptions on pages 194-200.

Description	Type No.
Hangers and Adapters	
Hanger Kit of 10, Recommended maximum spacing for outdoor installation is 5 ft (1.52 m)*	**31766A-11**
Hardware Kit of 10, 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Angle Adapter Kit of 10. Stainless steel	**31768A**
Round Member Adapter Kit of 10. Stainless steel	
Member Diameter, in (mm)	
1-2 (25-50)	**31670-1**
2-3 (50-75)	**31670-2**
3-4 (75-100)	**31670-3**
4-5 (100-125)	**31670-4**
5-6 (125-150)	**31670-5**
45° Adapter Kit of 10. Galvanized steel	**42334**
Threaded Rod Support, 3/8" rod, nuts, washers, ceiling bracket	
12 in (305 mm) long, kit of 1	**31771**
12 in (305 mm) long, kit of 5	**31771-4**
24 in (610 mm) long, kit of 1	**31771-9**
24 in (610 mm) long, kit of 5	**31771-6**
Tower Standoff Kit of 10. 1 in (25 mm) standoff	
Member Diameter, in (mm)	
0.75-1.5 (20-40)	**30848-5**
1.5-3.0 (40-75)	**30848-4**
3-4 (75-100)	**30848-1**
4-5 (100-125)	**30848-2**
5-6 (125-150)	**30848-3**
Tower Standoff Kit of 10. 2.5 in (60 mm) standoff	
Member Diameter, in (mm)	
3-4 (75-100)	**41108A-1**
4-5 (100-125)	**41108A-2**
5-6 (125-150)	**41108A-3**

* Standard conditions: 125 mph (200 km/h) survival wind velocity, 0.5 in (13 mm) radial ice. For other conditions see page 196

Description	Type No.
Other Accessories	
Splice	**128AZ**
Grounding Kit with factory attached, one-hole lug	**204989-5**
Grounding Kit with factory attached, two-hole lug	**241088-5**
Grounding Kit with field attachable crimp-on, one-hole lug	**204989-25**
Grounding Kit with field attachable crimp-on, two-hole lug	**241088-10**
Grounding Kit with field attachable screw-on lug	**204989-35**
Crimping Tool to field attach lug to Grounding Kit	**207270**
Wall-Roof Feed Thru	**35849-13**
Hoisting Grip	**26985A**
Bending Tool Kit. One each E and H Plane tool	**33586-5**

How To Order:

A sample order is shown on page 473.

Specify complete waveguide Type Number, including frequency band code, where listed, and length in feet or meters. See "Waveguide Assemblies" table.

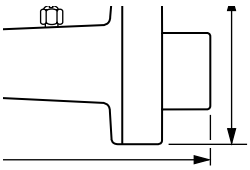
Specify connector Type Numbers and "attached" or "unattached". See "Waveguide Assemblies" table. When attached connectors on an assembly are different, specify which is "first off" the reel.

Further Information:

For general information on HELIAX® elliptical waveguide, see pages 156-159.

Elliptical Waveguide

Types EWP34 and EW34



Characteristics

Type Numbers	
Premium Waveguide	**EWP34**
Standard Waveguide	**EW34**
Electrical	
Max. Frequency Range, GHz*	3.1-4.2
$_{e}TE_{11}$ Mode Cutoff Frequency, GHz	2.376
Group Delay at 3.95 GHz, ns/100 ft (ns/100 m)	127 (417)
Peak Power Rating at 3.95 GHz, kW	306
Mechanical	
Minimum Bending Radii, without rebending, inches (mm)	
E Plane	17 (432)
H Plane	47 (1194)
Minimum Bending Radii, with rebending, inches (mm)	
E Plane	17 (432)
H Plane	47 (1194)
Maximum Twist, degrees/foot (m)	0.5 (1.5)
Dimensions over Jacket, in (mm)	3.27 x 1.85 (83.1 x 47.0)
Weight, pounds per foot (kg/m)	1.13 (1.68)

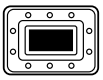
* Actual usable range is limited by the connecting rectangular waveguide.

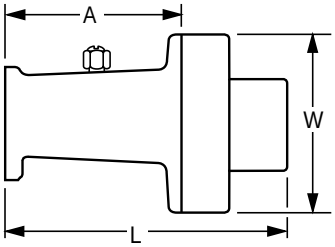
Attenuation, Average Power, Group Velocity

Frequency GHz	Attenuation dB/100 ft (dB/100 m)	Average Power Rating, kW	Group Velocity of Propagation,%
3.10	0.81 (2.67)	12.34	64.2
3.20	0.78 (2.55)	12.90	67.0
3.30	0.75 (2.46)	13.39	69.4
3.40	0.73 (2.38)	13.81	71.5
3.50	0.71 (2.32)	14.18	73.4
3.54	0.70 (2.30)	14.31	74.13
3.60	0.69 (2.27)	14.51	75.1
3.70	0.68 (2.23)	14.79	76.7
3.80	0.67 (2.19)	15.03	78.0
3.90	0.66 (2.16)	15.25	79.3
4.00	0.65 (2.13)	15.43	80.4
4.10	0.64 (2.11)	15.60	81.5
4.20	0.64 (2.09)	15.73	82.5

Attenuation values based on VSWR 1.0, ambient temperature 24°C (75°F) and are guaranteed within ±5%. Average power ratings based on VSWR 1.0 and 42°C (76°F) temperature rise over 40°C (104°F) ambient.

Connectors – Flange dimensions on pages 216-217

	L in (mm)	W in (mm)	A in (mm)	Weight lb (kg)
Type No. 134DE, 134DET, 134DEP, 134DEMT, 134DEM, 134DEMP				
	6.8 (174)	4.3 (109)	4.3 (109)	8.0 (3.6)



Connector Material: Brass

Ordering Information for Waveguide Assemblies

Frequency GHz*	Waveguide Type	Flange Type††	Connector† Tunable	Connector† Pre-Tuned	Pressure Window	Flex-Twist 2 ft (0.6 m)	VSWR, max.** (R.L. dB) Up to 300 ft (90 m)
Premium Waveguide Assemblies							
3.4-3.9	**EWP34-34**	CPR229G	**134DET**	–	**55001-229**	**F229PC0240CS**	1.10 (26.4)
3.54-4.2	**EWP34-35**	CPR229G	**134DET**	**134DEP-2**	**55001-229**	**F229PC0240CA**	1.08 (28.3)
		PDR40	**134DEMT**	**134DEMP-2**	**223306-40**	**F229MH0600HA**	1.08 (28.3)
3.7-4.2	**EWP34-37**	CPR229G	**134DET**	**134DEP-1**	**55001-229**	**F229PC0240CA**	1.08 (28.3)
Standard Waveguide Assemblies			**Non-Tunable**				
3.1-3.6	**EW34-31**	CPR229G	**134DE**	–	**55001-229**	**F229PC0240CS**	1.15 (23.1)
3.4-4.2	**EW34**	CPR229G	**134DE**	–	**55001-229**	**F229PC0240CS**	1.15 (23.1)

* Contact Andrew for information on other frequency bands.
** VSWR, max. (R.L.,dB) Up to 300 ft (90 m). The indicated maximum characteristics are guaranteed for factory assemblies and are typical for field assemblies.
† "Pre-tuned" connectors are for field attachment only. "Tunable" connectors ordered with factory assemblies are factory tuned.
†† For detailed information on mating flanges, refer to pages 214-218.

Accessories – Photos and detailed descriptions on pages 194-200

Description	Type No.
Hangers and Adapters	
Hanger Kit of 10, Recommended maximum spacing for outdoor installation is 4.5 ft (1.37 m)*	**42396A-15**
Hardware Kit of 10, 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Angle Adapter Kit of 10. Stainless steel	**31768A**
Round Member Adapter Kit of 10. Stainless steel	
Member Diameter, in (mm)	
1-2 (25-50)	**31670-1**
2-3 (50-75)	**31670-2**
3-4 (75-100)	**31670-3**
4-5 (100-125)	**31670-4**
5-6 (125-150)	**31670-5**
45° Adapter Kit of 10. Galvanized steel	**42334**
Threaded Rod Support, 3/8" rod, nuts, washers, ceiling bracket	
12 in (305 mm) long, kit of 1	**31771**
12 in (305 mm) long, kit of 5	**31771-4**
24 in (610 mm) long, kit of 1	**31771-9**
24 in (610 mm) long, kit of 5	**31771-6**
Tower Standoff Kit of 10. 1 in (25 mm) standoff	
Member Diameter, in (mm)	
0.75-1.5 (20-40)	**30848-5**
1.5-3.0 (40-75)	**30848-4**
3-4 (75-100)	**30848-1**
4-5 (100-125)	**30848-2**
5-6 (125-150)	**30848-3**
Tower Standoff Kit of 10. 2.5 in (60 mm) standoff	
Member Diameter, in (mm)	
3-4 (75-100)	**41108A-1**
4-5 (100-125)	**41108A-2**
5-6 (125-150)	**41108A-3**

* Standard conditions: 125 mph (200 km/h) survival wind velocity, 0.5 in (13 mm) radial ice. For other conditions see page 196.

Description	Type No.
Other Accessories	
Splice	**134DZ**
Grounding Kit with factory attached, one-hole lug	**204989-5**
Grounding Kit with factory attached, two-hole lug	**241088-5**
Grounding Kit with field attachable crimp-on, one-hole lug	**204989-25**
Grounding Kit with field attachable crimp-on, two-hole lug	**241088-10**
Grounding Kit with field attachable screw-on lug	**204989-35**
Crimping Tool to field attach lug to Grounding Kit	**207270**
Hoisting Grip	**26985A**
Bending Tool Kit. One each E and H Plane tool	**33586-11**
Connector Reattachment Kit	**33544-43**
Wall-Roof Feed Thru	**35849A-17**
Waveguide Boot for Plates (below),	
4 in (102 mm) dia.	**204679-34**
5 in (127 mm) dia	**48939-34**

Feed-Thru Plate for Boots (above)

Openings	For 4 in Boots	For 5 in Boots
1	**204673-1**	**48940-1**
1	**204673-2**	–
2	–	**48940-2**
3	–	**48940-3**
4	**204673-4**	**48940-4**
6	–	**48940-6**
8	**204673-8**	–

Elliptical Waveguide

Types EWP37S, EWP37 and EW37

Characteristics

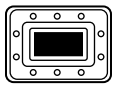
Type Numbers	
SuperPremium Waveguide	**EWP37S**
Premium Waveguide	**EWP37**
Standard Waveguide	**EW37**
Electrical	
Max. Frequency Range, GHz	3.3-4.3
$_eTE_{11}$ Mode Cutoff Frequency, GHz	2.79
Group Delay at 4.0 GHz, ns/100 ft (ns/100 m)	140 (459)
Peak Power Rating at 4.0 GHz, kW	309
Mechanical	
Minimum Bending Radii, without rebending, inches (mm)	
E Plane	12 (300)
H Plane	30 (760)
Minimum Bending Radii, with rebending, inches (mm)	
E Plane	17 (430)
H Plane	41 (1040)
Maximum Twist, degrees/foot (m)	0.5 (1.5)
Dimensions over Jacket, in (mm)	2.85 x 1.82 (72.4 x 46.2)
Weight, pounds per foot (kg/m)	0.84 (1.25)

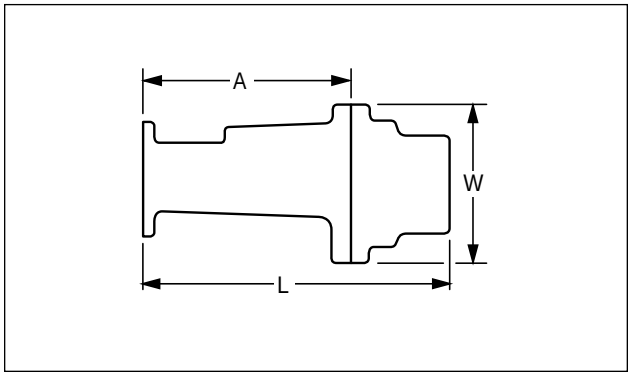
Attenuation, Average Power, Group Velocity

Frequency GHz	Attenuation dB/100 ft (dB/100 m)	Average Power Rating, kW	Group Velocity of Propagation,%
3.30	1.22 (4.00)	7.39	53.4
3.40	1.11 (3.63)	8.14	57.1
3.50	1.03 (3.37)	8.77	60.4
3.60	0.97 (3.18)	9.31	63.2
3.70	0.92 (3.03)	9.77	65.7
3.80	0.89 (2.91)	10.17	67.9
3.90	0.86 (2.81)	10.52	69.9
4.00	0.83 (2.73)	10.83	71.7
4.10	0.81 (2.66)	11.11	73.3
4.20	0.79 (2.60)	11.36	74.7
4.30	0.78 (2.55)	11.59	76.1

Attenuation values based on VSWR 1.0, ambient temperature 24°C (75°F) and are guaranteed within ±5%. Average power ratings based on VSWR 1.0 and 42°C (76°F) temperature rise over 40°C (104°F) ambient.

Connectors – Flange dimensions on pages 216-217

	L in (mm)	W in (mm)	A in (mm)	Weight lb (kg)
Type No. 137DE, 137DET, 137DEP, 137DEM, 137DEMP, 137DEMT				
	6.5 (165)	4.6 (117)	4.3 (109)	6.0 (2.7)



Connector Material: Brass

Ordering Information for Waveguide Assemblies

Frequency GHz*	Waveguide Type	Flange Type††	Connector† Tunable	Connector† Pre-Tuned	Pressure Window	Flex-Twist 2 ft (0.6 m)
Super Premium Waveguide Assemblies						**VSWR 1.06 (30.7)****
3.7–4.2	**EWP37S**	CPR229G	**137DET**	–	**55001-229**	**F229PC0240CA**
		PDR40	**137DEMT**	–	**223306-40**	**F229PH0600HA**
Premium Waveguide Assemblies						**VSWR 1.08 (28.3)****
3.4-3.9	**EWP37-34W*****	CPR229G	**137DET**	–	**55001-229**	**F229PC0240CS**
3.4-3.9	**EWP37-34*****	PDR40	–	**137DEMP-3**	**223306-40**	**F229MH0600HS**
3.54-4.2	**EWP37-35**	CPR229G	**137DET**	**137DEP-2**	**55001-229**	**F229PC0240CA**
		PDR40	–	**137DEMP-2**	**223306-40**	**F229MH0600HA**
3.52-4.2	**EWP37-35W**	CPR229G	**137DET**	**137DEP-2**	**55001-229**	**F229PC0240CA**
		PDR40	–	**137DEMP-2**	**223306-40**	**F229MH0600HA**
3.6-4.2	**EWP37-36**	CPR229G	**137DET**	–	**55001-229**	**F229PC0240CA**
3.7-4.2	**EWP37-37**	CPR229G	**137DET**	**137DEP-1**	**55001-229**	**F229PC0240CA**
Standard Waveguide Assemblies				**Non-Tunable**		**VSWR 1.15 (23.1)****
3.4–4.2	**EW37**	CPR229G	**137DE**	–	**55001-229**	**F229PC0240CS**
		PDR40	**137DEM**	–	**223306-40**	**F229MH0600HS**

* Contact Andrew for information on other frequency bands.
** VSWR max., (R.L., dB). The indicated maximum VSWR characteristics are guaranteed for factory assemblies and are typical for field assemblies.
*** VSWR 1.10 (26.4) † "Pre-tuned" connectors are for field attachment only. "Tunable" connectors ordered with factory assemblies are factory tuned.
†† For detailed information on mating flanges, refer to pages 214-218.

Accessories – Photos and detailed descriptions on pages 194-200

Description	Type No.
Hangers and Adapters	
Hanger Kit of 10, Recommended maximum spacing for outdoor installation is 4.5 ft (1.37 m)*	**42396A-4**
Hardware Kit of 10, 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Angle Adapter Kit of 10. Stainless steel	**31768A**
Round Member Adapter Kit of 10. Stainless steel	
Member Diameter, in (mm)	
1-2 (25-50)	**31670-1**
2-3 (50-75)	**31670-2**
3-4 (75-100)	**31670-3**
4-5 (100-125)	**31670-4**
5-6 (125-150)	**31670-5**
45° Adapter Kit of 10. Galvanized steel	**42334**
Threaded Rod Support, 3/8" rod, nuts, washers, ceiling bracket	
12 in (305 mm) long, kit of 1	**31771**
12 in (305 mm) long, kit of 5	**31771-4**
24 in (610 mm) long, kit of 1	**31771-9**
24 in (610 mm) long, kit of 5	**31771-6**
Tower Standoff Kit of 10. 1 in (25 mm) standoff	
Member Diameter, in (mm)	
0.75-1.5 (20-40)	**30848-5**
1.5-3.0 (40-75)	**30848-4**
3-4 (75-100)	**30848-1**
4-5 (100-125)	**30848-2**
5-6 (125-150)	**30848-3**
Tower Standoff Kit of 10. 2.5 in (60 mm) standoff	
Member Diameter, in (mm)	
3-4 (75-100)	**41108A-1**
4-5 (100-125)	**41108A-2**
5-6 (125-150)	**41108A-3**

* Standard conditions: 125 mph (200 km/h) survival wind velocity, 0.5 in (13 mm) radial ice. For other conditions see page 196.

Description	Type No.
Other Accessories	
Flaring Tool Kit for connector attachment	**205869**
Splice	**134DZ**
Grounding Kit with factory attached, one-hole lug	**204989-5**
Grounding Kit with factory attached, two-hole lug	**241088-5**
Grounding Kit with field attachable crimp-on, one-hole lug	**204989-25**
Grounding Kit with field attachable crimp-on, two-hole lug	**241088-10**
Grounding Kit with field attachable screw-on lug	**204989-35**
Crimping Tool to field attach lug to Grounding Kit	**207270**
Hoisting Grip	**31535**
Bending Tool Kit. One each E and H Plane tool	**33586-3**
Connector Reattachment Kit	**33544-24**
Wall-Roof Feed Thru	**245314-37**
Waveguide Boot for Plates (below),	
4 in (102 mm) dia.	**WGB4-37**
5 in (127 mm) dia	**WGB5-37**

Feed-Thru Plate for Boots (above)

Openings	For 4 in Boots	For 5 in Boots
1	**204673-1**	**48940-1**
1	**204673-2**	–
2	–	**48940-2**
3	–	**48940-3**
4	**204673-4**	**48940-4**
6	–	**48940-6**
8	**204673-8**	–

Elliptical Waveguide

Types EWP43 and EW43

Characteristics

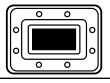
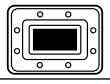
Type Numbers	
Premium Waveguide	**EWP43**
Standard Waveguide	**EW43**
Electrical	
Max. Frequency Range, GHz	4.4-5.0
$_{e}TE_{11}$ Mode Cutoff Frequency, GHz	2.78
Group Delay at 3.95 GHz, ns/100 ft (ns/100 m)	126 (413)
Peak Power Rating at 4.7 GHz, kW	187
Mechanical	
Minimum Bending Radii, without rebending, inches (mm)	
E Plane	11 (280)
H Plane	28 (711)
Minimum Bending Radii, with rebending, inches (mm)	
E Plane	15 (381)
H Plane	35 (889)
Maximum Twist, degrees/foot (m)	0.5 (1.5)
Dimensions over Jacket, in (mm)	2.81 x 1.60 (71.4 x 40.6)
Weight, pounds per foot (kg/m)	0.81 (1.2)

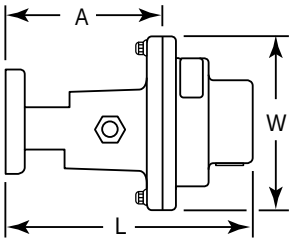
Attenuation, Average Power, Group Velocity

Frequency GHz	Attenuation dB/100 ft (dB/100 m)	Average Power Rating, kW	Group Velocity of Propagation,%
4.4	0.911 (2.9)	9.5	77.5
4.5	0.899 (2.9)	9.6	78.6
4.6	0.889 (2.9)	9.7	79.7
4.7	0.880 (2.8)	9.8	80.5
4.8	0.872 (2.8)	9.9	81.5
4.9	0.866 (2.8)	10.0	82.4
5.0	0.862 (2.8)	10.1	83.1

Attenuation values based on VSWR 1.0, ambient temperature 24°C (75°F) and are guaranteed within ±5%. Average power ratings based on VSWR 1.0 and 42°C (76°F) temperature rise over 40°C (104°F) ambient.

Connectors – Flange dimensions on pages 216-217

	L in (mm)	W in (mm)	A in (mm)	Weight lb (kg)
Type No. 143SE, 143SEM				
	6.12 (155.4)	4.6 (117)	4.0 (102)	7.5 (3.4)
Type No. 143DET				
	6.4 (163)	4.6 (117)	4.3 (109)	8.6 (3.9)
Type No. 143DCT, 143SC, 143SCM				
	6.4 (163)	4.6 (117)	4.3 (109)	9 (4.1)



Connector Material: Brass

Ordering Information for Waveguide Assemblies

Frequency GHz*	Waveguide Type	Flange Type††	Connector† Tunable	Connector† Pre-Tuned	Pressure Window	Flex-Twist 2 ft (0.6 m)
Premium Waveguide Assemblies						**VSWR 1.07 (29.4)****
4.4–5.0	**EWP43**	UG-149/U†††	**143DCT**	**143SC**	**55000A-187**	**F187PA0240BA**
		CPR187G	**143DET**	**143SE**	**55001-187**	**F187PA0240CA**
		PDR48	–	**143SEM**	**223306-48**	**F187MH0600HA**
		PAR48	–	**143SCM**		
Standard Waveguide Assemblies						**VSWR 1.15 (23.1)****
4.4–5.0	**EW43**	UG-149/U†††	–	**143SC**	**223306-48**	**F187MH0600HS**
		CPR187G	–	**143SE**	**55001-187**	**F187PA0240CS**
		PDR48	–	**143SEM**		
		PAR48	–	**143SCM**		

* Contact Andrew for information on other frequency bands.
** VSWR max., (R.L., dB). Up to 300 ft (90 m). The indicated maximum VSWR characteristics are guaranteed for factory assemblies and are typical for field assemblies.
† "Pre-tuned" connectors are for field attachment only. "Tunable" connectors ordered with factory assemblies are factory tuned.
†† For detailed information on mating flanges, refer to pages 214-218.
††† Modified cover flange with gasket groove. Mates with UG choke or cover flanges.

Accessories – Photos and detailed descriptions on pages 194-200

Description	Type No.
Hangers and Adapters	
Hanger Kit of 10, Recommended maximum spacing for outdoor installation is 4 ft (1.22 m)*	**42396A-16**
Hardware Kit of 10, 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Angle Adapter Kit of 10. Stainless steel	**31768A**
Round Member Adapter Kit of 10. Stainless steel	
Member Diameter, in (mm)	
1-2 (25-50)	**31670-1**
2-3 (50-75)	**31670-2**
3-4 (75-100)	**31670-3**
4-5 (100-125)	**31670-4**
5-6 (125-150)	**31670-5**
45° Adapter Kit of 10. Galvanized steel	**42334**
Threaded Rod Support, 3/8" rod, nuts, washers, ceiling bracket	
12 in (305 mm) long, kit of 1	**31771**
12 in (305 mm) long, kit of 5	**31771-4**
24 in (610 mm) long, kit of 1	**31771-9**
24 in (610 mm) long, kit of 5	**31771-6**
Tower Standoff Kit of 10. 1 in (25 mm) standoff	
Member Diameter, in (mm)	
0.75-1.5 (20-40)	**30848-5**
1.5-3.0 (40-75)	**30848-4**
3-4 (75-100)	**30848-1**
4-5 (100-125)	**30848-2**
5-6 (125-150)	**30848-3**
Tower Standoff Kit of 10. 2.5 in (60 mm) standoff	
Member Diameter, in (mm)	
3-4 (75-100)	**41108A-1**
4-5 (100-125)	**41108A-2**
5-6 (125-150)	**41108A-3**

* Standard conditions: 125 mph (200 km/h) survival wind velocity, 0.5 in (13 mm) radial ice. For other conditions see page 196.

Description	Type No.
Other Accessories	
Flaring Tool Kit for connector attachment	**EWFTK-43**
Splice	**134DZ**
Grounding Kit with factory attached, one-hole lug	**204989-10**
Grounding Kit with field attachable crimp-on, one-hole lug	**204989-28**
Crimping Tool to field attach lug to Grounding Kit	**207270**
Hoisting Grip	**31535**
Bending Tool Kit. One each E and H Plane tool	**33586-3**
Connector Reattachment Kit	**33544-45**
Wall-Roof Feed Thru	**245314-43**
Waveguide Boot for Plates (below),	
4 in (102 mm) dia.	**WGB4-43**
5 in (127 mm) dia.	**WGB5-43**

Feed-Thru Plate for Boots (above)

Openings	For 4 in Boots
1	**204673-1**
1	**204673-2**
4	**204673-4**
8	**204673-8**

Elliptical Waveguide

Types EWP52S, EWP52 and EW52

Characteristics

Type Numbers	
Super Premium Waveguide, Standard Jacket	**EWP52S**
Premium Waveguide, Standard Jacket	**EWP52**
Standard Waveguide, Standard Jacket	**EW52**
Premium Waveguide, Fire Retardant –	
Non-Halogenated Jacket	**35409-20****
Type CATVP	**222040-3**
Electrical	
Max. Frequency Range, GHz	4.6-6.425*
$_{e}TE_{11}$ Mode Cutoff Frequency, GHz	3.65
Group Delay at 6.2 GHz, ns/100 ft (ns/100 m)	124 (408)
Peak Power Rating at 6 GHz, kW	
with 152 Series Connectors	153
with 153 Series Connectors	92
Mechanical	
Minimum Bending Radii, without rebending, inches (mm)	
E Plane	8 (200)
H Plane	22 (560)
Minimum Bending Radii, with rebending, inches (mm)	
E Plane	12 (305)
H Plane	32 (810)
Maximum Twist, degrees/foot (m)	1 (3)
Dimensions over Jacket, in (mm)	2.21 x 1.26 (56.1 x 32.0)
Weight, pounds per foot (kg/m)	0.59 (0.88)

* Actual usable range is limited by the connecting rectangular waveguide.

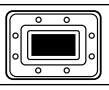
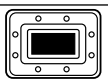
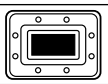
** UL® listed Type CATVR.

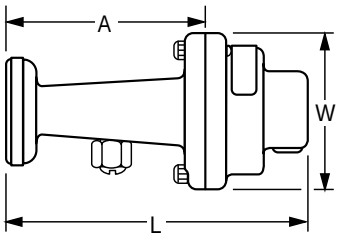
Attenuation, Average Power, Group Velocity

Frequency GHz	Attenuation dB/100 ft (dB/100 m)	Average Power Rating, kW	Group Velocity of Propagation,%
4.6	1.63 (5.34)	4.40	60.9
4.8	1.50 (4.92)	4.75	64.9
5.0	1.41 (4.63)	5.06	68.3
5.2	1.35 (4.42)	5.31	71.2
5.4	1.30 (4.26)	5.51	73.7
5.6	1.26 (4.13)	5.69	75.8
5.8	1.23 (4.02)	5.84	77.7
5.85	1.22 (4.00)	5.87	78.1
5.925	1.21 (3.96)	5.92	78.8
6.0	1.20 (3.93)	5.96	79.4
6.2	1.18 (3.86)	6.07	80.8
6.4	1.16 (3.80)	6.17	82.1
6.425	1.16 (3.80)	6.18	83.2

Attenuation values based on VSWR 1.0, ambient temperature 24°C (75°F) and are guaranteed within ±5%. Average power ratings based on VSWR 1.0 and 42°C (76°F) temperature rise over 40°C (104°F) ambient.

Connectors – Flange dimensions on pages 216-217

	L in (mm)	W in (mm)	A in (mm)	Weight lb (kg)
Type No. 152DE, 152DET, 152SE, 152SEM				
	5.3 (134.6)	3.8 (97)	3.7 (94)	4.2 (1.9)
Type No. 252DC, 252DCT				
	5.8 (148)	3.8 (97)	3.9 (100)	4.1 (1.9)
Type No. 252DE, 252DET, 252DEP-1, 252DEMP, 252DEMT				
	5.8 (148)	3.8 (97)	3.9 (100)	4.0 (1.8)
Type No. 252SE, 252SEM				
	5.0 (127)	3.75 (95.3)	3.0 (76.2)	4.2 (1.9)



Connector Material: Brass

Ordering Information for Waveguide Assemblies

Frequency* GHz	Waveguide Type	Flange Type††	Connector† Tunable	Connector† Fixed-Tuned	Pressure Window	Flex-Twist 2 ft (0.6 m)
Super Premium Waveguide Assemblies						**VSWR 1.05 (32.3)****
5.925–6.425	**EWP52S**	CPR159G	**152DET*****	–	**55001-159**	**F159PC0240CA**
		UG-344/U†††	**252DCT*****	–	**55000A-137**	**F137PA0240BA**
		CPR137G	**252DET*****	–	**55001-137**	**F137PC0240CA**
		PDR70	**252DEMT**	–	**223306-70**	**F137MH0600HA**
Premium Waveguide Assemblies						**VSWR 1.06 (30.7)****
5.6–6.2	**EWP52-56**	CPR159G	**152DET**	**152SE**	**55001-159**	**F159PC0240CS**
		UG-344/U†††	**252DCT**	–	**55000A-137**	**F137PA0240BG**
		CPR137G	**252DET**	**252SE**	**55001-137**	**F137PC0240CG**
		PDR70	**252DEMT**	**252SEM**	**223306-70**	**F137MH0600HG**
		PDR58		**152SEM**		
5.725–6.425	**EWP52-58**	CPR159G	**152DET**	**152SE**	**55001-159**	**F159PC0240CA**
		UG-344/U†††	**252DCT**	–	**55000A-137**	**F137PA0240BD**
		CPR137G	**252DET**	**252SE**	**55001-137**	**F137PC0240CD**
		PDR70	**252DEMT**	**252SEM**	**223306-70**	**F137MH0600HD**
		PDR58		**152SEM**		
5.925–6.425	**EWP52-59**	CPR159G	**152DET**	**152SE**	**55001-159**	**F159PC0240CA**
		UG-344/U†††	**252DCT**	–	**55000A-137**	**F137PA0240BA**
		CPR137G	**252DET**	**252SE**	**55001-137**	**F137PC0240CA**
		PDR70	**252DEMT**	**252SEM**	**223306-70**	**F137MH0600HA**
		PDR58		**152SEM**		
5.6-6.425	**EWP52-56W**	CPR159G	–	**152SE**	**55001-159**	**F159PC0240CS**
		CPR137G	–	**252SE**	**55001-137**	**F137PC0240CS**
		PDR70	–	**252SEM**	**223306-70**	**F137MH0600HS**
		PDR58		**152SEM**		
Standard Waveguide Assemblies			**Non-Tunable**			**VSWR 1.15 (23.1)****
5.60–6.425	**EW52**	CPR159G	**152DE**	**152SE**	**55001-159**	**F159PC0240CS**
		UG-344/U†††	**252DC**	–	**55000A-137**	**F137PA0240BS**
		CPR137G	**252DE**	**252SEM**	**55001-137**	**F137PC0240CS**
		PDR58		**152SEM**		

* Contact Andrew for information on other frequency bands. ** VSWR max., (R.L., dB). Up to 300 ft (90 m). The indicated maximum VSWR characteristics are guaranteed for factory assemblies and are typical for field assemblies. *** 1.036 (35.0 dB) for lengths 150 ft (46 m) and shorter. † "Tunable" connectors ordered with factory assemblies are factory tuned. †† For detailed information on mating flanges, refer to pages 214-218.
††† Modified cover flange with gasket groove. Mates with UG choke or cover flanges.

Accessories – Photos and detailed descriptions on pages 194-200

Description	Type No.
Hangers and Adapters	
Hanger Kit of 10, Recommended maximum spacing for outdoor installation is 3.5 ft (1.07 m)*	**42396A-8**
NEW! Snap-In Hanger Kit of 10. Recommended spacing for outdoor installation is 3.5 ft (1.07 m)	**EWSH-52**
Hardware Kit of 10, 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Angle Adapter Kit of 10. Stainless steel	**31768A**
Angle Adapter Kit of 10. Galvanized	
3/8" Hardware	**242774**
Metric Hardware	**242774-M**
Round Member Adapter Kit of 10. Stainless steel	
Member Diameter, in (mm)	
1-2 (25-50)	**31670-1**
2-3 (50-75)	**31670-2**
3-4 (75-100)	**31670-3**
4-5 (100-125)	**31670-4**
5-6 (125-150)	**31670-5**
45° Adapter Kit of 10. Galvanized steel	**42334**
Threaded Rod Support, 3/8" rod, nuts, washers, ceiling bracket	
12 in (305 mm) long, kit of 1	**31771**
12 in (305 mm) long, kit of 5	**31771-4**
24 in (610 mm) long, kit of 1	**31771-9**
24 in (610 mm) long, kit of 5	**31771-6**
Tower Standoff Kit of 10. 1 in (25 mm) standoff	
Member Diameter, in (mm)	
0.75-1.5 (20-40)	**30848-5**
1.5-3.0 (40-75)	**30848-4**
3-4 (75-100)	**30848-1**
4-5 (100-125)	**30848-2**
5-6 (125-150)	**30848-3**

* Standard conditions: 125 mph (200 km/h) survival wind velocity, 0.5 in (13 mm) radial ice. For other conditions see page 196.

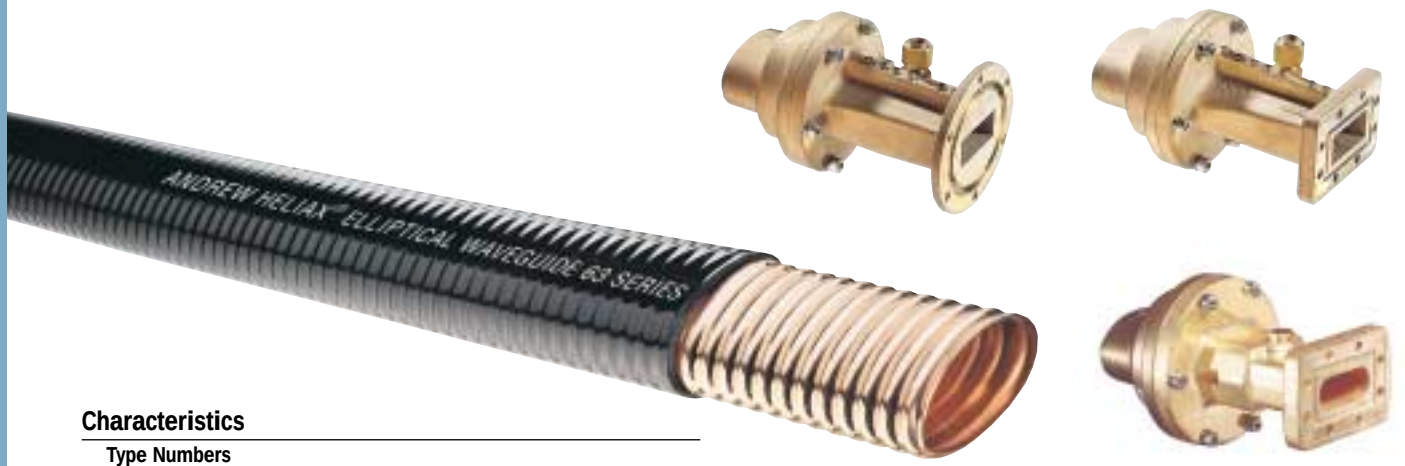
Description	Type No.
Tower Standoff Kit of 10. 2.5 in (60 mm) standoff	
Member Diameter, in (mm)	
3-4 (75-100)	**41108A-1**
4-5 (100-125)	**41108A-2**
5-6 (125-150)	**41108A-3**
Other Accessories	
Flaring Tool Kit for connector attachment	**EWFTK-52**
Splice	**152DZ**
Grounding Kit with factory attached, one-hole lug	**204989-4**
Grounding Kit with factory attached, two-hole lug	**241088-4**
Grounding Kit with field attachable crimp-on, one-hole lug	**204989-24**
Grounding Kit with field attachable crimp-on, two-hole lug	**241088-9**
Grounding Kit with field attachable screw-on lug	**204989-34**
Crimping Tool to field attach lug to Grounding Kit	**207270**
Hoisting Grip	**24312A**
Bending Tool Kit. One each E and H Plane tool	**33586-7**
Connector Reattachment Kit	**33544-38**
Wall-Roof Feed Thru	**245314-52**
Waveguide Boot for Plates (below),	
4 in (102 mm) dia.	**WGB4-52**
5 in (127 mm) dia	**WGB5-52**

Feed-Thru Plate for Boots (above)

Openings	For 4 in Boots	For 5 in Boots
1	**204673-1**	**48940-1**
1	**204673-2**	–
2	–	**48940-2**
3	–	**48940-3**
4	**204673-4**	**48940-4**
6	–	**48940-6**
8	**204673-8**	–

Elliptical Waveguide

Types EWP63S, EWP63 and EW63



Characteristics

Type Numbers	
Super Premium Waveguide, Standard Jacket	**EWP63S**
Premium Waveguide, Standard Jacket	**EWP63**
Standard Waveguide, Standard Jacket	**EW63**
Premium Waveguide, Fire Retardant – Non-Halogenated Jacket	**35409-18***
Premium Waveguide, Fire Retardant – Type CATVP	**222040-1**
Standard Waveguide, Fire Retardant – Non-Halogenated Jacket	**35409-19***

Electrical	
Max. Frequency Range, GHz	5.85-7.125
$_eTE_{11}$ Mode Cutoff Frequency, GHz	4.00
Group Delay at 6.775 GHz, ns/100 ft (ns/100 m)	125 (411)
Peak Power Rating at 6.775 GHz, kW	10

Mechanical	
Minimum Bending Radii, without rebending, inches (mm)	
E Plane	7 (180)
H Plane	20 (510)
Minimum Bending Radii, with rebending, inches (mm)	
E Plane	10 (260)
H Plane	29 (740)
Maximum Twist, degrees/foot (m)	1 (3)
Dimensions over Jacket, in (mm)	2.01 x 1.16 (51.1 x 29.5)
Weight, pounds per foot (kg/m)	0.51 (0.76)

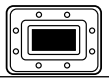
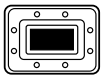
* UL® listed Type CATVR.

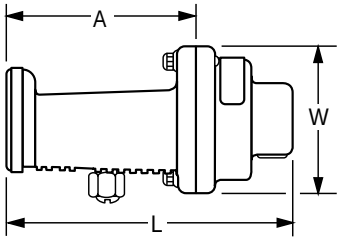
Attenuation, Average Power, Group Velocity

Frequency GHz	Attenuation dB/100 ft (dB/100 m)	Average Power Rating, kW	Group Velocity of Propagation,%
5.85	1.50 (4.94)	4.34	73.0
5.925	1.49 (4.88)	4.45	73.8
6.0	1.47 (4.82)	4.50	74.5
6.2	1.43 (4.70)	4.62	76.4
6.4	1.40 (4.59)	4.73	78.1
6.425	1.40 (4.58)	4.74	78.3
6.525	1.38 (4.53)	4.79	79.0
6.6	1.37 (4.50)	4.82	79.5
6.775	1.35 (4.44)	4.89	80.7
6.8	1.35 (4.43)	4.90	80.9
6.875	1.34 (4.40)	4.93	81.3
7.0	1.33 (4.37)	4.97	82.1
7.125	1.32 (4.33)	5.01	82.7

Attenuation values based on VSWR 1.0, ambient temperature 24°C (75°F) and are guaranteed within ±5%. Average power ratings based on VSWR 1.0 and 42°C (76°F) temperature rise over 40°C (104°F) ambient.

Connectors – Flange dimensions on pages 216-217

	L in (mm)	W in (mm)	A in (mm)	Weight lb (kg)
Type No. 163DC, 163DCT, 163DCP, 163SC, 163SCM				
	5.3 (135)	3.4 (86)	3.3 (84)	3.7 (1.7)
Type No. 163DE, 163DET, 163DEP				
	5.3 (135)	3.4 (86)	3.3 (84)	3.5 (1.6)
Type No. 163SEM, 163SE				
	5.3 (135)	3.4 (86)	3.5 (89)	3.7 (1.7)



Connector Material: Brass

Ordering Information for Waveguide Assemblies

Frequency* GHz	Waveguide Type	Flange Type††	Connector† Tunable	Fixed-Tuned	Pressure Window	Flex-Twist 2 ft (0.6 m)
Super Premium Waveguide Assemblies						**VSWR 1.05 (32.3)****
6.425–7.125	**EWP63S**	UG-344/U†††	**163DCT**	–	**55000A-137**	**F137PA0240BB**
		CPR137G	**163DET**	–	**55001-137**	**F137PC0240CB**
		PDR70	–	**163SEM**	**223306-70**	**F137MH0600HB**
Premium Waveguide Assemblies						**VSWR 1.06 (30.7)****
5.925–6.575	**EWP63-59**	UG-344/U†††	**163DCT**	**163SC**	**55000A-137**	**F137PA0240BA*****
		CPR137G	**163DET**	**163SE**	**55001-137**	**F137PC0240CA*****
		PDR70	–	**163SEM**	**223306-70**	**F137MH0600HA*****
		PAR70	–	**163SCM**		
5.800–7.125	**EWP63-59W**	UG-344/U†††	**163DCT**	**163SCM**	**55000A-137**	**F137PA0240BA*****
		CPR137G	**163DET**	**163SE**	**55001-137**	**F137PC0240CA*****
		PDR70	–	**163SEM**	**223306-70**	**F137MH0600HA*****
		PAR70	–	**163SCM**		
						VSWR 1.05 (32.3)*
6.525–6.875	**EWP63-65N**	UG-344/U†††	**163DCT**	**163SC**	**55000A-137**	**F137PA0240BB**
		CPR137G	**163DET**	**163SE**	**55001-137**	**F137PC0240CB**
		PDR70	–	**163SEM**	**223306-70**	**F137MH0600HB**
		PAR70	–	**163SCM**		
						VSWR 1.06 (30.7)**
6.425–7.125	**EWP63-65**	UG-344/U†††	**163DCT**	**163SC**	**55000A-137**	**F137PA0240BB**
		CPR137G	**163DET**	**163SE**	**55001-137**	**F137PC0240CB**
		PDR70	–	**163SEM**	**223306-70**	**F137MH0600HB**
		PAR70	–	**163SCM**		
Standard Waveguide Assemblies			**Non-Tunable**			**VSWR 1.15 (23.1)****
5.925–7.125	**EW63**	UG-344/U†††	**163DC**	**163SC**	**55000A-137**	**F137PA0240BS**
		CPR137G	**163DE**	**163SE**	**55001-137**	**F137PC0240CB**
		PDR70	–	**163SEM**	**223306-70**	**F137MH0600HS**
		PAR70	–	**163SCM**		

* Contact Andrew for information on other frequency bands. ** VSWR max., (R.L., dB). Up to 300 ft (90 m). The indicated maximum VSWR characteristics are guaranteed for factory assemblies and are typical for field assemblies. *** Low VSWR guaranteed for 5.925 to 6.425 GHz, nominal for 5.925 to 6.575 GHz.
† "Tunable" connectors ordered with factory assemblies are factory tuned. †† For detailed information on mating flanges, refer to pages 214-218. ††† Modified cover flange with gasket groove. Mates with UG choke or cover flanges.

Accessories – Photos and detailed descriptions on pages 194-200

Description	Type No.
Hangers and Adapters	
Hanger Kit of 10, Recommended maximum spacing for outdoor installation is 3 ft (0.91 m)*	**42396A-7**
NEW! Snap-In Hanger Kit of 10. Recommended spacing for outdoor installation is 3.5 ft (1.07 m)	**EWSH-63**
Hardware Kit of 10, 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Angle Adapter Kit of 10. Stainless steel	**31768A**
Angle Adapter Kit of 10. Galvanized	
3/8" Hardware	**242774**
Metric Hardware	**242774-M**
Round Member Adapter Kit of 10. Stainless steel Member Diameter, in (mm)	
1-2 (25-50)	**31670-1**
2-3 (50-75)	**31670-2**
3-4 (75-100)	**31670-3**
4-5 (100-125)	**31670-4**
5-6 (125-150)	**31670-5**
45° Adapter Kit of 10. Galvanized steel	**42334**
Threaded Rod Support, 3/8" rod, nuts, washers, ceiling bracket	
12 in (305 mm) long, kit of 1	**31771**
12 in (305 mm) long, kit of 5	**31771-4**
24 in (610 mm) long, kit of 1	**31771-9**
24 in (610 mm) long, kit of 5	**31771-6**
Tower Standoff Kit of 10. 1 in (25 mm) standoff Member Diameter, in (mm)	
0.75-1.5 (20-40)	**30848-5**
1.5-3.0 (40-75)	**30848-4**
3-4 (75-100)	**30848-1**
4-5 (100-125)	**30848-2**
5-6 (125-150)	**30848-3**

* Standard conditions: 125 mph (200 km/h) survival wind velocity, 0.5 in (13 mm) radial ice. For other conditions see page 196.

Description	Type No.
Tower Standoff Kit of 10. 2.5 in (60 mm) standoff Member Diameter, in (mm)	
3-4 (75-100)	**41108A-1**
4-5 (100-125)	**41108A-2**
5-6 (125-150)	**41108A-3**
Other Accessories	
Flaring Tool Kit for connector attachment	**EWFTK-63**
Splice	**163DZ**
Grounding Kit with factory attached, one-hole lug	**204989-4**
Grounding Kit with factory attached, two-hole lug	**241088-4**
Grounding Kit with field attachable crimp-on, one-hole lug	**204989-24**
Grounding Kit with field attachable crimp-on, two-hole lug	**241088-9**
Grounding Kit with field attachable screw-on lug	**204989-34**
Crimping Tool to field attach lug to Grounding Kit	**207270**
Hoisting Grip	**24312A**
Bending Tool Kit. One each E and H Plane tool	**33586-8**
Connector Reattachment Kit	**33544-33**
Wall-Roof Feed Thru	**245314-63**
Waveguide Boot for Plates (below),	
4 in (102 mm) dia.	**WGB4-63**
5 in (127 mm) dia	**WGB5-63**

Feed-Thru Plate for Boots (above)

Openings	For 4 in Boots	For 5 in Boots
1	**204673-1**	**48940-1**
1	**204673-2**	–
2	–	**48940-2**
3	–	**48940-3**
4	**204673-4**	**48940-4**
6	–	**48940-6**
8	**204673-8**	–

Elliptical Waveguide

Types EWP64 and EW64

Characteristics

Type Numbers	
Premium Waveguide	**EWP64**
Premium Waveguide Type CATVP	**222040-9**
Standard Waveguide	**EW64**
Electrical	
Max. Frequency Range, GHz*	5.3-7.75
$_eTE_{11}$ Mode Cutoff Frequency, GHz	4.32
Group Delay at 7.4 GHz, ns/100 ft (ns/100 m)	124 (408)
Peak Power Rating at 7.4 GHz, kW	
with 164 series connectors	107
with 264 series connectors	60
Mechanical	
Minimum Bending Radii, without rebending, inches (mm)	
E Plane	10 (260)
H Plane	27 (685)
Minimum Bending Radii, with rebending, inches (mm)	
E Plane	10 (260)
H Plane	27 (685)
Maximum Twist, degrees/foot (m)	1 (3)
Dimensions over Jacket, in (mm)	1.88 x 1.08 (47.8 x 27.4)
Weight, pounds per foot (kg/m)	0.49 (0.73)

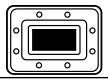
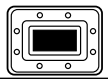
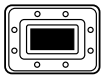
* Actual usable range is limited by the connecting rectangular waveguide.

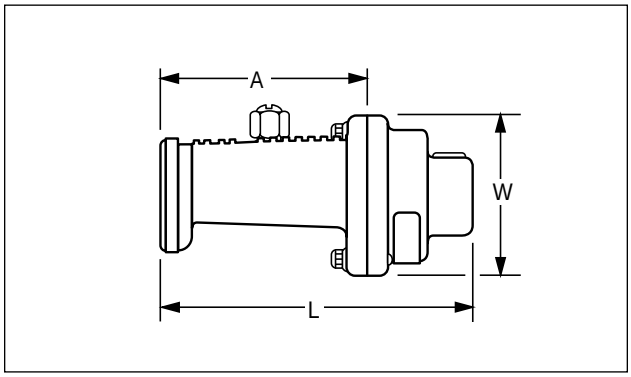
Attenuation, Average Power, Group Velocity

Frequency GHz	Attenuation dB/100 ft (dB/100 m)	Average Power Rating, kW	Group Velocity of Propagation,%
5.3	2.16 (7.07)	2.92	57.9
5.5	1.99 (6.50)	3.18	61.9
5.7	1.86 (6.09)	3.39	65.2
5.9	1.76 (5.79)	3.57	68.1
6.1	1.69 (5.56)	3.72	70.6
6.3	1.64 (5.37)	3.85	72.8
6.5	1.59 (5.22)	3.96	74.7
6.7	1.55 (5.10)	4.05	76.4
6.9	1.52 (5.10)	4.14	78.0
7.1	1.49 (4.90)	4.21	79.4
7.125	1.49 (4.87)	4.24	79.5
7.25	1.48 (4.85)	4.26	80.3
7.3	1.47 (4.83)	4.38	80.6
7.5	1.45 (4.76)	4.34	81.7
7.7	1.43 (4.70)	4.39	82.8
7.75	1.43 (4.69)	4.41	83.0

Attenuation values based on VSWR 1.0, ambient temperature 24°C (75°F) and are guaranteed within ±5%. Average power ratings based on VSWR 1.0 and 42°C (76°F) temperature rise over 40°C (104°F) ambient.

Connectors – Flange dimensions on pages 216-217

	L in (mm)	W in (mm)	A in (mm)	Weight lb (kg)
Type No. 164DC, 164DCT, 164SC, 164SCM				
	5.3 (135)	3.3 (84)	3.3 (84)	3.5 (1.6)
Type No. 164DE, 164DET				
	5.3 (135)	3.3 (84)	3.3 (84)	3.5 (1.6)
Type No. 264DE, 264DET				
	5.2 (132)	3.3 (84)	3.2 (81)	3.4 (1.5)
Type No. 164SEM, 164SE, 264SE, 264SEM				
	5.3 (134.6)	3.3 (84)	3.4 (86)	3.5 (1.6)



Connector Material: Brass

Ordering Information for Waveguide Assemblies

Frequency* GHz	Waveguide Type	Flange Type††	Connector† Tunable	Connector† Fixed-Tuned	Pressure Window	Flex-Twist 2 ft (0.6 m)
Premium Waveguide Assemblies						**VSWR 1.06 (30.7)****
7.125-7.750	**EWP64-71**	UG-344/U†††	**164DCT**	**164SC**	**55000A-137**	**F137PA0240BC**
		CPR137G	**164DET**	**164SE**	**55001-137**	**F137PC0240CC**
		CPR112G	**264DET**	**264SCM**	**55001-112**	**F112PC0240CA**
		PDR70	–	**164SEM**	**223306-70**	**F137MH0600HC**
		PDR84	–	**264SEM**	–	**F112MH0600HA**
6.425-7.125	**EWP64-65**	UG-344/U†††	**164DCT**	**164SC**	**55000A-137**	**F137PA0240BB**
		CPR137G	**164DET**	**164SE**	**55001-137**	**F137PC0240CB**
		PDR70	–	**164SEM**	**223306-70**	**F137MH0600HB**
		PAR70	–	**164SCM**	–	**F137MP0600PB**
6.525-6.875	**EWP64-65N**	UG-344/U†††	**164DCT**	**164SC**	**55000A-137**	**F137PA0240BB**
		CPR137G	**164DET**	**164SE**	**55001-137**	**F137PC0240CB**
		PDR70	–	**164SEM**	**223306-70**	**F137MH0600HB**
		PAR70	–	**164SCM**	–	**F137MP0600PB**
Standard Waveguide Assemblies						**VSWR 1.15 (23.1)****
6.425-7.750	**EW64**	UG-344/U†††	**164DC**	–	**55000A-137**	**F137PA0240BS**
		CPR137G	**164DE**	**164SE**	**55001-137**	**F137PC0240CS**
		PDR70	–	**164SEM**	**223306-70**	**F137MH0600HS**
7.125-7.750	**EW64**	CPR112G	**264DE**	**264SE**	**55001-112**	**F112PC0240CC**
		PDR84	–	**264SEM**	–	**F112MH0600HC**

* Contact Andrew for information on other frequency bands. ** VSWR max., (R.L., dB). Up to 300 ft (90 m). The indicated maximum VSWR characteristics are guaranteed for factory assemblies and are typical for field assemblies. † "Tunable" connectors ordered with factory assemblies are factory tuned. †† For detailed information on mating flanges, refer to pages 214-218. ††† Modified cover flange with gasket groove. Mates with UG choke or cover flanges.

Accessories – Photos and detailed descriptions on pages 194-200

Description	Type No.
Hangers and Adapters	
Hanger Kit of 10, Recommended maximum spacing for outdoor installation is 3.5 ft (1.07 m)*	**42396A-1**
NEW! Snap-In Hanger Kit of 10. Recommended spacing for outdoor installation is 3.5 ft (1.07 m)	**EWSH-64**
Hardware Kit of 10, 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Angle Adapter Kit of 10. Stainless steel	**31768A**
Angle Adapter Kit of 10. Galvanized	
3/8" Hardware	**242774**
Metric Hardware	**242774-M**
Round Member Adapter Kit of 10. Stainless steel	
Member Diameter, in (mm)	
1-2 (25-50)	**31670-1**
2-3 (50-75)	**31670-2**
3-4 (75-100)	**31670-3**
4-5 (100-125)	**31670-4**
5-6 (125-150)	**31670-5**
45° Adapter Kit of 10. Galvanized steel	**42334**
Threaded Rod Support, 3/8" rod, nuts, washers, ceiling bracket	
12 in (305 mm) long, kit of 1	**31771**
12 in (305 mm) long, kit of 5	**31771-4**
24 in (610 mm) long, kit of 1	**31771-9**
24 in (610 mm) long, kit of 5	**31771-6**
Tower Standoff Kit of 10. 1 in (25 mm) standoff	
Member Diameter, in (mm)	
0.75-1.5 (20-40)	**30848-5**
1.5-3.0 (40-75)	**30848-4**
3-4 (75-100)	**30848-1**
4-5 (100-125)	**30848-2**
5-6 (125-150)	**30848-3**

* Standard conditions: 125 mph (200 km/h) survival wind velocity, 0.5 in (13 mm) radial ice. For other conditions see page 196.

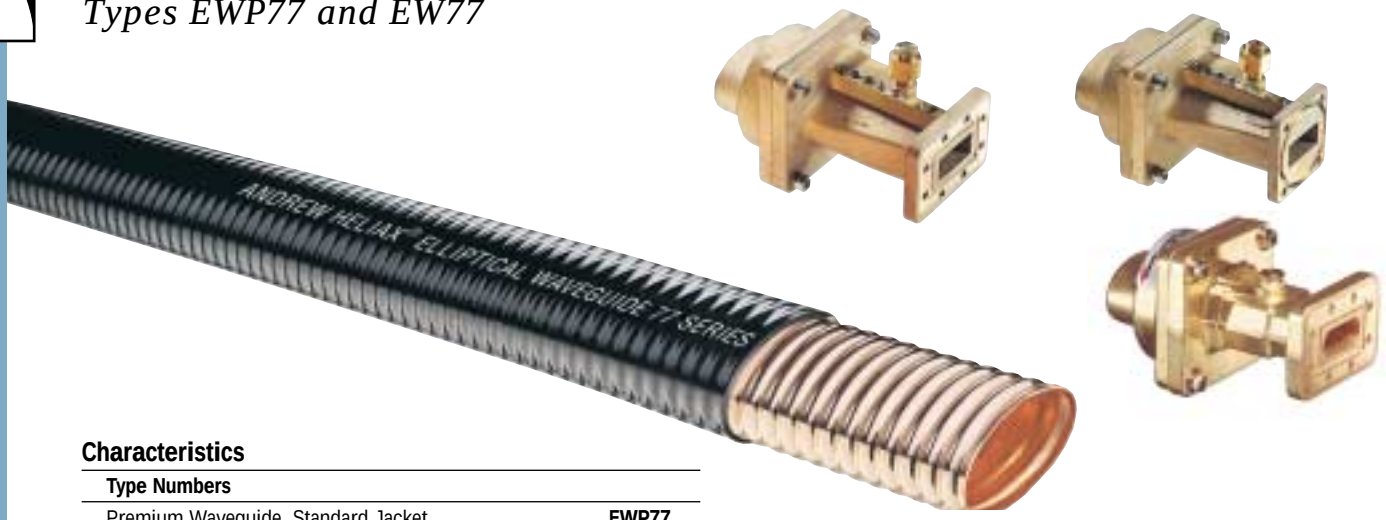
Description	Type No.
Tower Standoff Kit of 10. 2.5 in (60 mm) standoff	
Member Diameter, in (mm)	
3-4 (75-100)	**41108A-1**
4-5 (100-125)	**41108A-2**
5-6 (125-150)	**41108A-3**
Other Accessories	
Flaring Tool Kit for connector attachment	**202358**
Splice	**164DZ**
Grounding Kit with factory attached, one-hole lug	**204989-3**
Grounding Kit with factory attached, two-hole lug	**241088-3**
Grounding Kit with field attachable crimp-on, one-hole lug	**204989-23**
Grounding Kit with field attachable crimp-on, two-hole lug	**241088-8**
Grounding Kit with field attachable screw-on lug	**204989-33**
Crimping Tool to field attach lug to Grounding Kit	**207270**
Hoisting Grip	**29961**
Bending Tool Kit. One each E and H Plane tool	**33586-2**
Connector Reattachment Kit	**33544-35**
Wall-Roof Feed Thru	**245314-64**
Waveguide Boot for Plates (below),	
4 in (102 mm) dia.	**WGB4-64**
5 in (127 mm) dia	**WGB5-64**

Feed-Thru Plate for Boots (above)

Openings	For 4 in Boots	For 5 in Boots
1	**204673-1**	**48940-1**
1	**204673-2**	–
2	–	**48940-2**
3	–	**48940-3**
4	**204673-4**	**48940-4**
6	–	**48940-6**
8	**204673-8**	–

Elliptical Waveguide

Types EWP77 and EW77



Characteristics

Type Numbers	
Premium Waveguide, Standard Jacket	**EWP77**
Standard Waveguide, Standard Jacket	**EW77**
Premium Waveguide Type CATVP	**222040-6**
Standard Waveguide, Fire Retardant Non-Halogenated Jacket	**35409-22****
Electrical	
Max. Frequency Range, GHz*	6.1-8.5
$_{e}TE_{11}$ Mode Cutoff Frequency, GHz	4.72
Group Delay at 7.8 GHz, ns/100 ft (ns/100 m)	128 (419)
Peak Power Rating at 7.8 GHz, kW	63
Mechanical	
Minimum Bending Radii, without rebending, inches (mm)	
E Plane	7 (180)
H Plane	20 (510)
Minimum Bending Radii, with rebending, inches (mm)	
E Plane	9 (230)
H Plane	25 (635)
Maximum Twist, degrees/foot (m)	1 (3)
Dimensions over Jacket, in (mm)	1.72 x 1.00 (43.7 x 25.4)
Weight, pounds per foot (kg/m)	0.45 (0.67)

* Actual usable range is limited by the connecting rectangular waveguide.

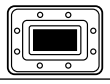
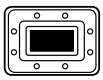
** UL® listed Type CATVR.

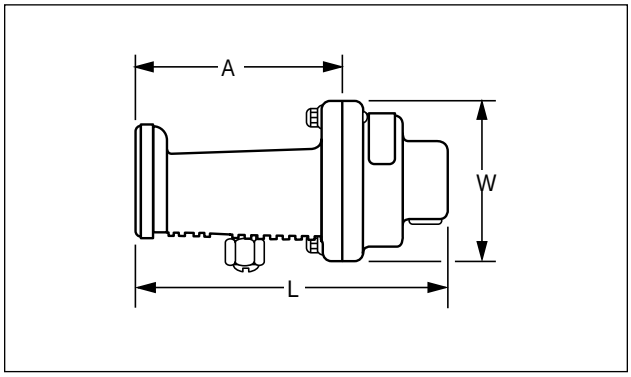
Attenuation, Average Power, Group Velocity

Frequency GHz	Attenuation dB/100 ft (dB/100 m)	Average Power Rating, kW	Group Velocity of Propagation,%
6.1	2.36 (7.75)	2.52	63.3
6.3	2.22 (7.30)	2.68	66.2
6.5	2.12 (6.95)	2.81	68.7
6.7	2.04 (6.68)	2.93	71.0
6.9	1.97 (6.46)	3.03	72.9
7.1	1.91 (6.28)	3.11	74.7
7.125	1.91 (6.26)	3.12	75.0
7.3	1.87 (6.13)	3.19	76.3
7.5	1.83 (6.00)	3.26	77.7
7.7	1.79 (5.89)	3.32	79.0
7.725	1.79 (5.88)	3.33	79.2
7.75	1.79 (5.86)	3.33	79.3
7.9	1.77 (5.80)	3.37	80.2
8.1	1.74 (5.71)	3.42	81.2
8.15	1.74 (5.69)	3.43	81.5
8.275	1.72 (5.65)	3.46	82.1
8.3	1.72 (5.64)	3.47	82.2
8.5	1.70 (5.58)	3.51	83.1

Attenuation values based on VSWR 1.0, ambient temperature 24°C (75°F) and are guaranteed within ±5%. Average power ratings based on VSWR 1.0 and 42°C (76°F) temperature rise over 40°C (104°F) ambient.

Connectors – Flange dimensions on pages 216-217

	L in (mm)	W in (mm)	A in (mm)	Weight lb (kg)
Type No. 177DC, 177DCT, 177DCP, 177DCM, 177DCMT, 177SC, 177SCM				
	4.5 (115)	2.7 (69)	2.75 (69.8)	2.8 (1.3)
Type No. 177DE, 177DET, 177DEMT				
	4.8 (122)	2.7 (69)	2.75 (69.8)	2.8 (1.3)
Type No. 177SE, 177SEM				
	4.5 (115)	2.7 (69)	2.75 (69.8)	2.8 (1.3)



Connector Material: Brass

Ordering Information for Waveguide Assemblies

Frequency* GHz	Waveguide Type	Flange Type††	Connector† Tunable	Connector† Fixed-Tuned	Pressure Window	Flex-Twist 2 ft (0.6 m)
Premium Waveguide Assemblies						**VSWR 1.06 (30.7)****
7.125–7.750	**EWP77-71**	UG-51/U†††	**177DCT**	**177SC**	**55000A-112**	**F112PA0240BA**
		CPR112G	**177DET**	**177SE**	**55001-112**	**F112PC0240CA**
		PBR84	**177DCMT**	**177SCM**	**243498-84**	**F112MK0600KA**
		PDR84	**177DEMT**	**177SEM**	**223306-84**	**F112MH0600HA**
		PDR70	**277DEMT**	**–**	**223306-70**	**F137MH0600HC**
7.725–8.500	**EWP77-77**	UG-51/U†††	**177DCT**	**177SC**	**55000A-112**	**F112PA0240BB**
		CPR112G	**177DET**	**177SE**	**55001-112**	**F112PC0240CB**
		PBR84	**177DCMT**	**177SCM**	**243498-84**	**F112MK0600KB**
		PDR84	**177DEMT**	**177SEM**	**223306-84**	**F112MH0600HB**
		PDR70	**277DEMT**	**–**	**223306-70**	**F137MH0600HF‡**
7.125–8.500	**EWP77-71W**	UG-51/U†††	**177DCT**	**177SC**	**55000A-112**	**F112PA0240BC**
		CPR112G	**177DET**	**177SE**	**55001-112**	**F112PC0240CC**
		PBR84	**177DCMT**	**177SCM**	**243498-84**	**F112MK0600KC**
		PDR84	**177DEMT**	**177SEM**	**223306-84**	**F112MH0600HC**
***		PDR70	**277DEMT**	**–**	**223306-70**	**F137MH0600HE**
Standard Waveguide Assemblies			**Non-Tunable**			**VSWR 1.15 (23.1)****
7.125–8.500	**EW77**	UG-51/U†††	**177DC**	**177SC**	**55000A-112**	**F112PA0240BC**
		PBR84	**177DCM**	**177SCM**	**243498-84**	**F112MK0600KC**
		CPR112G	**177DE**	**177SE**	**55001-112**	**F112PC0240CC**
		PDR84	**177DEM**	**177SCM**	**223306-84**	**F112MH0600HC**

* Contact Andrew for information on other frequency bands. ** VSWR max., (R.L., dB). Up to 300 ft (90 m). The indicated maximum VSWR characteristics are guaranteed for factory assemblies and are typical for field assemblies. *** 7.425 - 7.925 GHz ‡ 7.725 - 8.3 GHz ONLY

† "Tunable" connectors ordered with factory assemblies are factory tuned.

†† For detailed information on mating flanges, refer to pages 214-218. ††† Modified cover flange with gasket groove. Mates with UG choke or cover flanges.

Accessories – Photos and detailed descriptions on pages 194-200

Description	Type No.
Hangers and Adapters	
Hanger Kit of 10, Recommended maximum spacing for outdoor installation is 3 ft (0.91 m)*	**42396A-11**
NEW! Snap-In Hanger Kit of 10. Recommended spacing for outdoor installation is 3 ft (0.91 m)	**EWSH-77**
Hardware Kit of 10, 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Angle Adapter Kit of 10. Stainless steel	**31768A**
Angle Adapter Kit of 10. Galvanized	
3/8" Hardware	**242774**
Metric Hardware	**242774-M**
Round Member Adapter Kit of 10. Stainless steel Member Diameter, in (mm)	
1-2 (25-50)	**31670-1**
2-3 (50-75)	**31670-2**
3-4 (75-100)	**31670-3**
4-5 (100-125)	**31670-4**
5-6 (125-150)	**31670-5**
45° Adapter Kit of 10. Galvanized steel	**42334**
Threaded Rod Support, 3/8" rod, nuts, washers, ceiling bracket	
12 in (305 mm) long, kit of 1	**31771**
12 in (305 mm) long, kit of 5	**31771-4**
24 in (610 mm) long, kit of 1	**31771-9**
24 in (610 mm) long, kit of 5	**31771-6**
Tower Standoff Kit of 10. 1 in (25 mm) standoff Member Diameter, in (mm)	
0.75-1.5 (20-40)	**30848-5**
1.5-3.0 (40-75)	**30848-4**
3-4 (75-100)	**30848-1**
4-5 (100-125)	**30848-2**
5-6 (125-150)	**30848-3**

* Standard conditions: 125 mph (200 km/h) survival wind velocity, 0.5 in (13 mm) radial ice. For other conditions see page 196.

Description	Type No.
Tower Standoff Kit of 10. 2.5 in (60 mm) standoff Member Diameter, in (mm)	
3-4 (75-100)	**41108A-1**
4-5 (100-125)	**41108A-2**
5-6 (125-150)	**41108A-3**
Other Accessories	
Flaring Tool Kit for connector attachment	**202421**
Splice	**177DZ**
Grounding Kit with factory attached, one-hole lug	**204989-3**
Grounding Kit with factory attached, two-hole lug	**241088-3**
Grounding Kit with field attachable crimp-on, one-hole lug	**204989-23**
Grounding Kit with field attachable crimp-on, two-hole lug	**241088-8**
Grounding Kit with field attachable screw-on lug	**204989-33**
Crimping Tool to field attach lug to Grounding Kit	**207270**
Hoisting Grip	**19256B**
Bending Tool Kit. One each E and H Plane tool	**33586-9**
Connector Reattachment Kit	**33544-34**
Wall-Roof Feed Thru	**245314-77**
Waveguide Boot for Plates (below),	
4 in (102 mm) dia.	**WGB4-77**
5 in (127 mm) dia	**WGB5-77**

Feed-Thru Plate for Boots (above)

Openings	For 4 in Boots	For 5 in Boots
1	**204673-1**	**48940-1**
1	**204673-2**	–
2	–	**48940-2**
3	–	**48940-3**
4	**204673-4**	**48940-4**
6	–	**48940-6**
8	**204673-8**	–

Elliptical Waveguide

Types EW85

Characteristics

Type Numbers	
Premium Waveguide, Standard Jacket	**EW85**
Standard Waveguide, Fire Retardant Non-Halogenated Jacket	**35409-17****
Electrical	
Max. Frequency Range, GHz*	7.7-9.8
$_{e}TE_{11}$ Mode Cutoff Frequency, GHz	6.46
Group Delay at 9.2 GHz, ns/100 ft (ns/100 m)	142 (465)
Peak Power Rating at 9.2 GHz, kW	38.9
Mechanical	
Minimum Bending Radii, without rebending, inches (mm)	
E Plane	8 (200)
H Plane	19 (480)
Minimum Bending Radii, with rebending, inches (mm)	
E Plane	8 (200)
H Plane	19 (480)
Maximum Twist, degrees/foot (m)	1 (3)
Dimensions over Jacket, in (mm)	1.29 x 0.88 (32.8 x 22.4)
Weight, pounds per foot (kg/m)	0.33 (0.50)

* Actual usable range is limited by the connecting rectangular waveguide.

** UL® listed Type CATVR.

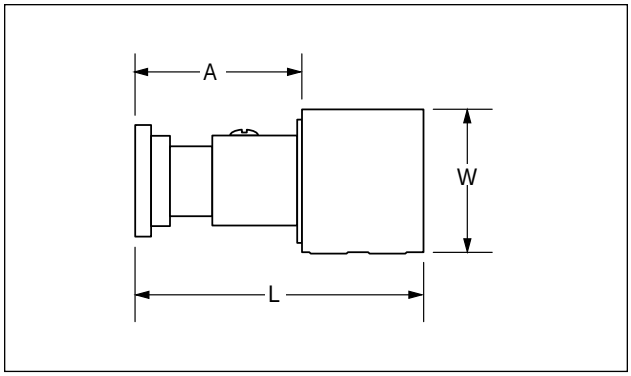
Attenuation, Average Power, Group Velocity

Frequency GHz	Attenuation dB/100 ft (dB/100 m)	Average Power Rating, kW	Group Velocity of Propagation,%
7.7	4.32 (14.20)	1.17	54.4
7.9	4.01 (13.10)	1.26	57.6
8.1	3.78 (12.40)	1.34	60.3
8.3	3.59 (11.80)	1.40	62.8
8.5	3.45 (11.31)	1.46	65.6
8.7	3.33 (10.92)	1.52	67.6
8.9	3.23 (10.59)	1.56	69.4
9.1	3.14 (10.31)	1.61	71.0
9.3	3.07 (10.07)	1.64	72.4
9.5	3.01 (9.86)	1.68	73.8
9.7	2.95 (9.68)	1.71	75.0
9.8	2.93 (9.60)	1.72	75.6

Attenuation values based on VSWR 1.0, ambient temperature 24°C (75°F) and are guaranteed within ±5%. Average power ratings based on VSWR 1.0 and 42°C (76°F) temperature rise over 40°C (104°F) ambient.

Connectors – Flange dimensions on pages 216-217

	L in (mm)	W in (mm)	A in (mm)	Weight lb (kg)
Type No. 185BC				
	4.75 (121)	2.1 (52)	3.5 (89)	2.0 (0.9)



Connector Material: Brass

Ordering Information for Waveguide Assemblies

Frequency GHz*	Waveguide Type	Flange Type††	Connector Non-Tunable	Pressure Window	Flex-Twist 2 ft (0.6 m)
Premium Waveguide Assemblies					**VSWR 1.17 (22.1)****
8.5-9.8	**EW85**	UG-39/U†††	**185BC**	**55000A-90**	**F090PA024BS**

* Contact Andrew for information on other frequency bands.
** VSWR max., (R.L., dB). Up to 300 ft (90 m). The indicated maximum VSWR characteristics are guaranteed for factory assemblies and are typical for field assemblies.
†† For detailed information on mating flanges, refer to pages 214-218
††† Modified cover flange with gasket groove. Mates with UG choke or cover flanges.

Accessories – Photos and detailed descriptions on pages 194-200

Description	Type No.
Hangers and Adapters	
Hanger Kit of 10, Recommended maximum spacing for outdoor installation is 3 ft (0.91 m)*	**42396A-5**
Hardware Kit of 10, 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Angle Adapter Kit of 10. Stainless steel	**31768A**
Round Member Adapter Kit of 10. Stainless steel	
Member Diameter, in (mm)	
1-2 (25-50)	**31670-1**
2-3 (50-75)	**31670-2**
3-4 (75-100)	**31670-3**
4-5 (100-125)	**31670-4**
5-6 (125-150)	**31670-5**
45° Adapter Kit of 10. Galvanized steel	**42334**
Threaded Rod Support, 3/8" rod, nuts, washers, ceiling bracket	
12 in (305 mm) long, kit of 1	**31771**
12 in (305 mm) long, kit of 5	**31771-4**
24 in (610 mm) long, kit of 1	**31771-9**
24 in (610 mm) long, kit of 5	**31771-6**
Tower Standoff Kit of 10. 1 in (25 mm) standoff	
Member Diameter, in (mm)	
0.75-1.5 (20-40)	**30848-5**
1.5-3.0 (40-75)	**30848-4**
3-4 (75-100)	**30848-1**
4-5 (100-125)	**30848-2**
5-6 (125-150)	**30848-3**
Tower Standoff Kit of 10. 2.5 in (60 mm) standoff	
Member Diameter, in (mm)	
3-4 (75-100)	**41108A-1**
4-5 (100-125)	**41108A-2**
5-6 (125-150)	**41108A-3**

* Standard conditions: 125 mph (200 km/h) survival wind velocity, 0.5 in (13 mm) radial ice. For other conditions see page 196.

Description	Type No.
Other Accessories	
Splice	**185AZ**
Grounding Kit with factory attached, one-hole lug	**204989-3**
Grounding Kit with factory attached, two-hole lug	**241088-2**
Grounding Kit with field attachable crimp-on, one-hole lug	**204989-22**
Grounding Kit with field attachable crimp-on, two-hole lug	**241088-7**
Grounding Kit with field attachable screw-on lug	**204989-32**
Crimping Tool to field attach lug to Grounding Kit	**207270**
Wall-Roof Feed Thru	**245314-85**
Hoisting Grip	**29958**
Bending Tool Kit. One each E and H Plane tool	**33586-1**
Connector Reattachment Kit	**33544-17**

How To Order:

A sample order is shown on page 473.

Specify complete waveguide Type Number, including frequency band code, where listed, and length in feet or meters. See "Waveguide Assemblies" table.

Specify connector Type Numbers and "attached" or "unattached". See "Waveguide Assemblies" table. When attached connectors on an assembly are different, specify which is "first off" the reel.

Further Information:

For general information on HELIAX® elliptical waveguide, see pages 156-159.

Elliptical Waveguide

Types EWP90S, EWP90 and EW90

Characteristics

Type Numbers	
Super Premium Waveguide, Standard Jacket	**EWP90S**
Premium Waveguide, Standard Jacket	**EWP90**
Standard Waveguide, Standard Jacket	**EW90**
Premium Waveguide, Fire Retardant, Non-Halogenated Jacket	**35409-16***
Premium Waveguide Type CATVP	**222040-2**
Electrical	
Max. Frequency Range, GHz	8.3-11.7
$_eTE_{11}$ Mode Cutoff Frequency, GHz	6.50
Group Delay at 11.2 GHz, ns/100 ft (ns/100 m)	125 (410)
Peak Power Rating at 11.2 GHz, kW	
with 190 series connectors	44.9
with 290 series connectors	30.8
Mechanical	
Minimum Bending Radii, without rebending, inches (mm)	
E Plane	6 (150)
H Plane	13 (330)
Minimum Bending Radii, with rebending, inches (mm)	
E Plane	7 (180)
H Plane	19 (480)
Maximum Twist, degrees/foot (m)	2 (6)
Dimensions over Jacket, in (mm)	1.28 x 0.76 (32.5 x 19.3)
Weight, pounds per foot (kg/m)	0.32 (0.48)

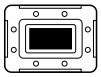
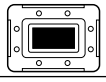
* UL® listed Type CATVR.

Attenuation, Average Power, Group Velocity

Frequency GHz	Attenuation dB/100 ft (dB/100 m)	Average Power Rating, kW	Group Velocity of Propagation,%
8.3	4.20 (13.8)	1.17	62.2
8.8	3.79 (12.4)	1.29	67.4
9.3	3.53 (11.6)	1.39	71.5
9.8	3.35 (11.0)	1.46	74.8
10.3	3.22 (10.6)	1.52	77.6
10.5	3.18 (10.44)	1.54	78.6
10.7	3.14 (10.31)	1.56	79.5
10.9	3.11 (10.20)	1.58	80.3
11.1	3.08 (10.10)	1.59	81.1
11.3	3.05 (10.00)	1.61	81.8
11.5	3.02 (9.92)	1.62	82.5
11.7	3.00 (9.84)	1.63	83.2

Attenuation values based on VSWR 1.0, ambient temperature 24°C (75°F) and are guaranteed within ±5%. Average power ratings based on VSWR 1.0 and 42°C (76°F) temperature rise over 40°C (104°F) ambient.

Connectors – Flange dimensions on pages 216-217

		L in (mm)	W in (mm)	A in (mm)	Weight lb (kg)
Type No. 190DE, 190DET, 190DEM, 190DEMT					
Figure 1		4.5 (117)	2.3 (58)	2.7 (67)	1.9 (0.9)
Type No. 290SC					
Figure 2		3.6 (91)	2.3 (58)	1.8 (46)	1.9 (0.9)
Type No. 190SE, 190SEM					
Figure 2		4.16 (105.8)	2.29 (58.2)	2.44 (62.1)	2.1 (0.9)

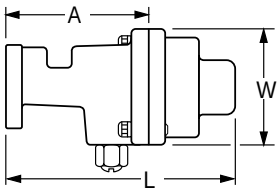


Figure 1

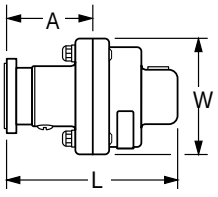


Figure 2

Connector Material: Brass

Ordering Information for Waveguide Assemblies

Frequency* GHz	Waveguide Type	Flange Type††	Connector† Tunable	Connector† Fixed-Tuned	Pressure Window	Flex-Twist 2 ft (0.6 m)
Super Premium Waveguide Assemblies						**VSWR 1.05 (32.3)****
10.7-11.7	**EWP90S**	CPR90G	**190DET**	**190SE**	**55001-90**	**F090PC0240CB**
		PDR100	**190DEMT**	**190SEM**	**223306-100**	**F090MH0600HB**
Premium Waveguide Assemblies						**VSWR 1.06 (30.7)****
10.2-10.7	**EWP90-105**	CPR90G	**190DET**	**190SE**	**55001-90**	**F090PC0240CA**
		PDR100	**190DEMT**	**190SEM**	**223306-100**	**F090MH0600HA**
10.5-11.7	**EWP90-105W**	CPR90G	–	**190SE**	**55001-90**	**F090PC0240CB**
		PDR100	–	**190SEM**	**223306-100**	**F090MH0600HB**
10.7-11.7	**EWP90-107**	CPR90	**190DET**	**190SE**	**55001-90**	**F090PC0240CB**
		PDR100	**190DEMT**	**190SEM**	**223306-100**	**F090MH0600HB**
						VSWR 1.09 (27.3)**
10.7-11.7		WR75†††	–	**290SC**	**55000A-75**	**F075PA0240BB**
Standard Waveguide Assemblies			**Non-Tunable**			**VSWR 1.15 (23.1)****
10.2-11.7	**EW90**	CPR90G	**190DE**	**190SE**	**55001-90**	**F090PC0240CS**
		PDR100	**190DEM**	**190SEM**	**223306-100**	**F090MH0600HS**
		WR75†††	–	–	**55000A-75**	**F075PA0240BS**

* Contact Andrew for information on other frequency bands.
** VSWR max., (R.L., dB). Up to 300 ft (90 m). The indicated maximum VSWR characteristics are guaranteed for factory assemblies and are typical for field assemblies.
† "Tunable" connectors ordered with factory assemblies are factory tuned.
†† For detailed information on mating flanges, refer to pages 214-218. ††† Pressurizable cover flange.

Accessories – Photos and detailed descriptions on pages 194-200

Description	Type No.
Hangers and Adapters	
Hanger Kit of 10, Recommended maximum spacing for outdoor installation is 3 ft (0.91 m)*	**42396A-5**
NEW! Snap-In Hanger Kit of 10. Recommended spacing for outdoor installation is 3 ft (0.91 m)	**EWSH-90**
Hardware Kit of 10, 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Angle Adapter Kit of 10. Stainless steel	**31768A**
Angle Adapter Kit of 10. Galvanized	
3/8" Hardware	**242774**
Metric Hardware	**242774-M**
Round Member Adapter Kit of 10. Stainless steel	
Member Diameter, in (mm)	
1-2 (25-50)	**31670-1**
2-3 (50-75)	**31670-2**
3-4 (75-100)	**31670-3**
4-5 (100-125)	**31670-4**
5-6 (125-150)	**31670-5**
45° Adapter Kit of 10. Galvanized steel	**42334**
Threaded Rod Support, 3/8" rod, nuts, washers, ceiling bracket	
12 in (305 mm) long, kit of 1	**31771**
12 in (305 mm) long, kit of 5	**31771-4**
24 in (610 mm) long, kit of 1	**31771-9**
24 in (610 mm) long, kit of 5	**31771-6**
Tower Standoff Kit of 10. 1 in (25 mm) standoff	
Member Diameter, in (mm)	
0.75-1.5 (20-40)	**30848-5**
1.5-3.0 (40-75)	**30848-4**
3-4 (75-100)	**30848-1**
4-5 (100-125)	**30848-2**
5-6 (125-150)	**30848-3**
Tower Standoff Kit of 10. 2.5 in (60 mm) standoff	
Member Diameter, in (mm)	
3-4 (75-100)	**41108A-1**
4-5 (100-125)	**41108A-2**
5-6 (125-150)	**41108A-3**

Description	Type No.
Other Accessories	
Flaring Tool Kit for connector attachment	**204919**
Splice	**190DZ**
Grounding Kit with factory attached, one-hole lug	**204989-2**
Grounding Kit with factory attached, two-hole lug	**241088-2**
Grounding Kit with field attachable crimp-on, one-hole lug	**204989-22**
Grounding Kit with field attachable crimp-on, two-hole lug	**241088-7**
Grounding Kit with field attachable screw-on lug	**204989-32**
Crimping Tool to field attach lug to Grounding Kit	**207270**
Hoisting Grip	**29958**
Bending Tool Kit. One each E and H Plane tool	**33586-1**
Connector Reattachment Kit	**33544-37**
Wall-Roof Feed Thru	**245314-90**
Waveguide Boot for Plates (below),	
4 in (102 mm) dia.	**WGB4-90**
5 in (127 mm) dia	**WGB5-90**

Feed-Thru Plate for Boots (above)

Openings	For 4 in Boots	For 5 in Boots
1	**204673-1**	**48940-1**
1	**204673-2**	–
2	–	**48940-2**
3	–	**48940-3**
4	**204673-4**	**48940-4**
6	–	**48940-6**
8	**204673-8**	–

* Standard conditions: 125 mph (200 km/h) survival wind velocity, 0.5 in (13 mm) radial ice. For other conditions see page 196.

Elliptical Waveguide

Types EWP127A and EW127A

Characteristics

Type Numbers	
Premium Waveguide, Standard Jacket	**EWP127A**
Standard Waveguide, Standard Jacket	**EW127A**
Premium Waveguide Type CATVP	**222040-4**
Standard Waveguide, Fire Retardant, Non-Halogenated Jacket	**35409-15***
Electrical	
Max. Frequency Range, GHz	10.0-13.25
$_eTE_{11}$ Mode Cutoff Frequency, GHz	7.67
Group Delay at 12.7 GHz, ns/100 ft (ns/100 m)	126 (414)
Peak Power Rating at 12.7 GHz, kW	34
Mechanical	
Minimum Bending Radii, without rebending, inches (mm)	
E Plane	5 (130)
H Plane	11 (280)
Minimum Bending Radii, with rebending, inches (mm)	
E Plane	6 (150)
H Plane	15 (380)
Maximum Twist, degrees/foot (m)	2 (6)
Dimensions over Jacket, in (mm)	1.11 x 0.67 (28.2 x 17.1)
Weight, pounds per foot (kg/m)	0.29 (0.43)

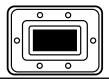
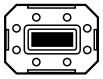
* UL® listed Type CATVR.

Attenuation, Average Power, Group Velocity

Frequency GHz	Attenuation dB/100 ft (dB/100 m)	Average Power Rating, kW	Group Velocity of Propagation,%
10.0	4.46 (14.60)	1.00	64.2
10.5	4.16 (13.60)	1.07	68.3
11.0	4.95 (13.00)	1.13	71.7
11.5	3.79 (12.40)	1.18	64.5
11.7	3.74 (12.28)	1.20	75.5
11.9	3.69 (12.12)	1.21	76.5
12.1	3.65 (11.98)	1.23	77.3
12.3	3.61 (11.86)	1.24	78.2
12.5	3.58 (11.74)	1.25	79.0
12.7	3.55 (11.64)	1.26	79.7
12.9	3.52 (11.54)	1.27	80.4
13.1	3.49 (11.45)	1.28	81.1
13.25	3.47 (11.38)	1.29	81.5

Attenuation values based on VSWR 1.0, ambient temperature 24°C (75°F) and are guaranteed within ±5%. Average power ratings based on VSWR 1.0 and 42°C (76°F) temperature rise over 40°C (104°F) ambient.

Connectors – Flange dimensions on pages 216-217

		L in (mm)	W in (mm)	A in (mm)	Weight lb (kg)
Type No.	**1127DC,1127DCT, 1127DCP, 1127DCM, 1127DCMT, 1127SC, 1127SCM**				
Figure 1		3.8 (97)	2.3 (58)	1.9 (48)	1.8 (0.8)
Type No. 1127DEM, 1127DEMT, 1127SEM					
Figure 1		3.8 (97)	2.3 (58)	1.9 (48)	1.8 (0.8)
Type No. 1127DK, 1127DKT					
Figure 2		5.0 (127)	2.3 (58)	3.1 (79)	1.8 (0.8)

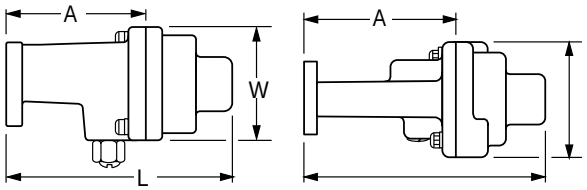


Figure 1 Figure 2

Connector Material: Brass

Ordering Information for Waveguide Assemblies

Frequency* GHz	Waveguide Type	Flange Type††	Connector† Tunable	Fixed-Tuned	Pressure Window	Flex-Twist 2 ft (0.6 m)
Super Premium Waveguide Assemblies						**VSWR 1.08 (28.3)****
11.7-12.2	**EWP127A-117**	WR75†††	**1127DCT**	**1127SC**	**55000A-75**	**F075PA0240BS**
		PBR120	**1127DCMT**	**1127SCM**	**110088**	**F075MK0600KS**
		PDR120	**1127DEMT**	**1127SEM**	**223306-120**	**F075MH0600HS**
		Pressurizable Contact Flange	**1127DKT**	–	***	***
12.2-12.7	**EWP127A-122**	WR75†††	**1127DCT**	**1127SC**	**55000A-75**	**F075PA0240BS**
		PBR120	**1127DCMT**	**1127SCM**	**110088**	**F075MK0600KS**
		PDR120	**1127DEMT**	–	**223306-120**	**F075MH0600HS**
12.7-13.25	**EWP127A-127**	WR75†††	**1127DCT**	**1127SC**	**55000A-75**	**F075PA0240BS**
		PBR120	**1127DCMT**	**1127SCM**	**110088**	**F075MK0600KS**
		PDR120	**1127DEMT**	**1127SEM**	**223306-120**	**F075MH0600HS**
Standard Waveguide Assemblies			**Non-Tunable**			**VSWR 1.15 (23.1)****
11.7-13.25	**EW127A**	WR75†††	**1127DC**	**1127SC**	**55000A-75**	**F075PA0240BS**
		PBR120	**1127DCM**	**1127SCM**	**110088**	**F075MK0600KS**
		PDR120	**1127DEM**	**1127SEM**	**223306-120**	**F075MH0600HS**
		Pressurizable Contact Flange	**1127DK**	–	***	***

* Contact Andrew for information on other frequency bands. ** VSWR max., (R.L., dB). Up to 300 ft (90 m). The indicated maximum VSWR characteristics are guaranteed for factory assemblies and are typical for field assemblies. *** Not Available

† "Tunable" connectors ordered with factory assemblies are factory tuned.

†† For detailed information on mating flanges, refer to pages 214-218. ††† Pressurizable cover flange.

Accessories – Photos and detailed descriptions on pages 194-200

Description	Type No.
Hangers and Adapters	
Hanger Kit of 10, Recommended maximum spacing for outdoor installation is 3 ft (0.91 m)*	**42396A-9**
NEW! Snap-In Hanger Kit of 10. Recommended spacing for outdoor installation is 3 ft (0.91 m)	**EWSH-127**
Hardware Kit of 10, 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Angle Adapter Kit of 10. Stainless steel	**31768A**
Angle Adapter Kit of 10. Galvanized	
3/8" Hardware	**242774**
Metric Hardware	**242774-M**
Round Member Adapter Kit of 10. Stainless steel Member Diameter, in (mm)	
1-2 (25-50)	**31670-1**
2-3 (50-75)	**31670-2**
3-4 (75-100)	**31670-3**
4-5 (100-125)	**31670-4**
5-6 (125-150)	**31670-5**
45° Adapter Kit of 10. Galvanized steel	**42334**
Threaded Rod Support, 3/8" rod, nuts, washers, ceiling bracket	
12 in (305 mm) long, kit of 1	**31771**
12 in (305 mm) long, kit of 5	**31771-4**
24 in (610 mm) long, kit of 1	**31771-9**
24 in (610 mm) long, kit of 5	**31771-6**
Tower Standoff Kit of 10. 1 in (25 mm) standoff Member Diameter, in (mm)	
0.75-1.5 (20-40)	**30848-5**
1.5-3.0 (40-75)	**30848-4**
3-4 (75-100)	**30848-1**
4-5 (100-125)	**30848-2**
5-6 (125-150)	**30848-3**
Tower Standoff Kit of 10. 2.5 in (60 mm) standoff Member Diameter, in (mm)	
3-4 (75-100)	**41108A-1**
4-5 (100-125)	**41108A-2**
5-6 (125-150)	**41108A-3**

Description	Type No.
Other Accessories	
Flaring Tool Kit for connector attachment	**204960**
Splice	**1127DZ**
Grounding Kit with factory attached, one-hole lug	**204989-2**
Grounding Kit with factory attached, two-hole lug	**241088-2**
Grounding Kit with field attachable crimp-on, one-hole lug	**204989-22**
Grounding Kit with field attachable crimp-on, two-hole lug	**241088-7**
Grounding Kit with field attachable screw-on lug	**204989-32**
Crimping Tool to field attach lug to Grounding Kit	**207270**
Hoisting Grip	**29958**
Bending Tool Kit. One each E and H Plane tool	**33586-1**
Connector Reattachment Kit	**33544-41**
Wall-Roof Feed Thru	**245314-127A**
Waveguide Boot for Plates (below),	
4 in (102 mm) dia.	**WGB4-127**
5 in (127 mm) dia	**WGB5-127**

Feed-Thru Plate for Boots (above)

Openings	For 4 in Boots	For 5 in Boots
1	**204673-1**	**48940-1**
1	**204673-2**	–
2	–	**48940-2**
3	–	**48940-3**
4	**204673-4**	**48940-4**
6	–	**48940-6**
8	**204673-8**	–

* Standard conditions: 125 mph (200 km/h) survival wind velocity, 0.5 in (13 mm) radial ice. For other conditions see page 196.

Elliptical Waveguide

Types EWP132 and EW132

Characteristics

Type Numbers	
Premium Waveguide, Standard Jacket	**EWP132**
Standard Waveguide, Standard Jacket	**EW132**
Premium Waveguide Type CATVP	**222040-7**
Standard Waveguide, Fire Retardant, Non-Halogenated Jacket	**35409-14***
Electrical	
Max. Frequency Range, GHz	11.0-15.35
$_{e}TE_{11}$ Mode Cutoff Frequency, GHz	9.22
Group Delay at 14.7 GHz, ns/100 ft (ns/100 m)	130 (425)
Peak Power Rating at 14.7 GHz, kW	
with 1132 series connectors	22.8
with 2132 series connectors	36.6
Mechanical	
Minimum Bending Radii, without rebending, inches (mm)	
E Plane	5 (130)
H Plane	14 (360)
Minimum Bending Radii, with rebending, inches (mm)	
E Plane	5 (130)
H Plane	14 (360)
Maximum Twist, degrees/foot (m)	2 (6)
Dimensions over Jacket, in (mm)	0.95 x 0.59 (24.1 x 15.0)
Weight, pounds per foot (kg/m)	0.22 (0.33)

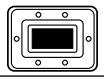
* UL® listed Type CATVR.

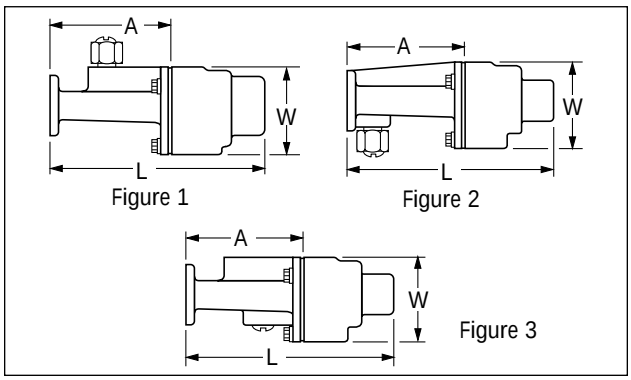
Attenuation, Average Power, Group Velocity

Frequency GHz	Attenuation dB/100 ft (dB/100 m)	Average Power Rating, kW	Group Velocity of Propagation,%
11.0	7.06 (23.20)	0.58	54.4
11.5	6.35 (20.80)	0.65	59.8
12.0	5.89 (19.30)	0.70	64.0
12.5	5.56 (18.30)	0.74	70.5
13.0	5.32 (17.40)	0.73	70.5
13.5	5.13 (16.80)	0.80	73.0
14.0	4.98 (16.34)	0.83	75.9
14.2	4.93 (16.17)	0.83	76.6
14.4	4.88 (16.02)	0.84	77.4
14.6	4.84 (15.87)	0.85	78.1
14.8	4.80 (15.74)	0.86	78.8
15.0	4.76 (15.62)	0.87	79.4
15.2	4.72 (15.50)	0.87	80.0
15.35	4.70 (15.42)	0.88	80.4

Attenuation values based on VSWR 1.0, ambient temperature 24°C (75°F) and are guaranteed within ±5%. Average power ratings based on VSWR 1.0 and 42°C (76°F) temperature rise over 40°C (104°F) ambient.

Connectors – Flange dimensions on pages 216-217

		L in (mm)	W in (mm)	A in (mm)	Weight lb (kg)
Type No. 1132DC,1132DCT, 1132DCMT					
Figure 1		4.5 (114)	2.1 (53)	2.5 (64)	2.0 (0.9)
Type No. 1132DEM, 1132DEMT					
Figure 1		4.4 (112)	2.1 (53)	2.5 (64)	1.5 (0.7)
Type No. 1132SC, 1132SCM					
Figure 1		3.67 (93.2)	1.89 (48)	1.89 (48)	1.5 (0.67)
Type No. 2132DC, 2132DCT, 2132DCMT					
Figure 2		4.1 (104)	2.0 (51)	2.2 (56)	1.5 (0.7)
Type No. 2132DEMT					
Figure 3		4.1 (104)	2.1 (53)	2.2 (56)	1.5 (0.7)
Type No. 2132DK, 2132DKT					
Figure 1		4.6 (117)	2.1 (53)	2.7 (69)	1.6 (0.7)



Connector Material: Brass

Ordering Information for Waveguide Assemblies

Frequency* GHz	Waveguide Type	Flange Type††	Connector† Tunable	Connector† Fixed-Tuned	Pressure Window	Flex-Twist 2 ft (0.6 m)
Premium Waveguide Assemblies						**VSWR 1.08 (28.3)****
14.0-14.5	**EWP132-140**	WR75†††	**2132DCT**	–	**55000A-75**	**F075PA0240BS**
		PBR120	**2132DCMT**	–	**110088**	**F075MK0600KS**
		PBR140	**1132DCMT**	**1132SCM**	**110089**	**F062MK0600KS**
		PDR120	**2132DEMT**	–	**223306-120**	**F075MH0600HS**
		PDR140	**1132DEMT**	–	**223306-140**	**F062MH0600HS**
		Pressurizable Contact Flange UG-541/U††††	**2132DKT**	–	***	***
				1132SC		
14.4-15.35	**EWP132-144**	UG-541/U††††	**1132DCT**	**1132SC**	**55000-62**	**F062PA0240BS**
		PBR140	**1132DCMT**	**1132SCM**	**110089**	**F062MK0600KS**
		PDR140	**1132DEMT**	–	**223306-140**	**F062MH0600HS**
Standard Waveguide Assemblies			**Non-Tunable**			**VSWR 1.15 (23.1)****
14.0-14.5	**EW132-140**	WR75†††	**2132DC**	–	**55000A-75**	**F075PA0240BS**
		PBR140	**1132DCM**	**1132SCM**	**110089**	**F062MK0600KS**
		PDR140	**1132DEM**	–	**223306-140**	**F062MH0600HS**
		PBR120	**2132DCM**	–	**110088**	**F075MK0600KS**
		PDR120	**2132DEM**	–	**223306-120**	**F075MH0600HS**
		Pressurizable Contact Flange UG-541/U††††	**2132DK**	–	***	***
				1132SC		
14.4-15.35	**EW132-144**	UG-541/U††††	**1132DC**	**1132SC**	**55000-62**	**F062PA0240BS**
		PBR140	**1132DCM**	**1132SCM**	**110089**	**F062MK0600KS**
		PDR140	**1132DEM**	–	**223306-140**	**F062MH0600HS**

* Contact Andrew for information on other frequency bands. **VSWR max., (R.L., dB). Up to 300 ft (90 m). The indicated maximum VSWR characteristics are guaranteed for factory assemblies and are typical for field assemblies. *** Not Available † "Tunable" connectors ordered with factory assemblies are factory

Accessories – Photos and detailed descriptions on pages 194-200

Description	Type No.
Hangers and Adapters	
Hanger Kit of 10, Recommended maximum spacing for outdoor installation is 3 ft (0.91 m)*	**42396A-9**
NEW! Snap-In Hanger Kit of 10. Recommended spacing for outdoor installation is 3 ft (0.91 m)	**EWSH-132**
Hardware Kit of 10, 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Angle Adapter Kit of 10. Stainless steel	**31768A**
Angle Adapter Kit of 10. Galvanized	
3/8" Hardware	**242774**
Metric Hardware	**242774-M**
Round Member Adapter Kit of 10. Stainless steel Member Diameter, in (mm)	
1-2 (25-50)	**31670-1**
2-3 (50-75)	**31670-2**
3-4 (75-100)	**31670-3**
4-5 (100-125)	**31670-4**
5-6 (125-150)	**31670-5**
45° Adapter Kit of 10. Galvanized steel	**42334**
Threaded Rod Support, 3/8" rod, nuts, washers, ceiling bracket	
12 in (305 mm) long, kit of 1	**31771**
12 in (305 mm) long, kit of 5	**31771-4**
24 in (610 mm) long, kit of 1	**31771-9**
24 in (610 mm) long, kit of 5	**31771-6**
Tower Standoff Kit of 10. 1 in (25 mm) standoff Member Diameter, in (mm)	
0.75-1.5 (20-40)	**30848-5**
1.5-3.0 (40-75)	**30848-4**
3-4 (75-100)	**30848-1**
4-5 (100-125)	**30848-2**
5-6 (125-150)	**30848-3**

* Standard conditions: 125 mph (200 km/h) survival wind velocity, 0.5 in (13 mm) radial ice. For other conditions see page 196.

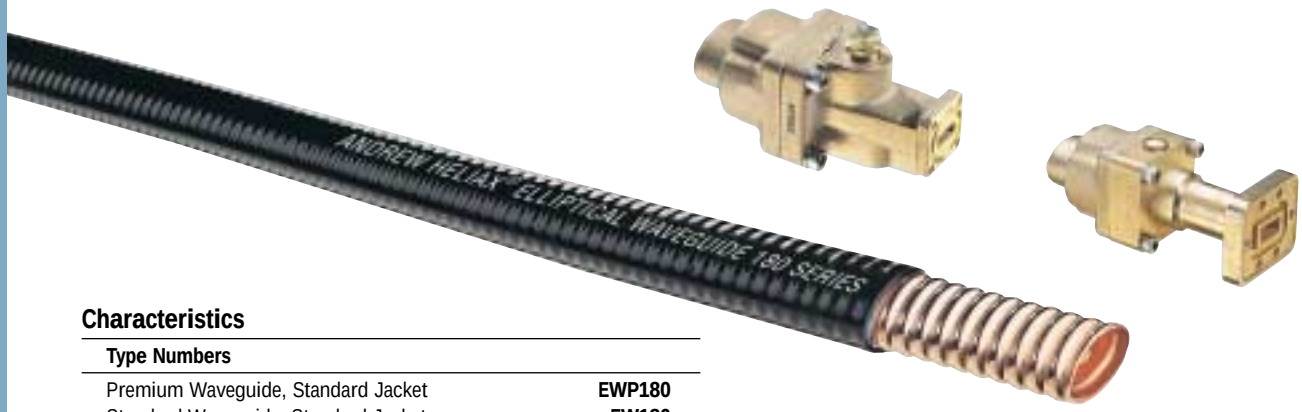
Description	Type No.
Tower Standoff Kit of 10. 2.5 in (60 mm) standoff Member Diameter, in (mm)	
3-4 (75-100)	**41108A-1**
4-5 (100-125)	**41108A-2**
5-6 (125-150)	**41108A-3**
Other Accessories	
Flaring Tool Kit for connector attachment	**203809**
Splice	**1132DZ**
Grounding Kit with factory attached, one-hole lug	**204989-2**
Grounding Kit with factory attached, two-hole lug	**241088-2**
Grounding Kit with field attachable crimp-on, one-hole lug	**204989-22**
Grounding Kit with field attachable crimp-on, two-hole lug	**241088-7**
Grounding Kit with field attachable screw-on lug	**204989-32**
Crimping Tool to field attach lug to Grounding Kit	**207270**
Hoisting Grip	**29958**
Bending Tool Kit. One each E and H Plane tool	**33586-1**
Connector Reattachment Kit	**33544-39**
Wall-Roof Feed Thru	**245314-132**
Waveguide Boot for Plates (below),	
4 in (102 mm) dia.	**WGB4-132**
5 in (127 mm) dia	**WGB5-132**

Feed-Thru Plate for Boots (above)

Openings	For 4 in Boots	For 5 in Boots
1	**204673-1**	**48940-1**
1	**204673-2**	–
2	–	**48940-2**
3	–	**48940-3**
4	**204673-4**	**48940-4**
6	–	**48940-6**
8	**204673-8**	–

Elliptical Waveguide

Types EWP180 and EW180



Characteristics

Type Numbers	
Premium Waveguide, Standard Jacket	**EWP180**
Standard Waveguide, Standard Jacket	**EW180**
Standard Waveguide, Fire Retardant, Non-Halogenated Jacket	**35409-21**
Premium Waveguide Type CATVP	**222040-5**
Electrical	
Max. Frequency Range, GHz*	14.0-19.7
$_eTE_{11}$ Mode Cutoff Frequency, GHz	11.15
Group Delay at 18.7 GHz, ns/100 ft (ns/100 m)	127 (416)
Peak Power Rating at 18.7 GHz, kW	7.3
Mechanical	
Minimum Bending Radii, without rebending, inches (mm)	
E Plane	6 (150)
H Plane	15 (380)
Minimum Bending Radii, with rebending, inches (mm)	
E Plane	6 (150)
H Plane	11 (280)
Maximum Twist, degrees/foot (m)	2 (6)
Dimensions over Jacket, in (mm)	0.78 x 0.48 (19.8 x 12.2)
Weight, pounds per foot (kg/m)	0.15 (0.22)

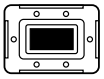
* Actual usable range is limited by the connecting rectangular waveguide.

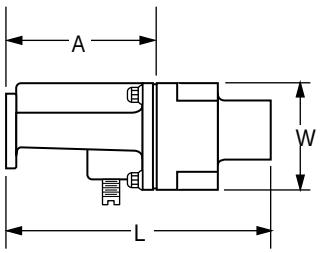
Attenuation, Average Power, Group Velocity

Frequency GHz	Attenuation dB/100 ft (dB/100 m)	Average Power Rating, kW	Group Velocity of Propagation,%
14	8.42 (27.63)	0.39	60.5
14.5	7.79 (25.57)	0.42	63.9
15	7.34 (24.07)	0.45	66.9
15.5	6.99 (22.95)	0.47	89.5
16	6.72 (22.06)	0.49	71.7
16.5	6.51 (21.35)	0.51	73.7
17	6.33 (20.77)	0.52	75.5
17.5	6.18(20.28)	0.53	77.1
17.7	6.13 (20.11)	0.54	77.7
17.9	6.08 (19.95)	0.54	78.2
18.1	6.03 (19.80)	0.55	78.8
18.3	5.99 (19.66)	0.55	79.3
18.5	5.95 (19.52)	0.55	79.8
18.7	5.91 (19.40)	0.56	80.3
18.9	5.88 (19.28)	0.56	80.7
19.1	5.84 (19.17)	0.56	81.2
19.3	5.81 (19.06)	0.57	81.6
19.5	5.78 (18.96)	0.57	82.0
19.7	5.75 (18.86)	0.57	82.4

Attenuation values based on VSWR 1.0, ambient temperature 24°C (75°F) and are guaranteed within ±5%. Average power ratings based on VSWR 1.0 and 42°C (76°F) temperature rise over 40°C (104°F) ambient.

Connectors – Flange dimensions on pages 216-217

	L in (mm)	W in (mm)	A in (mm)	Weight lb (kg)
Type No. 1180DCT, 1180DCP, 1180DCMT, 1180DCMP, 1180SC, 1180SCM				
	3.4 (86)	1.5 (38)	1.9 (48)	0.9 (0.4)
Type No. 2180SEM				
	4.0 (102)	1.5 (38)	1.9 (48)	0.9 (0.4)



Connector Material: Brass

Ordering Information for Waveguide Assemblies

Frequency* GHz	Waveguide Type	Flange Type††	Connector† Tunable	Connector† Fixed-Tuned	Pressure Window	Flex-Twist 2 ft (0.6 m)
Premium Waveguide Assemblies						**VSWR 1.08 (28.3)****
17.7-19.7	**EWP180-180**	UG-595/U†††	**1180DCT**	**1180SC**	**55000A-42**	**F042PA0240BS**
		PBR220	**1180DCMT**	**118SCM**	**112587**	**F042MK0600KS**
		PDR180	–	**2180SEM**	**223306-180**	**F051MH0600HS**
Standard Waveguide Assemblies						**VSWR 1.15 (23.1)****
17.7-19.7	**EW180**	UG-595/U†††	**1180DCT**	**1180SC**	**55000A-42**	**F042PA0240BS**
		PBR220	**1180DCMT**	**1180SCM**	**112587**	**F042MK0600KS**
		PDR180	–	**2180SEM**	**223306-180**	**F051MH0600HS**

* Contact Andrew for information on other frequency bands.

** VSWR max., (R.L., dB). Up to 300 ft (90 m). The indicated maximum VSWR characteristics are guaranteed for factory assemblies and are typical for field assemblies.

† "Tunable" connectors ordered with factory assemblies are factory tuned.

†† For detailed information on mating flanges, refer to pages 214-218.

††† Modified cover flange with gasket groove. Mates with UG choke or cover flanges.

Accessories – Photos and detailed descriptions on pages 194-200

Description	Type No.
Hangers and Adapters	
Hanger Kit of 10, Recommended maximum spacing for outdoor installation is 3 ft (0.91 m)*	**43211A**
NEW! Snap-In Hanger Kit of 10. Recommended spacing for outdoor installation is 3 ft (0.91 m)	**EWSH-180**
Hardware Kit of 10, 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Angle Adapter Kit of 10. Stainless steel	**31768A**
Angle Adapter Kit of 10. Galvanized	
3/8" Hardware	**242774**
Metric Hardware	**242774-M**
Round Member Adapter Kit of 10. Stainless steel	
Member Diameter, in (mm)	
1-2 (25-50)	**31670-1**
2-3 (50-75)	**31670-2**
3-4 (75-100)	**31670-3**
4-5 (100-125)	**31670-4**
5-6 (125-150)	**31670-5**
45° Adapter Kit of 10. Galvanized steel	**42334**
Threaded Rod Support, 3/8" rod, nuts, washers, ceiling bracket	
12 in (305 mm) long, kit of 1	**31771**
12 in (305 mm) long, kit of 5	**31771-4**
24 in (610 mm) long, kit of 1	**31771-9**
24 in (610 mm) long, kit of 5	**31771-6**
Tower Standoff Kit of 10. 1 in (25 mm) standoff	
Member Diameter, in (mm)	
0.75-1.5 (20-40)	**30848-5**
1.5-3.0 (40-75)	**30848-4**
3-4 (75-100)	**30848-1**
4-5 (100-125)	**30848-2**
5-6 (125-150)	**30848-3**
Tower Standoff Kit of 10. 2.5 in (60 mm) standoff	
Member Diameter, in (mm)	
3-4 (75-100)	**41108A-1**
4-5 (100-125)	**41108A-2**
5-6 (125-150)	**41108A-3**

Description	Type No.
Other Accessories	
Flaring Tool Kit for connector attachment	**201439**
Splice	**1180DZ**
Grounding Kit with factory attached, one-hole lug	**204989-1**
Grounding Kit with factory attached, two-hole lug	**241088-1**
Grounding Kit with field attachable crimp-on, one-hole lug	**204989-21**
Grounding Kit with field attachable crimp-on, two-hole lug	**241088-6**
Grounding Kit with field attachable screw-on lug	**204989-31**
Crimping Tool to field attach lug to Grounding Kit	**207270**
Hoisting Grip	**43094**
Bending Tool Kit. One each E and H Plane tool	**33586-1**
Connector Reattachment Kit	**33544-42**
Wall-Roof Feed Thru	**245314-180**
Waveguide Boot for Plates (below),	
4 in (102 mm) dia.	**WGB4-180**
5 in (127 mm) dia	**WGB5-180**

Feed-Thru Plate for Boots (above)

Openings	For 4 in Boots	For 5 in Boots
1	**204673-1**	**48940-1**
1	**204673-2**	–
2	–	**48940-2**
3	–	**48940-3**
4	**204673-4**	**48940-4**
6	–	**48940-6**
8	**204673-8**	–

* Standard conditions: 125 mph (200 km/h) survival wind velocity, 0.5 in (13 mm) radial ice. For other conditions see page 196.

Elliptical Waveguide

Type EW220

Characteristics

Type Numbers	
Standard Waveguide	**EW220**
Standard Waveguide Type CATVP	**222040-8**
Electrical	
Max. Frequency Range, GHz*	17.0-23.6
$_eTE_{11}$ Mode Cutoff Frequency, GHz	13.34
Group Delay at 22.4 GHz, ns/100 ft (ns/100 m)	127 (415)
Peak Power Rating at 22.4 GHz, kW	8.6
Mechanical	
Minimum Bending Radii, without rebending, inches (mm)	
E Plane	4 (120)
H Plane	9 (230)
Minimum Bending Radii, with rebending, inches (mm)	
E Plane	4 (120)
H Plane	9 (230)
Maximum Twist, degrees/foot (m)	2 (6)
Dimensions over Jacket, in (mm)	0.67 x 0.41 (17.0 x 10.4)
Weight, pounds per foot (kg/m)	0.12 (0.18)

* Actual usable range is limited by the connecting rectangular waveguide.

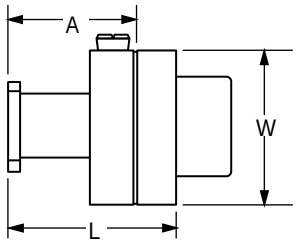
Attenuation, Average Power, Group Velocity

Frequency GHz	Attenuation dB/100 ft (dB/100 m)	Average Power Rating, kW	Group Velocity of Propagation,%
21	8.86 (29.08)	0.38	77.2
21.2	8.82 (28.93)	0.39	77.7
21.4	8.78 (28.80)	0.39	78.2
21.6	8.74 (28.67)	0.39	78.6
21.8	8.70 (28.54)	0.39	79.1
22.0	8.66 (28.43)	0.39	79.5
22.2	8.63 (28.32)	0.39	79.9
22.4	8.60 (28.22)	0.40	80.3
22.6	8.57 (28.13)	0.40	80.7
22.8	8.55 (28.03)	0.40	81.1
23.0	8.52 (27.95)	0.40	81.5
23.2	8.50 (27.87)	0.40	81.8
23.4	8.47 (27.80)	0.40	82.2
23.6	8.45 (27.73)	0.40	82.5

Attenuation values based on VSWR 1.0, ambient temperature 24°C (75°F) and are guaranteed within ±5%. Average power ratings based on VSWR 1.0 and 42°C (76°F) temperature rise over 40°C (104°F) ambient.

Connectors – Flange dimensions on pages 216-217

	L in (mm)	W in (mm)	A in (mm)	Weight lb (kg)
Type No. 1220ASC, 1220ASCM				
	2.4 (61)	1.57 (40)	1.3 (33)	0.7 (0.3)



Connector Material: Brass

How To Order:

A sample order is shown on page 473.

Specify complete waveguide Type Number, including frequency band code, where listed, and length in feet or meters. See “Waveguide Assemblies” table.

Specify connector Type Numbers and “attached” or “unattached”. See “Waveguide Assemblies” table. When attached connectors on an assembly are different, specify which is “first off” the reel.

Further Information:

For general information on HELIAX® elliptical waveguide, see pages 156-159.

Ordering Information for Waveguide Assemblies

Frequency* GHz	Waveguide Type	Flange Type††	Connector Fixed-Tuned	Pressure Window	Flex-Twist 2 ft (0.6 m)
Premium Waveguide Assemblies					**VSWR 1.15 (23.1)****
21.2-23.6	**EW220**	UG-595/U†††	**1220ASC**	**55000A-42**	**F042PA0240BS**
		PBR220	**1220ASCM**	**112587**	**F042MK0600KS**

* Contact Andrew for information on other frequency bands.
** VSWR max., (R.L., dB). Up to 300 ft (90 m). The indicated maximum VSWR characteristics are guaranteed for factory assemblies and are typical for field assemblies.
†† For detailed information on mating flanges, refer to pages 214-218.
††† Modified cover flange with gasket groove. Mates with UG choke or cover flanges.

Accessories – Photos and detailed descriptions on pages 194-200

Description	Type No.
Hangers and Adapters	
Hanger Kit of 10, Recommended maximum spacing for outdoor installation is 3 ft (0.91 m)*	**43211A**
NEW! Snap-In Hanger Kit of 10. Recommended spacing for outdoor installation is 3 ft (0.91 m)	**EWSH-220**
Hardware Kit of 10, 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Angle Adapter Kit of 10. Stainless steel	**31768A**
Angle Adapter Kit of 10. Galvanized	
3/8" Hardware	**242774**
Metric Hardware	**242774-M**
Round Member Adapter Kit of 10. Stainless steel Member Diameter, in (mm)	
1-2 (25-50)	**31670-1**
2-3 (50-75)	**31670-2**
3-4 (75-100)	**31670-3**
4-5 (100-125)	**31670-4**
5-6 (125-150)	**31670-5**
45° Adapter Kit of 10. Galvanized steel	**42334**
Threaded Rod Support, 3/8" rod, nuts, washers, ceiling bracket	
12 in (305 mm) long, kit of 1	**31771**
12 in (305 mm) long, kit of 5	**31771-4**
24 in (610 mm) long, kit of 1	**31771-9**
24 in (610 mm) long, kit of 5	**31771-6**
Tower Standoff Kit of 10. 1 in (25 mm) standoff Member Diameter, in (mm)	
0.75-1.5 (20-40)	**30848-5**
1.5-3.0 (40-75)	**30848-4**
3-4 (75-100)	**30848-1**
4-5 (100-125)	**30848-2**
5-6 (125-150)	**30848-3**
Tower Standoff Kit of 10. 2.5 in (60 mm) standoff Member Diameter, in (mm)	
3-4 (75-100)	**41108A-1**
4-5 (100-125)	**41108A-2**
5-6 (125-150)	**41108A-3**

* Standard conditions: 125 mph (200 km/h) survival wind velocity, 0.5 in (13 mm) radial ice. For other conditions see page 196.

Description	Type No.
Other Accessories	
Flaring Tool Kit for connector attachment	**205127**
Splice	**1220DZ**
Grounding Kit with factory attached, one-hole lug	**204989-1**
Grounding Kit with factory attached, two-hole lug	**241088-1**
Grounding Kit with field attachable crimp-on, one-hole lug	**204989-21**
Grounding Kit with field attachable crimp-on, two-hole lug	**241088-6**
Grounding Kit with field attachable screw-on lug	**204989-31**
Crimping Tool to field attach lug to Grounding Kit	**207270**
Hoisting Grip	**43094**
Bending Tool Kit. One each E and H Plane tool	**33586-1**
Connector Reattachment Kit	**33544-44A**
Wall-Roof Feed Thru	**245314-220**
Waveguide Boot for Plates (below),	
4 in (102 mm) dia.	**WGB4-220**
5 in (127 mm) dia	**WGB5-220**

Feed-Thru Plate for Boots (above)

Openings	For 4 in Boots	For 5 in Boots
1	**204673-1**	**48940-1**
1	**204673-2**	–
2	–	**48940-2**
3	–	**48940-3**
4	**204673-4**	**48940-4**
6	–	**48940-6**
8	**204673-8**	–

Elliptical Waveguide

Type EW240

Characteristics

Type Numbers	
Standard Waveguide	**EW240**
Electrical	
Max. Frequency Range, GHz*	18.0-26.5
$_{e}TE_{11}$ Mode Cutoff Frequency, GHz	15.2
Group Delay at 22.4 GHz, ns/100 ft (ns/100 m)	127 (417)
Peak Power Rating at 22.4 GHz, kW	8.6
Mechanical	
Minimum Bending Radii, without rebending, inches (mm)	
E Plane	4 (120)
H Plane	9 (230)
Minimum Bending Radii, with rebending, inches (mm)	
E Plane	4 (120)
H Plane	9 (230)
Maximum Twist, degrees/foot (m)	2 (6)
Dimensions over Jacket, in (mm)	0.60 x 0.38 (15.2 x 9.65)
Weight, pounds per foot (kg/m)	0.11 (0.16)

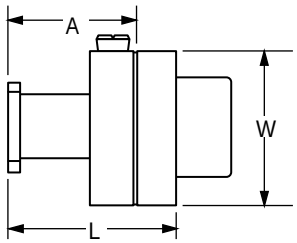
Attenuation, Average Power, Group Velocity

Frequency GHz	Attenuation dB/100 ft (dB/100 m)	Average Power Rating, kW	Group Velocity of Propagation,%
22.000	11.456 (37.586)	0.281	72.3
22.500	11.186 (36.699)	0.287	73.8
23.000	10.952 (35.932)	0.294	75.1
23.500	10.748 (35.264)	0.299	76.3
24.000	10.570 (34.677)	0.304	77.4
24.200	10.504 (34.462)	0.306	77.8
24.250	10.488 (34.410)	0.307	78.0
24.400	10.441 (34.257)	0.308	78.3
24.600	10.382 (34.061)	0.310	78.7
24.800	10.325 (33.874)	0.311	79.0
25.000	10.271 (33.696)	0.313	79.4
25.200	10.219 (33.525)	0.315	79.8
25.250	10.206 (33.484)	0.315	79.9
25.500	10.145 (33.283)	0.317	80.3
26.000	10.032 (32.912)	0.320	81.2
26.500	9.930 (32.578)	0.324	81.9

Attenuation values based on VSWR 1.0, ambient temperature 24°C (75°F) and are guaranteed within ±5%. Average power ratings based on VSWR 1.0 and 42°C (76°F) temperature rise over 40°C (104°F) ambient.

Connectors – Flange dimensions on pages 216-217

	L in (mm)	W in (mm)	A in (mm)	Weight lb (kg)
Type No. 1240SCM				
	2.4 (61)	1.57 (40)	1.3 (33)	0.7 (0.3)



Connector Material: Brass

How To Order:

A sample order is shown on page 473.

Specify complete waveguide Type Number, including frequency band code, where listed, and length in feet or meters. See “Waveguide Assemblies” table.

Specify connector Type Numbers and “attached” or “unattached”. See “Waveguide Assemblies” table. When attached connectors on an assembly are different, specify which is “first off” the reel.

Further Information:

For general information on HELIAX® elliptical waveguide, see pages 156-159.

Ordering Information for Waveguide Assemblies

Frequency* GHz	Waveguide Type	Flange Type††	Connector Fixed-Tuned	Pressure Window	Flex-Twist 2 ft (0.6 m)
Premium Waveguide Assemblies					**VSWR 1.15 (23.1)****
24.0-26.5	**EW240**	PBR220	**1240SCM**	**112587**	**F042MK0600KS**

* Contact Andrew for information on other frequency bands.
** VSWR max., (R.L., dB). Up to 300 ft (90 m). The indicated maximum VSWR characteristics are guaranteed for factory assemblies and are typical for field assemblies.
†† For detailed information on mating flanges, refer to pages 214-218.

Accessories – Photos and detailed descriptions on pages 194-200

Description	Type No.
Hangers and Adapters	
Hanger Kit of 10, Recommended maximum spacing for outdoor installation is 3 ft (0.91 m)*	**43211A**
NEW! Snap-In Hanger Kit of 10. Recommended spacing for outdoor installation is 3 ft (0.91 m)	**EWSH-240**
Hardware Kit of 10, 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Angle Adapter Kit of 10. Stainless steel	**31768A**
Angle Adapter Kit of 10. Galvanized	
3/8" Hardware	**242774**
Metric Hardware	**242774-M**
Round Member Adapter Kit of 10. Stainless steel	
Member Diameter, in (mm)	
1-2 (25-50)	**31670-1**
2-3 (50-75)	**31670-2**
3-4 (75-100)	**31670-3**
4-5 (100-125)	**31670-4**
5-6 (125-150)	**31670-5**
45° Adapter Kit of 10. Galvanized steel	**42334**
Threaded Rod Support, 3/8" rod, nuts, washers, ceiling bracket	
12 in (305 mm) long, kit of 1	**31771**
12 in (305 mm) long, kit of 5	**31771-4**
24 in (610 mm) long, kit of 1	**31771-9**
24 in (610 mm) long, kit of 5	**31771-6**
Tower Standoff Kit of 10. 1 in (25 mm) standoff	
Member Diameter, in (mm)	
0.75-1.5 (20-40)	**30848-5**
1.5-3.0 (40-75)	**30848-4**
3-4 (75-100)	**30848-1**
4-5 (100-125)	**30848-2**
5-6 (125-150)	**30848-3**
Tower Standoff Kit of 10. 2.5 in (60 mm) standoff	
Member Diameter, in (mm)	
3-4 (75-100)	**41108A-1**
4-5 (100-125)	**41108A-2**
5-6 (125-150)	**41108A-3**

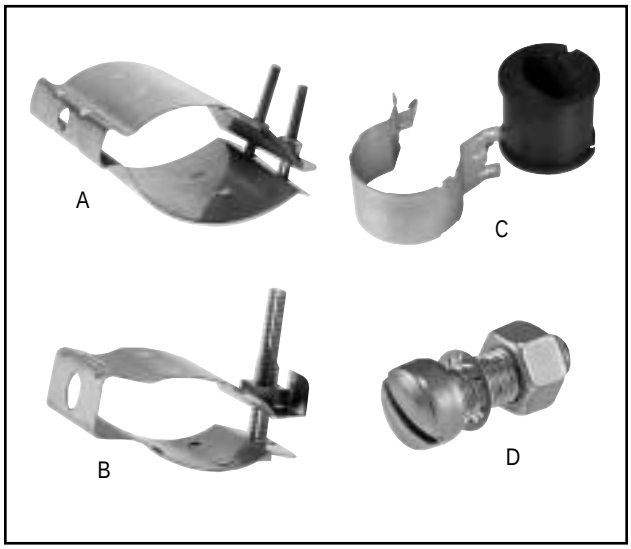
* Standard conditions: 125 mph (200 km/h) survival wind velocity, 0.5 in (13 mm) radial ice. For other conditions see page 196.

Description	Type No.
Other Accessories	
Flaring Tool Kit for connector attachment	**205127**
Splice	**1240DZ**
Grounding Kit with factory attached, one-hole lug	**223158**
Hoisting Grip	**43094**
Bending Tool Kit. One each E and H Plane tool	**33586-1**
Connector Reattachment Kit	**33544-47**
Wall-Roof Feed Thru	**245314-240**
Waveguide Boot for Plates (below),	
4 in (102 mm) dia.	**WGB4-240**
5 in (127 mm) dia	**WGB5-240**

Feed-Thru Plate for Boots (above)

Openings	For 4 in Boots	For 5 in Boots
1	**204673-1**	**48940-1**
1	**204673-2**	–
2	–	**48940-2**
3	–	**48940-3**
4	**204673-4**	**48940-4**
6	–	**48940-6**
8	**204673-8**	–

Elliptical Waveguide Hangers



Heavy-Gauge Stainless Steel Construction

High strength and excellent corrosion resistance for long-term reliability.

HELIAX® hangers are designed for easy installation. The clamp locking bolt and nut are preassembled and captivated to minimize installation labor. Proper tension is easy to determine. The hanger is simply tightened until there is a gap of approximately 5/16" (8 mm) between the clamp legs. The pre-drilled hole for 3/8" or 1/2" mounting hardware and slots for round member adapter clamps further simplify installation. Many accessories are available to adapt these hangers to most tower configurations.

42396A Series

Gripping Tabs

Prevent waveguide slippage without the need for a hoisting grip.

Pre-Assembled and Captivated Hardware

Eliminates the need for field assembly.

Springlike Flexibility

Makes it easy to form the hanger around the waveguide and dampens vibration for long life.

A, B Waveguide Hanger Kit of 10 stainless steel hangers. Mount with 3/8" hardware or adapters.

For Waveguide Type Numbers	Waveguide Hanger Kit	Photo Ref.	Recommended Maximum Hanger Spacing* ft (m)
EW17, EWP17	**31766A-9**	**A**	6 (1.83)
EW20	**31766A-10**	**A**	5.5 (1.68)
EW28	**31766A-11**	**A**	5 (1.52)
EW34, EWP34	**42396A-15**	**B**	4.5 (1.37)
EW37, EWP37, EWP37S	**42396A-4**	**B**	4.5(1.37)
EW43, EWP43	**42396A-16**	**B**	4 (1.22)
EW52, EWP52, EWP52S	**42396A-8**	**B**	3.5 (1.07)
EW63, EWP63, EWP63S	**42396A-7**	**B**	3 (0.91)
EW64, EWP64	**42396A-1**	**B**	3 (0.91)
EW77, EWP77	**42396A-11**	**B**	3 (0.91)
EW85	**42396A-5**	**B**	3 (0.91)
EW90, EWP90, EWP90S	**42396A-5**	**B**	3 (0.91)
EW127A, EWP127A	**42396A-9**	**B**	3 (0.91)
EW132, EWP132	**42396A-9**	**B**	3 (0.91)
EW180, EWP180	**43211A**	**B**	3 (0.91)
EW220	**43211A**	**B**	3 (0.91)
EW240	**43211A**	**B**	3 (0.91)

C Snap-In Hanger Kit of 10

For Waveguide Type Numbers	Waveguide Hanger Kit	Photo Ref.	Recommended Maximum Hanger Spacing* ft (m)
EW52	**EWSH-52**	**C**	3.5 (1.07)
EW63	**EWSH-63**	**C**	3 (0.91)
EW64	**EWSH-64**	**C**	3 (0.91)
EW77	**EWSH-77**	**C**	3 (0.91)
EW90	**EWSH-90**	**C**	3 (0.91)
EW127A	**EWSH-127A**	**C**	3 (0.91)
EW132	**EWSH-132**	**C**	3 (0.91)
EW180	**EWSH-180**	**C**	3 (0.91)
EW220	**EWSH-220**	**C**	3 (0.91)
EW249	**EWSH-240**	**C**	3 (0.91)

* Standard conditions: 125 mph (200 km/h) survival wind velocity, 0.5 in (13 mm) radial ice. For other conditions see page 196.

D Hardware Kit of 10 stainless steel fillister-head bolts, 3/8 inch lockwashers, and nuts for attachment of hangers to drilled tower members.

3/4 in (19 mm) long .....Type **31769-5**
1 in (25 mm) long .....Type **31769-1**

E **Angle Adapter Kit** of 10 stainless steel clamps to mount waveguide hangers to angle members up to 7/8" (22 mm) thick .....Type **31768A**

Angle Adapter, Galvanized, kit of 10. For mounting cable 1/2" to 2-1/4" cable hangers to angle tower members up to 3/4" (19mm) thick. Includes hanger attachment hardware.
3/8" Hardware .....Type **242774**
Metric Hardware .....Type **242774-M**

F **Round Member Adapter Kit** of 10 stainless steel clamps to mount hangers to round support members. Two kits are required for use with each EW17 and EW20 hanger kit. One kit is required for all other sizes.

Member Diameter, in (mm)	Type Number
1 - 2 (25 - 50)	**31670-1**
2 - 3 (50 - 75)	**31670-2**
3 - 4 (75 - 100)	**31670-3**
4 - 5 (100 - 125)	**31670-4**
5 - 6 (125 - 150)	**31670-5**

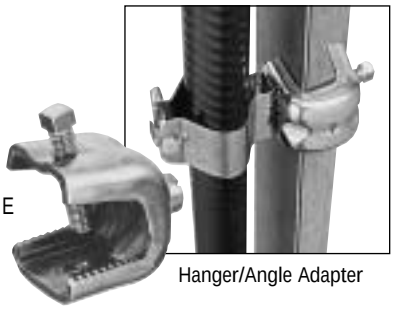
G **45° Adapter Kit** of 10. Use with angle adapter and threaded rod support kit to place a hanger at a waveguide bend. Galvanized steel .....Type **42334**

H **Threaded Rod Support Kit**. Stainless steel. Use to mount hangers away from supporting structure, under waveguide bridge, inside equipment room and to restrain waveguide bends. Includes 3/8 inch diameter threaded rod, nuts and washers. Attach to ceiling using included ceiling mounting bracket. Attach to angle tower members with 31768A angle adapters. Attach to round tower members with 30848 series tower standoffs.

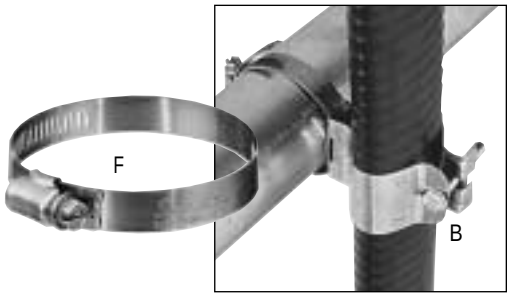
	Kit of 1	Kit of 5
12 inch (305 mm) rod	**31771**	**31771-4**
24 inch (610 mm) rod	**31771-9**	**31771-6**

I **Tower Standoff Kit** of 10 adapters with round member clamps and 3/8 inch hardware. Provides clearance for tower leg flanges.

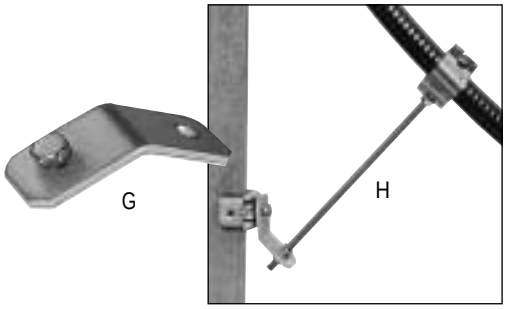
Member Diameter in (mm)	1 in (25 mm) Standoff	2.5 in (60 mm) Standoff
0.75 - 1.5 (20 - 40)	**30848-5**	–
1.5 - 3.0 (40 - 75)	**30848-4**	–
3 - 4 (75 - 100)	**30848-1**	**41108A-1**
4 - 5 (100 - 125)	**30848-2**	**41108A-2**
5 - 6 (125 - 150)	**30848-3**	**41108A-3**



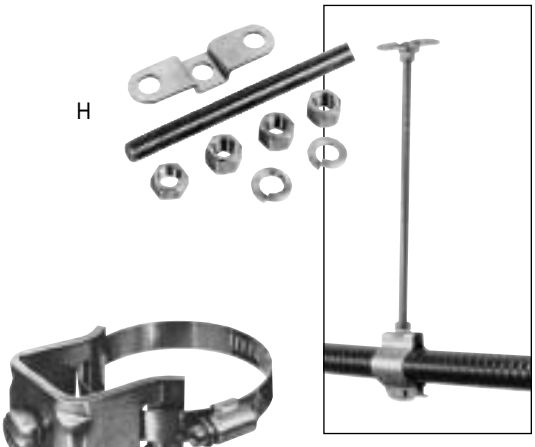
Hanger/Angle Adapter

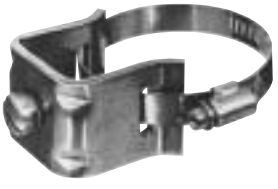


Hanger/Round Member Adapter



Hanger/45° Adapter Threaded Rod Support Kit





Hanger/Threaded Rod Support Kit

Hanger Spacing
for HELIAX® Elliptical Waveguide

Recommended maximum hanger spacings are tabulated below for various wind speed and ice conditions. The recommendations are based on guidelines stated in EIA Standard RS-222 and new wind tunnel and vibration tests. They supersede those in previous Andrew catalogs.

Installations in Typical Climates. Use the 125 mph (200 km/h), 1/2" ice conditions, highlighted in red in the table.

Severe or Mild Climates. Use the wind speed and ice conditions that most closely approximate the expected worst case conditions for the local climate.

Recommended Maximum Hanger Spacing – Standard Hangers, Outdoors for Various Wind Speed and Ice Conditions

Waveguide Type Number	Hanger Type Number	Recommended Maximum Hanger Spacing, feet (m)					
Wind Speed:			**85 mph (137 km/h)**			**100 mph (160 km/h)**	
Radial Ice:		**No Ice**	**1/2 in (13 mm)**	**1 in (25 mm)**	**No Ice**	**1/2 in (13 mm)**	**1 in (25 mm)**
EW17, EWP17	**31766A-9**	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)
EW20	**31766A-10**	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)
EW28	**31766A-11**	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	5.5 (1.68)
EW34, EWP34	**42396A-15**	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	5.5 (1.68)	6 (1.83)
EW37, EWP37	**42396A-4**	6 (1.83)	6 (1.83)	5.5 (1.68)	5.5 (1.68)	5.5 (1.68)	5 (1.52)
EW43, EWP43	**42396A-16**	6 (1.83)	6 (1.83)	5.5 (1.68)	5 (1.52)	5 (1.52)	4.5 (1.37)
EW52, EWP52	**42396A-8**	5.5 (1.68)	5 (1.52)	4.5 (1.37)	4.5 (1.37)	4.5 (1.37)	4 (1.22)
EW63, EWP63	**42396A-7**	5 (1.52)	4.5 (1.37)	4 (1.22)	4 (1.22)	4 (1.22)	3.5 (1.07)
EW64, EWP64	**42396A-11**	5 (1.52)	5 (1.52)	4 (1.22)	4.5 (1.37)	4 (1.22)	3.5 (1.07)
EW77, EWP77	**42396A-1**	5 (1.52)	5 (1.52)	4 (1.22)	4.5 (1.37)	4 (1.22)	3.5 (1.07)
EW85	**42396A-5**	5.5 (1.68)	5 (1.52)	4 (1.22)	4.5 (1.37)	4 (1.22)	3.5 (1.07)
EW90, EWP90	**42396A-5**	5.5 (1.68)	4.5 (1.37)	4 (1.22)	4.5 (1.37)	4 (1.22)	3 (0.91)
EW127A, EWP127A	**42396A-9**	5.5 (1.68)	4.5 (1.37)	3.5 (1.07)	4.5 (1.37)	4 (1.22)	3 (0.91)
EW132, EWP132	**42396A-9**	5.5 (1.68)	4.5 (1.37)	3.5 (1.07)	5 (1.52)	4 (1.22)	3 (0.91)
EW180, EWP180	**43211A**	6 (1.83)	4.5 (1.37)	3.5 (1.07)	5 (1.52)	4 (1.22)	3 (0.91)
EW220	**43211A**	6 (1.83)	4.5 (1.37)	3.5 (1.07)	5 (1.52)	4 (1.22)	3 (0.91)
EW240	**43211A**	6 (1.83)	4.5 (1.37)	3.5 (1.07)	5 (1.52)	4 (1.22)	3 (0.91)
Wind Speed:			**125 mph (200 km/h)**			**150 mph (240 km/h)**	
Radial Ice:		**No Ice**	**1/2 in (13 mm)**	**1 in (25 mm)**	**No Ice**	**1/2 in (13 mm)**	**1 in (25 mm)**
EW17, EWP17	**31766A-9**	6 (1.83)	**6 (1.83)**	5.5 (1.68)	5 (1.52)	5 (1.52)	4.5 (1.37)
EW20	**31766A-10**	5.5 (1.68)	**5.5 (1.68)**	5 (1.52)	4.5 (1.37)	4.5 (1.37)	4 (1.22)
EW28	**31766A-11**	5 (1.52)	**5 (1.52)**	4.5 (1.37)	4 (1.22)	4 (1.22)	3.5 (1.07)
EW34, EWP34	**42396A-15**	4.5 (1.37)	**4.5 (1.37)**	4 (1.22)	4 (1.22)	3.5 (1.07)	4 (1.22)
EW37, EWP37	**42396A-4**	4.5 (1.37)	**4.5 (1.37)**	4 (1.22)	3.5 (1.07)	3.5 (1.07)	3 (0.91)
EW43, EWP43	**42396A-16**	4 (1.22)	**4 (1.22)**	3.5 (1.07)	3.5 (1.07)	3.5 (1.07)	3 (0.91)
EW52, EWP52	**42396A-8**	3.5 (1.07)	**3.5 (1.07)**	3 (0.91)	3 (0.91)	3 (0.91)	2.5 (0.76)
EW63, EWP63	**42396A-7**	3.5 (1.07)	**3 (0.91)**	2.5 (0.76)	2.5 (0.76)	2.5 (0.76)	2 (0.61)
EW64, EWP64	**42396A-1**	3.5 (1.07)	**3 (0.91)**	2.5 (0.76)	3 (0.91)	2.5 (0.76)	2 (0.61)
EW77, EWP77	**42396A-11**	3.5 (1.07)	**3 (0.91)**	2.5 (0.76)	3 (0.91)	2.5 (0.76)	2 (0.61)
EW85	**42396A-5**	3.5 (1.07)	**3 (0.91)**	2.5 (0.76)	3 (0.91)	2.5 (0.76)	2 (0.61)
EW90, EWP90	**42396A-5**	3.5 (1.07)	**3 (0.91)**	2.5 (0.76)	3 (0.91)	2.5 (0.76)	2 (0.61)
EW127A, EWP127A	**42396A-9**	3.5 (1.07)	**3 (0.91)**	2.5 (0.76)	3 (0.91)	2.5 (0.76)	2 (0.61)
EW132, EWP132	**42396A-9**	4 (1.22)	**3 (0.91)**	2.5 (0.76)	3 (0.91)	2.5 (0.76)	2 (0.61)
EW180, EWP180	**43211A**	4 (1.22)	**3 (0.91)**	2.5 (0.76)	3.5 (1.07)	2.5 (0.76)	2 (0.61)
EW220	**43211A**	4 (1.22)	**3 (0.91)**	2.5 (0.76)	3.5 (1.07)	2.5 (0.76)	2 (0.61)
EW240	**43211A**	4 (1.22)	**3 (0.91)**	2.5 (0.76)	3.5 (1.07)	2.5 (0.76)	2 (0.61)

Definitions and Assumptions

1. Per EIA-222 Standard:
   - Coefficient of drag for elliptical waveguide is 1.6 (average of 1.2 for cylindrical and 2.0 for flat members).
   - Ice forms completely around member (360 degrees).
   - Combined wind and ice loading is reduced by 25% to reflect lower probability of wind and ice occuring simultaneously.
2. Wind speeds are maximum, which includes gust factors and exposure factors.

A well designed system uses grounding kits to provide a bond between the elliptical waveguide and the tower/earth ground system. One grounding kit is recommended at tower top, tower bottom, at 200 ft (60 m) intervals (where applicable), and at the entrance to the equipment shelter.

- Solid copper construction for high current handling capability, compatibility with copper cable outer conductors, and long life.
- Meet military standards at commercial prices.
- Provide certainty of continued operation.

Andrew 204989 and 241088 series solid copper grounding kits have passed United States Air Force lightning simulation tests and meet MIL-STD-188-124A. The non-braided solid copper construction of all Andrew grounding kits eliminates corrosion caused by moisture retention and "wicking". A heat-shrink tube, either factory or field installed, protects the cable terminal connection.

Easy Installation

Standard Grounding Kits (204989 and 241088 series) require few steps to install and include easy to follow instructions. Proper tensioning is ensured by an expansion section which provides visual indication that the strap is secured.

Grounding Cable Length Options. The kit with factory attached lug includes a 24 inch (610 mm) grounding cable. Two optional versions are offered with 36 inch (915 mm) grounding cables, field attachable grounding lugs and shrink jackets for custom fitting. One has a screw-on lug; the other has a crimp-on lug.

Grounding Lugs. Grounding Kits are now available with two grounding lug configurations. The 204989 series feature a one-hole lug. The 241088 series feature a two-hole lug. The hole spacing on the two-hole lug is 0.815 in (20.7 mm). All Andrew bus bars will accept both types of lugs.

Continued on next page

Grounding Kit Type Numbers

For Waveguide	With Factory Attached One-Hole Lug	With Factory Attached Two-Hole Lug	With Field Attachable One-Hole Crimp-On Lug	With Field Attachable Two-Hole Crimp-On Lug	With Field Attachable Screw-on Lug
Grounding Wire Length	**24"**	**24"**	**36"**	**36"**	**36"**
EW17, EWP17	**204989-6**	–	**204989-26**	–	**204989-36**
EW20	**204989-6**	–	**204989-26**	–	**204989-36**
EW28	**204989-5**	**241088-5**	**204989-25**	**241088-10**	**204989-35**
EW34, EWP34	**204989-5**	**241088-5**	**204989-25**	**241088-10**	**204989-35**
EW37, EWP37, EWP37S	**204989-5**	**241088-5**	**204989-25**	**241088-10**	**204989-35**
EW43, EWP43	**204989-10**	–	**204989-28**	–	**204989-34**
EW52, EWP52, EWP52S	**204989-4**	**241088-4**	**204989-24**	**241088-9**	**204989-34**
EW63, EWP63, EWP63S	**204989-4**	**241088-4**	**204989-24**	**241088-9**	**204989-34**
EW64, EWP64	**204989-3**	**241088-3**	**204989-23**	**241088-8**	**204989-33**
EW77, EWP77	**204989-3**	**241088-3**	**204989-23**	**241088-8**	**204989-33**
EW85	**204989-2**	**241088-2**	**204989-22**	**241088-7**	**204989-32**
EW90, EWP90, EWP90S	**204989-2**	**241088-2**	**204989-22**	**241088-7**	**204989-32**
EW127A, EWP127A	**204989-2**	**241088-2**	**204989-22**	**241088-7**	**204989-32**
EW132, EWP132	**204989-2**	**241088-2**	**204989-22**	**241088-7**	**204989-32**
EW180, EWP180	**204989-1**	**241088-1**	**204989-21**	**241088-6**	**204989-31**
EW220	**204989-1**	**241088-1**	**204989-21**	**241088-6**	**204989-31**
EW240	**223158**	–	–	–	–

Grounding Kits / Flaring Tools

Kits Include

Standard Grounding Kits for Elliptical Waveguide. Series 204989 and 241088 kits include a solid copper strap riveted to the grounding wire, a coil tool for proper tightening, tower attachment hardware, and a two-part tape weatherproofing system. Field attachable, crimp-on grounding lugs require the use of a crimping tool (not included, described below).

Standard Grounding Kits for EW22O and Smaller Waveguide. Includes a solid copper strap, connection hardware, tower attachment hardware, and a two-part tape weatherproofing system .....Type **223158**

Lug and Wire Length Options for Standard Grounding Kits

Kits are available with either factory attached lugs or field attachable lugs. Field attachable lugs are either crimp-on or screw-on. One or two-hole lugs are available as indicated in the table.

Grounding wire length is 36 in (915 mm) for field attachable lugs and 24 or 36 in (610 or 915 mm) for factory attached lugs, as indicated in the table.

Crimping Tool. Used to attach crimp-on lugs for standard grounding kits. Not required for kits having factory-attached lugs or field-attachable screw-on lugs.....Type **207270**

Flaring Tool Kits*

New 2-in-1 Design

Kits for EW43, EW52, and EW63. Major and minor axis flaring tool combined into one unit.

Fast and Accurate Connector Attachment Compact Design

Small, lightweight and easy to use in crowded areas above radio bays. Can be easily carried to top of tower.

Reliable, Low VSWR Waveguide Flares Easy to Use

Consistent results with no special training. No tab flares to cut.

Saw Guide Included

Ensures proper cut-off length for flare.

Andrew flaring tool kits for HELIAX® elliptical waveguide consistently produce high accuracy waveguide flares for connector and splice installation.

The kits include one major and one minor axis flaring tool, a saw guide and a rugged carrying case.

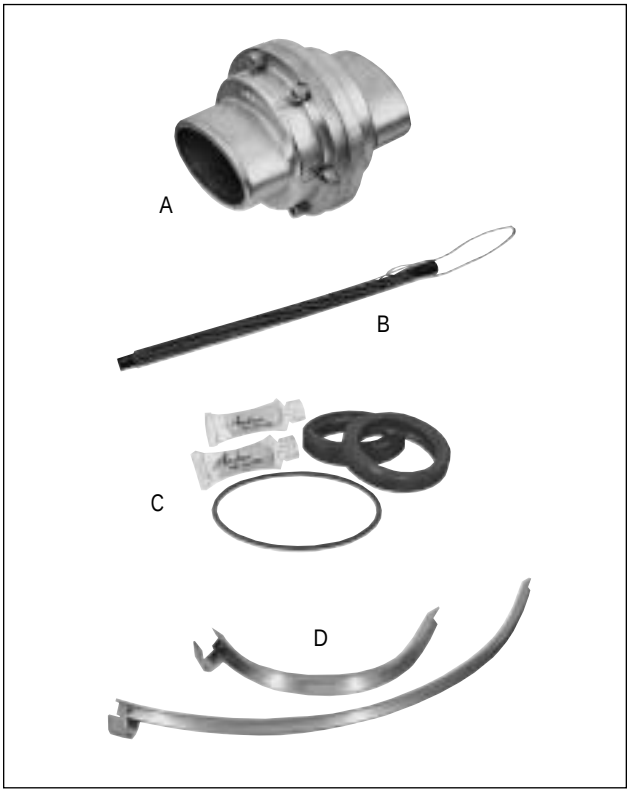
Flaring tools are especially recommended for field installation of pre-tuned connectors on premium waveguide. They are required to achieve the stated VSWR specifications when using pre-tuned or fixed-tuned connectors on EWP90 and smaller premium waveguides.

The fast, two-step flaring technique forms the waveguide accurately every time. The tools are attached and the flare made without disturbing the connector assembly. The waveguide can be trimmed and the flare completed in three to five minutes.

Each tool makes contact with the waveguide just once. The precision with which the tools form the flare ensures a contact face that has not been shaved, compressed or work hardened.

*Patented United States 4,590,785

For Waveguide Types	Type Number
EW37, EWP37, EWP37S	**205869**
EW43, EWP43	**EWFTK-43**
EW52, EWP52, EWP52S	**EWFTK-52**
EW63, EWP63, EWP63S	**EWFTK-63**
EW64, EWP64	**202358**
EW77, EWP77	**202421**
EW90, EWP90, EWP90S	**204919**
EW127A, EWP127A	**204960**
EW132, EWP132	**203809**
EW180, EWP180	**201439**
EW220, EW240	**205127**



A Splice.

B Hoisting Grip used at 200 ft (60 m) intervals to raise waveguide on tower.

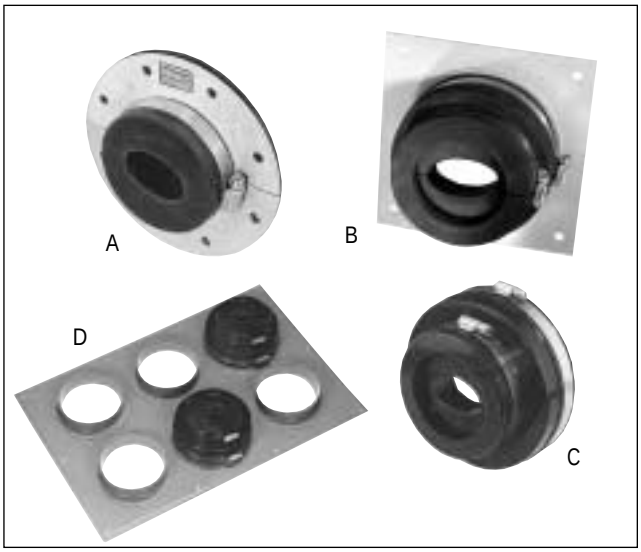
C Bending Tool Kit for elliptical waveguide installation. One each E- and H-plane form included.

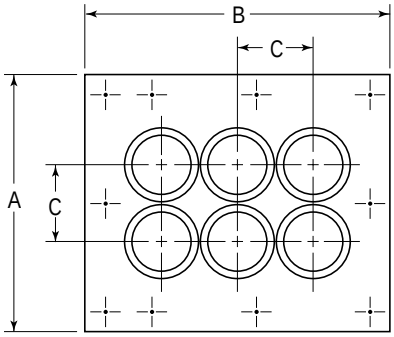
D Connector Reattachment Kit includes rubber gasket parts (except flange gaskets) which may need replacing during removal and subsequent reattachment of connectors.

Accessories

For Waveguide Type Numbers	Splice	Hoisting Grip	Bending Tool Kit	Connector Reattachment Kit
EW17, EWP17	**117Z**	**34759**	**33586-4**	**33544-10**
EW20	**120Z**	**34759**	**33586-4**	**33544-11**
EW28	**128AZ**	**26985A**	**33586-5**	–
EW34, EWP34	**134DZ**	**26985A**	**33586-11**	**33544-43**
EW37, EWP37, EWP37S	**137DZ**	**31535**	**33586-3**	**33544-24**
EW43, EWP43	**143Z**	**31535**	**33586-3**	**33544-45**
EW52, EWP52, EWP52S	**152DZ**	**24312A**	**33586-7**	**33544-38**
EW63, EWP63, EWP63S	**163DZ**	**24312A**	**33586-8**	**33544-33**
EW64, EWP64	**164DZ**	**29961**	**33586-2**	**33544-35**
EW77, EWP77	**177DZ**	**19256B**	**33586-9**	**33544-34**
EW85	**185AZ**	**29958**	**33586-1**	**33544-17**
EW90, EWP90, EWP90S	**190DZ**	**29958**	**33586-1**	**33544-37**
EW127A, EWP127A	**1127DZ**	**29958**	**33586-1**	**33544-41**
EW132, EWP132	**1132DZ**	**29958**	**33586-1**	**33544-39**
EW180, EWP180	**1180DZ**	**43094**	**33586-1**	**33544-42**
EW220	**1220DZ**	**43094**	**33586-1**	**33544-44A**
EW240	**1240DZ**	**43094**	**33586-1**	**33544-47**

Accessories





A Single Entrance Wall/Roof Feed-Thru Assembly. Includes rubber boot, clamp, and galvanized steel plate. Order from table below.

B Single Entrance Wall/Roof Feed-Thru Assembly for EW37-EW240. Includes rubber boot, clamps, and aluminum plate. Similar to D but Single Entry. Order from table below.

C Waveguide Boot for use with multiple entrance wall/roof feed-thru plate (Item D). Boot diameter of 4 in or 5 in (102 or 127 mm) is available to match plate. Order individually from table below.

D Multiple Entrance Wall/Roof Feed-thru Plate. (Aluminum) Use with waveguide boots (Item B). Order from table below.

D Multiple Entrance Wall/Roof Feed-Thru Plate

Type	Number of Openings	Dimen. A in (mm)	Dimen. B in (mm)	Dimen. C in (mm)
4 in (102 mm) Diameter Entry Opening				
204673-1	1	7 (178)	7 (178)	–
204673-2	1	5 (127)	5 (127)	–
204673-4	4	9.5 (241)	25.5 (648)	5.5 (140)
204673-8	8	17.5 (444)	25.5 (648)	5.5 (140)
5 in (127 mm) Diameter Entry Opening				
48940-1	1	9.5 (241)	9.5 (241)	–
48940-2	2	9.5 (241)	17.5 (444)	7 (178)
48940-3	3	9.5 (241)	25.5 (648)	7 (178)
48940-4	4	17.5 (444)	17.5 (444)	7 (178)
48940-6	6	17.5 (444)	25.5 (648)	7 (178)

C Waveguide Boots

For Waveguide Type Numbers	Waveguide Boots 4 in (102 mm) Diameter	Waveguide Boots 5 in (127 mm) Diameter
EW17, EWP17	–	–
EW20	–	–
EW28	–	–
EW34, EWP34	**204679-34**	**48939-34**
EW37, EWP37, EWP37S	**WGB4-37**	**WGB5-37**
EW43, EWP43	**WGB4-43**	**WGB5-43**
EW52, EWP52, EWP52S	**WGB4-52**	**WGB5-52**
EW63, EWP63, EWP63S	**WGB4-63**	**WGB5-63**
EW64, EWP64	**WGB4-64**	**WGB5-64**
EW77, EWP77	**WGB4-77**	**WGB5-77**
EW85	**WGB4-85**	**WGB5-85**
EW90, EWP90, EWP90S	**WGB4-90**	**WGB5-90**
EW127A, EWP127A	**WGB4-127**	**WGB5-122**
EW132, EWP132	**WGB4-132**	**WGB5-132**
EW180, EWP180	**WGB4-180**	**WGB5-180**
EW220	**WGB4-220**	**WGB5-220**
EW240	**WGB4-240**	**WGB5-240**

A, B Single Entrance Wall/Roof Feed-Thru Assemblies

For Waveguide Type Numbers	Single Entrance Wall/Roof Feed-Thru Assembly
EW17, EWP17	**35849A-10**
EW20	**35849A-9**
EW28	**35849A-13**
EW34, EWP34	**35849A-17**
EW37, EWP37, EWP37S	**245314-37**
EW43, EWP43	**245314-43**
EW52, EWP52, EWP52S	**245314-52**
EW63, EWP63, EWP63S	**245314-63**
EW64, EWP64	**245314-64**
EW77, EWP77	**245314-77**
EW85	**245314-85**
EW90, EWP90, EWP90S	**245314-90**
EW127A, EWP127A	**245314-127A**
EW132, EWP132	**245314-132**
EW180, EWP180	**245314-180**
EW220	**245314-220**
EW240	**245314-240**

Hybrid T Reflectometer

The Andrew hybrid T reflectometer is a unique and highly directive test component useful for measuring return loss or VSWR in waveguide systems. The reflectometer utilizes a precision hybrid T junction to separate the incident and reflected waves at the input of the system under test.

In addition to the reflectometer, a signal generator and equipment to detect and display return loss or VSWR are necessary. For information on operation of the Andrew hybrid T reflectometer, request Bulletin 37260.

To order, specify Type Number from the table. A calibration load, a termination load and carrying case are included.

Elliptical Waveguide Sliding Load. Spear type termination load used at far end of bulk reels to terminate waveguide without attaching a connector and calibration load.

Elliptical Waveguide Sliding Loads

Waveguide Type	Type No.	Frequency Band, GHz	VSWR, Max. (R.L., dB)
EW37	**40502-37**	3.4-4.2	1.052 (32)
EW44	**40502-44**	4.4-5.0	1.02 (40)
EW52	**40502-52**	5.925-6.425	1.02 (40)
EW63	**40502-63**	6.425-7.125	1.02 (40)
EW90	**40502-90**	10.5-11.7)	1.02 (40)

Ordering Information - Hybrid T Reflectometers

Frequency Band GHz	Waveguide Size EIA	IEC	Type Number	Directivity Min., dB	Mates with Flange Types EIA*	U.S. MIL	IEC
1.7-2.110	WR430	R22	**49000-430A-1**	50	CPR430G	–	PDR22
1.9-2.3	WR430	R22	**49000-430B-1**	50	CPR430G	–	PDR22
2.45-2.75	WR340	R26	**49000-340C-1**	60	CPR340G	–	PDR26
2.9-3.5	WR284	R32	**49000-284D-1**	60	CPR284G	–	PDR32
3.4-4.2	WR229	R40	**49000-229E-1**	55	CPR229G	–	PDR40
3.7-4.2	WR229	R40	**49000-229F-1**	60	CPR229G	–	PDR40
4.4-5.0	WR187	R48	**49000-187G-1**	60	CPR187G	UG-148C/U UG-149A/U	CAR48, UAR48 PAR48, PDR48
5.925-6.425	WR159	R58	**49000-159H-1**	60	CPR159G	–	PDR58
5.925-6.425	WR137	R70	**49000-137H-1**	60	CPR137G	UG-343B/U UG-344/U	CAR70, UAR70 PAR70, PDR70
5.925-7.125	WR137	R70	**49000-137J-1**	60	CPR137G UG-344/U	UG-343B/U PAR70, PDR70	CAR70, UAR70
5.925-7.750	WR137	R70	**49000-137K-1**	60	CPR137G	UG-343B/U UG-344/U	CAR70, UAR70 PAR70, PDR70
7.125-8.5	WR112	R84	**49000-112L-1**	60	CPR112G	UG-52B/U UG-51/U	CBR84, UBR84 PBR84, PDR84
10.5-11.7	WR90	R100	**49000-90M-1**	60	CPR90G	UG-40B/U UG-39/U	CBR100, UBR100 PBR100, PDR100
12.2-13.25	WR75	R120	**49000-75N-1**	60	–	WR75 choke and cover	CBR120, UBR120 PBR120
12.2-13.25	WR75	R120	**205594-75-1**	60	–	–	PDR120
14.4-15.35	WR62	R140	**49000-62P-1**	60	–	UG-541A/U UG-419/U	CBR140, UBR140 PBR140
17.7-19.7	WR42	R220	**207191-1**	60	–	UG-596A/U UG-595/U	CBR220, PBR220 UBR220
21.2-23.6	WR42	R220	**207191-4**	60	–	UG-596A/U UG-595/U	CBR220, PBR220 UBR220

*Also mates with "F" Suffix.

Rectangular Waveguide Components

Long Life, Maximum Performance

High conductivity copper or 90/10 bronze construction, chemically cleaned and coated to prevent corrosion.

Wide Selection

Broad range of components and flanges simplifies system planning. All elements are designed to work together, maximizing system performance.

Custom Components

All custom components are available for quick delivery. To order these components you can:

- *Use the information on pages 203 to 206 to construct a type number for ordering*
- *Use our ezGuide™ software to construct a type number for ordering*
- *Call Andrew and describe your requirements*

Andrew custom components can accommodate almost any flange and length combination. Please note that each component is custom made to meet your specific requirements and is not returnable. Use our ezGuide™ software for correct ordering.

Finish. All Andrew stocked rigid rectangular components are now supplied unpainted (natural), painted components are available as an option. Every component is chemically cleaned and coated for corrosion resistance.

Standard and Low VSWR Waveguides. Andrew offers rectangular waveguides for standard and low VSWR applications. Standard waveguide components cover the entire recommended frequency ranges, while low VSWR components are generally only available over narrow frequency ranges.The Size and Frequency Codes table on page 204 gives details of standard frequency ranges, and commonly requested low VSWR details. Other low VSWR frequency ranges are available on request. Attenuation curves for rectangular waveguide are presented on pages 230 and 231.

ezGuide™ Software

For Rectangular Waveguide Components

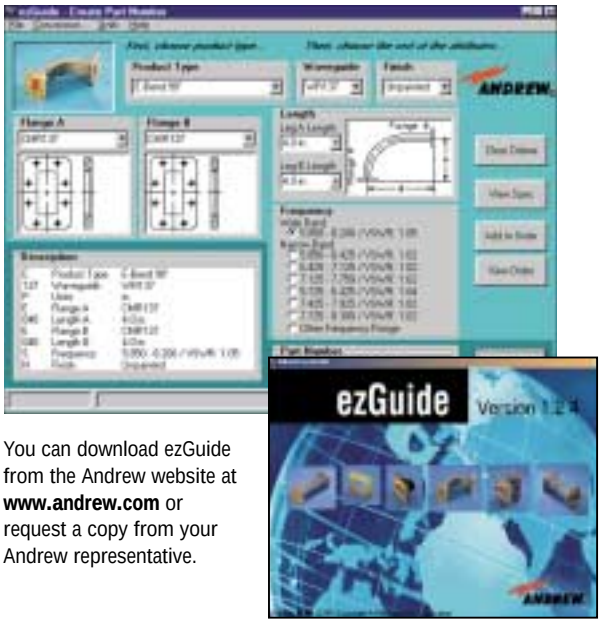
Rectangular waveguide components are an integral part of any transmission line system for private microwave, cellular, and PCS/PCN installations.

Andrew offers self-directed ezGuide software to simplify the designing and ordering of rectangular waveguide components to meet the requirements of a transmission line system.

This functional type numbering system uses Windows®-based software which guides the design and ordering process. The exact component type, waveguide size, flange types, component dimensions, operating frequency band, and finish can be specified with point-and-click options. Each product is pictured on your screen and diagrammed for your reference.

Each rectangular waveguide component and its flanges are identified by a type number that is automatically created as you specify how each section should be configured.

Windows is a registered trademark of Microsoft Corporation.



You can download ezGuide from the Andrew website at **www.andrew.com** or request a copy from your Andrew representative.

The ezGuide™ Numbering System identifies each custom component with alphanumeric codes that provide detailed ordering information for that component. The type number describes the component, waveguide size, flanges, and where applicable, the units of measure used, dimensions, frequency, and finish.

ezGuide Numbering System Example:

R	062	P	A	0240	B	S	N
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**

1 **Component Code**. A one letter code that identifies the component type. See Table 1.

2 **Waveguide Size Code**. A three number code that identifies the waveguide size. Use Table 2 (page 204) to identify the code for your waveguide size. For taper transition sections, refer to the Taper Transition Size Codes table (page 208) for the waveguide-to-waveguide size code.

3 **Units of Measure**. A one letter code that identifies the units of measure used. Use P for imperial (inches) or M for metric (millimeters).

4 **Flange Code 1**. A one letter code that identifies the first flange. Flange Code 1 and Flange Code 2 must be sequenced alphabetically (except for taper transition sections, see below). Use Table 3 (page 204) to determine the appropriate flange code for your application.

5 **Dimension 1.** A customer-specified numeric code that indicates the length of the component in the unit of measure specified previously (imperial or metric). Bends require three numbers, flex-twist and straight sections require four numbers. See page 204.

6 **Flange Code 2**. A one letter code that identifies the second flange. Flange Code 1 and Flange Code 2 must be sequenced alphabetically (except for tapered transition sections, see below). Use Table 3 (page 204) to determine the appropriate flange code for your application.

7 **Frequency Code**. A one letter code that identifies the frequency specification. See Table 2 (page 204).

8 **Finish**. A one letter code that indicates the finish choice. Use N for unpainted or G for gray.

In the example at left, **R062PA0240BSN** is:

1 a straight section

2 waveguide size WR62

3 Imperial measurement (inches)

4 UG-Choke flange on one end

5 24 inches long

6 UG-Cover flange on other end

7 12.40 - 18.0 GHz band

8 unpainted finish

Table 1
Overview of ezGuide Numbering System Codes

Component Name	Component Code (1 alpha)	Waveguide Size Code (3 numeric)	Units of Measure (1 alpha)	Flange 1 Code (1 alpha)	Dimension 1 Code (3 or 4 numeric)*	Flange 2 Code (1 alpha)	Dimension 2 Code (3 or 4 numeric)*	Frequency Code (1 alpha)	Finish Code (1 alpha)	Required Characters
Straight Section	R	Table 2	P or M	Table 3	Customer specified	Table 3	–	Table 2	N or G	13
90° E Plane Swept Bend	E	Table 2	P or M	Table 3	Customer specified	Table 3	Customer specified	Table 2	N or G	15
90° H Plane Swept Bend	H	Table 2	P or M	Table 3	Customer specified	Table 3	Customer specified	Table 2	N or G	15
90° H Plane Miter Bend	M	Table 2	P or M	Table 3	Customer specified	Table 3	Customer specified	Table 2	N or G	15
90° E Plane Miter Bend	N	Table 2	P or M	Table 3	Customer specified	Table 3	Customer specified	Table 2	N or G	15
Flexible Twist	F	Table 2	P or M	Table 3	Customer specified	Table 3	–	Table 2	–	12
90° Rigid Twist	D	Table 2	–	Table 3	–	Table 3	–	Table 2	N or G	8
Taper Transition	T	page 208	–	Table 3	–	Table 3	–	–	N or G	7
Flange Adapter	A	Table 2	–	Table 3	–	Table 3	–	–	N or G	7
Waveguide/Coax Transition	C	Table 2	–	Table 3	–	S or N**	–	Table 2	G only	8

* Bends require 3 numbers, flex-twist and straight sections require 4 numbers. See pages 207-208.
** Use S for SMA female or N for N-type female.

Flange Codes

For straight sections, flex-twists, E and H-plane bends, twists, and flange adapters, enter the flange codes in alphabetical order (for example, F042P**A**0240**B**).

For taper transitions, the flange code sequence is not entered alphabetically. The first flange following the waveguide size code is the smaller of the two waveguide sizes.

For asymmetric bends, specify the correct leg length/flange combination. The flange specified first (flange 1) is attached to the leg length specified first (dimension 1).

Dimensions

Straight sections and flex-twists require four characters. All four characters must be used, including leading zeros, if necessary. For imperial (inch) dimensions, the code is made up of three characters to the left of the decimal point and one character to the right. 24 inches is denoted 0240. Flex-twist sections are only available in whole inch increments. For metric dimensions, enter the length in millimeters. 600 millimeters is denoted 0600.

Bends require three characters. All three characters must be used, including leading zeroes, if necessary. For imperial (inch) dimensions, the code is made up of two characters to the left of the decimal point and one character to the right. 5.0 inches is denoted 050. For metric dimensions, enter the length in millimeters. 75 millimeters is denoted 075.

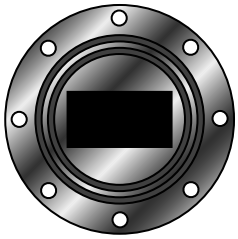
Table 2
Size and Frequency Codes

EIA	RCSC	IEC	Waveguide Size Code	Frequency Code	Frequency (GHz)
WR28	WG22	R320	028	S	26.50 - 40.00
				A	37.00 - 40.00
WR42	WG20	R220	042	S	17.70 - 26.50
WR51	WG19	R180	051	S	15.00 - 22.00
WR62	WG18	R140	062	S	12.40 - 18.00
WR75	WG17	R120	075	S	10.00 - 15.00
WR90	WG16	R100	090	S	8.20 - 12.4
				A	10.2 - 10.7
				B	10.7 - 11.7
WR112	WG15	R84	112	S	7.050 - 10.00
				A	7.125 - 7.750
				B	7.725 - 8.500
				C	7.125 - 8.500
WR137	WG14	R70	137	S	5.850 - 8.200
				A	5.850 - 6.425
				B	6.425 - 7.125
				C	7.125 - 7.750
				D	5.725 - 6.425
				E	7.425 - 7.925
				F	7.725 - 8.300
				G	5.600 - 6.200
WR159	WG13	R58	159	S	4.900 - 7.050
				A	5.725 - 6.425
WR187	WG12	R48	187	S	3.95 - 5.85
				A	4.40 - 5.00
WR229	WG11	R40	229	S	3.30 - 4.90
				A	3.54 - 4.20

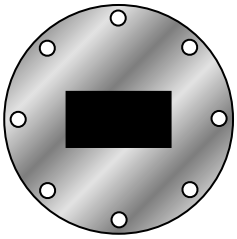
Table 3
Flange Codes, Descriptions and Availability

Code	Flange Type *	Description	Available for Waveguide Size Codes
A	UG-Choke	Tapped Holes, Gasket Groove, Choke Groove, Square Flange	028, 042, 062, 075, 090, 112
A	UG-Choke	Tapped Holes, Gasket Groove, Choke Groove, Circular Flange	137, 187
B	UG-Cover	Through Holes, No Gasket or Choke Grooves, Square Flange	028, 042, 062, 075, 090, 112
B	UG-Cover	Through Holes, No Gasket or Choke Grooves, Circular Flange	137, 187
C	CPR( )G	Through Holes, Gasket Groove, Rectangular Flange	090, 112, 137, 159, 187, 229
D	CPR( )F	Through Holes, No Gasket Groove, Rectangular Flange	090, 112, 137, 159, 187, 229
E	CMR	Alternate Tapped Holes, No Gasket Groove, Rectangular Flange	090, 112, 137, 159 , 187
F	CMR Through	All Through Holes, No gasket groove, Rectangular Flange	137
G	CMR Tapped	All Tapped Holes, No gasket Groove, Rectangular Flange	137
H	PDR	Through Holes, Gasket Groove, Rectangular Flange	051, 062, 075, 090, 112, 137, 187, 229
K	PBR	Through Holes, Gasket Groove, No Choke, Square Flange	028, 042, 062, 075, 090, 112
L	UDR	Through Holes, No Gasket Groove, Rectangular Flange	062, 075, 090, 112, 187
M	UBR	Through Holes, No Gasket Groove, No Choke, Square Flange	028, 042, 062, 075, 112
P	PAR	Through Holes, Gasket Groove, No Choke, Circular Flange	137, 187
–	CBR	Through Holes, Gasket Groove, Choke Groove, Square Flange	On Request
–	BRJ		On Request
T	UER	Through Holes, No Gasket Groove, Rectangular Flange	137
–	UAR	Through Holes, No Gasket Groove, Circular Flange	On Request
Y	UG Cover/Gasket	Through Holes, Gasket Groove, No Choke, Square Flange	028, 042, 062, 075, 090, 112
Y	UG Cover/Gasket	Through Holes, Gasket Groove, No Choke, Circular Flange	137, 187

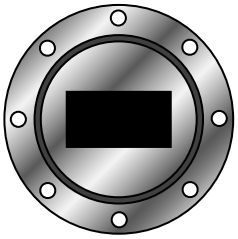
* All other flange options on request, if you have a requirement, not listed, please contact your Andrew representative.



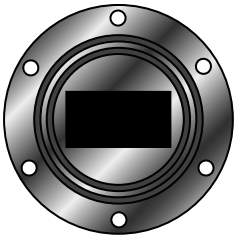
UG-148C/U, UG-54B/U



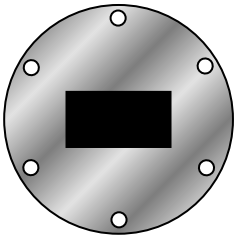
UG-149A/U, UG-53/U*



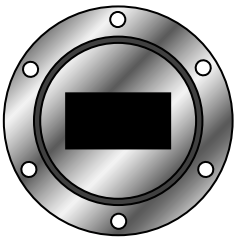
Pressure Cover 187



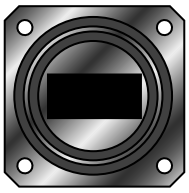
UG-343B/U



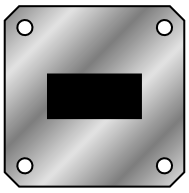
UG-344/U



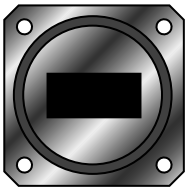
Pressure Cover 137



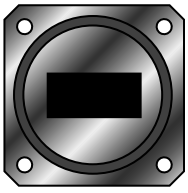
UG-52B/U, UG-40B/U
WR75 Choke
UG-541A/U
UG-596A/U



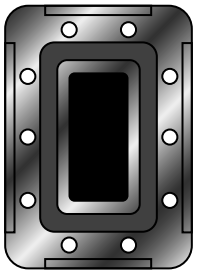
UG-51/U, UG-39/U
WR75 Cover
UG-419/U
UG-595/U



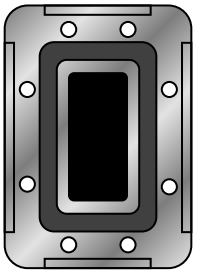
Pressure Cover 28,
42, 62, 75, 90, 112



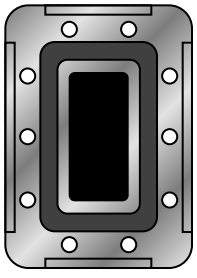
PBR84, PBR100
PBR120, PBR140
PBR220, PBR320



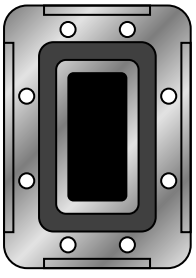
CPR229G



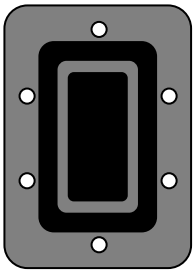
CPR187G, CPR159G
CPR137G, CPR112G
CPR90G



PDR40



PDR40, PDR70
PDR84, PDR100



PDR120, PDR140
PDR180

Creating Type Numbers
for Custom Components

The examples below describe ezGuide™ Numbering for each custom component:

Flex Twist Ordering Information - F137PC0360CS (11 characters in product code)

Product Code	Waveguide Size	Measurement P = Inches M = Millimeters	Flange A Code	Length	Flange B Code	Frequency Code
F	**137**	**P**	**C**	**0360**	**C**	**S**

Description: Flex Twist, WR137, Measurement in Inches, Flange A is a CPR137G, Length is 36 inches, Flange B is a CPR137G, Frequency of 5.850-8.200 GHz.

Straight Section Ordering Information - R112MH0600HSN (13 characters in product code)

Product Code	Waveguide Size	Measurement P = Inches M = Millimeters	Flange A Code	Length	Flange B Code	Frequency Code	Finish Code
R	**112**	**M**	**H**	**0600**	**H**	**S**	**N**

Description: Straight Section, WR112, Measurement in Millimeters, Flange A is a PDR112, Length is 600 Millimeters, Flange B is a PDR112, Frequency of 7.050-10.00 GHz, Natural (unpainted) finish.

90° Swept and Miter Bend Ordering Information - H090PC036C036SN (15 characters in product code)

Product Code	Waveguide Size	Measurement P = Inches M = Millimeters	Flange A Code	Leg Length A	Flange B Code	Leg Length B	Frequency Code	Finish Code
H	**090**	**P**	**C**	**036**	**C**	**036**	**S**	**N**

Description: 90° H-Bend, WR90, Measurement in Inches, Flange A is a CPR90G, Leg Length A is 3.6 Inches, Flange B is a CPR90G, Leg Length B is 3.6 Inches, frequency of 8.20-12.40 GHz, Natural (unpainted) finish.

90° Rigid Twist Section Ordering Information - D159CAEAG (8 characters in product code)

Product Code	Waveguide Size	Flange A Code	Flange B Code	Frequency Code	Finish Code
D	**159**	**C**	**E**	**A**	**G**

Description: 90° Rigid Twist Section, WR159, Flange A is a CPR159G, Flange B is a CMR159, Frequency of 5.725-6.425 GHz, Gray (painted) finish.

Tapered Transition Ordering Information -T137DCN (7 characters in product code)

Product Code	Waveguide Size	WR137 Flange	WR159 Flange	Finish Code
T	**137**	**D**	**C**	**N**

Description: Tapered Transition section, transitioning from WR137 to WR159, WR137 Flange is a CPR137F, WR159 Flange is a CPR159G, Natural (unpainted) finish.

Flange Adapter Ordering Information - A075AHN (7 characters in product code)

Product Code	Waveguide Size	Flange A Code	Flange B Code	Finish Code
A	**075**	**A**	**H**	**N**

Description: Flange Adapter, WR75, UG Choke Flange to a PDR120 Flange, Natural (unpainted) finish.

Waveguide to Coax Transition Ordering Information - C062H5SG (8 characters in product code)

Product Code	Waveguide Size	Waveguide Flange	Coax Flange	Frequency Code	Finish Code
C	**062**	**H**	**S**	**S**	**G**

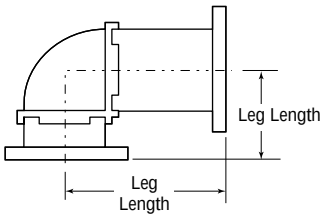
Description: Waveguide to Coax Transition Section, Waveguide flange is a PDR140, Coax flange is an SMA Female, Frequency of 12.4-18.00 GHz, Gray (painted) finish.

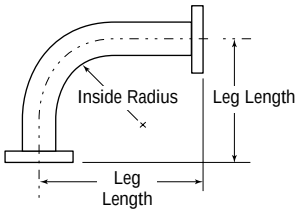
Straight Sections are offered in lengths up to 10 feet (3.1 meters).

90° E Bends, 90° H Bends , and Rigid Twist Sections are available with custom leg lengths and the following flange combinations: CPR( )G/CPR( )G, UG Choke/UG Cover, PDR/PDR, and PBR/PBR. See page 211.

Taper Transitions have VSWR 1.05 and fixed length of 6" (152 mm).

Flex-twist Sections include brass flanges chemically cleaned and coated for corrosion resistance. Each section is jacketed with rugged black Neoprene, UV stabilized for outdoor use. The silver plated wound brass core assures highest flexibility and low attenuation.





90° E-Plane Elbow

CPR137G Flanges Shown

90° H-Plane Elbow

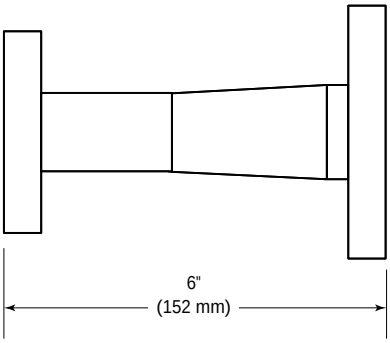
CPR137G Flanges Shown

Straight Sections, H and E Plane Bends and Twists

EIA	RCSC	IEC	Operating Frequency (GHz)	Twists Length	Twists VSWR	Straight Sections VSWR	Swept H and E Plane Bends Std Leg Length	Swept H and E Plane Bends Min Leg Length	Swept H and E Plane Bends Radius E	Swept H and E Plane Bends Radius H	VSWR Swept Bends/ Miter Bends	Miter E and H-Plane Bends Min Leg Lengths** E-Plane	Miter E and H-Plane Bends Min Leg Lengths** H-Plane
WR28	WG22	R320	26.50 - 40.00	4.00 (102)	1.30	1.30	2.0 (51)	1.6 (41)	0.75 (19)	0.75 (19)	1.30	*	*
			37.00 - 40.00		1.12	1.12					1.12	*	*
WR42	WG20	R220	17.70 - 26.50	3.00 (76)	1.05	1.05	2.3 (58)	2.3 (58)	1.0 (25)	1.0 (25)	1.05	*	*
WR51	WG19	R180	15.00 - 22.00	†	–	–	†	†	†	†	–	*	*
WR62	WG18	R140	12.40 - 18.00	5.00 (127)	1.05	1.05	2.6 (66)	2.5 (65)	1.50 (38)	1.50 (38)	1.05	1.1 (28)	1.4 (36)
WR75	WG17	R120	10.00 - 15.00	6.00 (152)	1.05	1.05	3.6 (91)	2.8 (71)	1.75 (44)	1.75 (44)	1.05	1.5 (38)	1.6 (41)
WR90	WG16	R100	8.20 - 12.4	8.00 (203)	1.05	1.05	3.6 (91)	2.9 (74)	1.75 (44)	1.75 (44)	1.05	1.5 (38)	1.8 (46)
			10.2 - 10.7		1.02	1.02					1.02		
			10.7 - 11.7		1.02	1.02					1.02		
WR112	WG15	R84	7.050 - 10.00	10.00 (254)	1.05	1.05	4.0 (102)	3.9 (99)	2.68 (68)	2.68 (68)	1.05	1.6 (41)	2.00 (52)
			7.125 - 7.750		1.02	1.02					1.02		
			7.750 - 8.500		1.02	1.02					1.02		
			7.125 - 8.500		1.02	1.02					1.02		
WR137	WG14	R70	5.850 - 8.200	12.00 (305)	1.05	1.05	4.0 (102)	4.0 (102)	2.62 (67)	2.62 (67)	1.05	1.8 (46)	2.3 (58)
			5.850 - 6.425		1.02	1.02					1.02		
			6.425 - 7.125		1.02	1.02					1.02		
			7.125 - 7.750		1.02	1.02					1.02		
			5.725 - 6.425		1.02	1.02					1.02		
			7.425 - 7.925		1.02	1.02					1.02		
WR159	WG13	R58	4.900 - 7.050	12.00 (305)	1.05	1.05	7.0 (178)	4.7 (119)	3.25 (83)	3.25 (83)	1.05	2.0 (52)	2.5 (64)
			5.725 - 6.425		1.02	1.02					1.02		
WR187	WG12	R48	3.95 - 5.85	12.00 (305)	1.05	1.05	7.0 (178)	6.6 (168)	5.0 (127)	5.0 (127)	1.05	2.3 (58)	2.6 (67)
			4.40 - 5.00		1.02	1.02					1.02		
WR229	WG11	R40	3.30 - 4.90	18.00 (457)	1.05	1.05	7.8(198)	7.8(198)	6.0 (152)	6.0 (152)	1.05	2.5 (64)	3.0 (76)
			3.54 - 4.20		1.02	1.02					1.02		

* Not available. ** Maximum Leg Length 24" (610 mm) for all waveguide sizes, for either Swept or Miter bends. † Available on request.

Taper Transitions



Flange	Flange	Type Number
CPR159G	CPR137G	**T137CCN**
CPR159G	UG Cover/Gasket (WR137)	**T137YCN**
CMR159	CMR137	**T137EEN**
CMR159	CPR137G	**T137CEN**
CPR137G	CPR112G	**T112CCN**
CPR137G	UG Cover/Gasket (WR112)	**T112YCN**
UG Cover/Gasket (WR137)	UG Cover/Gasket (WR112)	**T112YYN**
UG Cover/Gasket (WR112)	UG Cover/Gasket (WR90)	**T090YYN**
CPR90G	UG Cover/Gasket (WR75)	**T075YCN**
UG Cover/Gasket (WR90)	UG Cover/Gasket (WR75)	**T075YYN**

Taper Transition Size Codes

EIA	RCSC	IEC	Size Code	Frequency (GHz)	Type Number*
WR42 to WR51	WG20 to WG19	R220 to R180	042	17.70 - 20.00	**T042** (WR42 flange) (WR51 flange) (Finish)
WR51 to WR62	WG19 to WG18	R180 to R140	051	15.00 - 18.00	**T051** (WR51 flange) (WR62 flange) (Finish)
WR62 to WR75	WG18 to WG17	R140 to R120	062	12.40 - 15.00	**T062** (WR62 flange) (WR75 flange) (Finish)
WR75 to WR90	WG17 to WG16	R120 to R100	075	10.00 - 12.40	**T075** (WR75 flange) (WR90 flange) (Finish)
WR90 to WR112	WG16 to WG15	R100 to R84	090	8.20 - 10.00	**T090** (WR90 flange) (WR112 flange) (Finish)
WR112 to WR137	WG15 to WG14	R84 to R70	112	7.05 - 8.20	**T112** (WR112 flange) (WR137 flange) (Finish)
WR137 to WR159	WG14 to WG13	R70 to R58	137	5.85 - 7.05	**T137** (WR137 flange) (WR159 flange) (Finish)
WR159 to WR187	WG13 to WG12	R58 to R48	159	4.90 - 5.85	**T159** (WR159 flange) (WR187flange) (Finish)
WR187 to WR229	WG12 to WG11	R48 to R40	187	3.95 - 4.90	**T187** (WR187 flange) (WR229 flange) (Finish)

* Insert flange code from Table 3, page 204 and the finish code: N for Natural (unpainted) or G for Gray (painted)

Flex-Twist Sections

EIA	RCSC	IEC	Frequency (GHz)	VSWR 12-36" (300-915 mm)	VSWR 36-79" (915-2000 mm)	Attenuation dB/ft (dB/m)	Average Power watts	Peak Power kW	Max Twist deg/ft (deg/m)	Min E-Bend Radius in (mm)	Min H-Bend Radius in (mm)	Pressure lb/in (kPa)
WR28	WG22	R320	26.50 - 40.00	On Request	On Request	1.00 (3.28)	75	20	155 (510)	1.5 (38)	3.0 (76)	45 (310)
			37.00 - 40.00	1.20	1.25	1.00 (3.28)	75	20	155 (510)	1.5 (38)	3.0 (76)	45 (310)
WR42	WG20	R220	17.70 - 26.50	1.25	1.35	0.80 (2.62)	100	39	155 (510)	1.5 (38)	3.0 (76)	45 (310)
WR51	WG19	R180	15.00 - 22.00	1.20	1.20	0.55 (1.80)	140	60	135 (445)	1.5 (38)	3.0 (76)	45 (310)
WR62	WG18	R140	12.40 - 18.00	1.10	1.20	0.30 (0.99)	400	100	135 (445)	2.0 (52)	4.0 (102)	45 (310)
WR75	WG17	R120	10.00 - 15.00	1.10	1.13	0.18 (0.59)	750	140	110 (360)	2.5 (64)	4.5 (115)	45 (310)
WR90	WG16	R100	8.20 - 12.4	1.10	1.13	0.13 (0.43)	960	180	95 (310)	2.5 (64)	5.0 (127)	45 (310)
			10.2 - 10.7	1.03	1.05							
			10.7 - 11.7	1.03	1.05							
WR112	WG15	R84	7.050 - 10.00	1.10	1.13	0.12 (0.40)	1,260	315	80 (264)	3.0 (76)	6.0 (152)	35 (240)
			7.125 - 7.750	1.03	1.05							
			7.750 - 8.500	1.03	1.05							
			7.125 - 8.500	1.04	1.05							
WR137	WG14	R70	5.850 - 8.200	1.10	1.10	0.09 (0.30)	2,000	500	65 (214)	4.0 (102)	8.0 (204)	30 (205)
			5.850 - 6.425	1.03	1.05							
			6.425 - 7.125	1.03	1.05							
			7.125 - 7.750	1.03	1.05							
			5.725 - 6.425	1.03	1.05							
			7.425 - 7.925	1.03	1.05							
WR159	WG13	R58	4.900 - 7.050	1.10	1.10	0.08 (2.63)	2,500	1,100	55 (180)	5.0 (127)	10.0 (254)	30 (205)
			5.725 - 6.425	1.03	1.05							
WR187	WG12	R48	3.95 - 5.85	1.10	1.10	0.05 (0.17)	3,000	1,250	50 (165)	6.5 (165)	13.0 (330)	30 (205)
			4.40 - 5.00	1.03	1.05							
WR229	WG11	R40	3.30 - 4.90	1.10	1.10	0.04 (0.13)	4,000	1,550	40 (132)	6.5 (165)	13.0 (330)	30 (205)
			3.54 - 4.20	1.03	1.05							

Common Flange Adapters

Flange Type	FlangeType	Adapter Type Number
UG-51/U	CPR112G	**A112BCN**
UG-52B/U	CPR112G	**A112ACN**
UG Cover/Gasket	CPR137G	**A137CYN**
CMR90	CPR90G	**A090CEN**
CMR112	CPR112G	**A112CEN**
CMR137	CPR137G	**A137CEN**
CMR159	CPR159G	**A159CEN**
CMR187	CPR187G	**A187CEN**
CMR229	CPR229G	**A229CEN**

All above flange adapters have VSWR 1.05 (32.3 dB)

Transition to Type N Female

Flange Adapters are available in many commonly used configurations, and when used with standard components, provide a quick solution to almost any interconnection requirement. All Andrew standard flange adapters are 4 inches (102 mm) in length.

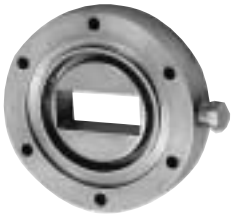
Waveguide to Coaxial Adapters. Other coaxial interfaces (for example, N-type male) are available. Where immediate availability is a consideration, you may choose to order the standard product and use a coaxial adapter to convert the interface. Other waveguide flange options are available on request.

Waveguide to Coaxial Adapters

						Waveguide to Coax Adapters	
EIA	RCSC	IEC	Size Code	Frequency Code	Frequency (GHz)	Type N VSWR	SMA VSWR
WR28	WG22	R320	028	S	26.50 - 40.00	**	**
				A	37.00 - 40.00	**	**
WR42	WG20	R220	042	S	17.70 - 26.50	**	1.35
WR51	WG19	R180	051	S	15.00 - 20.00	**	1.05
WR62	WG18	R140	062	S	12.40 - 18.00	1.25	1.25
WR75	WG17	R120	075	S	10.00 - 15.00	1.20	1.25
WR90	WG16	R100	090	S	8.20 - 12.4	1.20	On Request
				A	10.2 - 10.7	1.10	On Request
				B	10.7 - 11.7	1.10	On Request
WR112	WG15	R84	112	S	7.050 - 10.00	1.20	On Request
				A	7.125 - 7.750	1.10	On Request
				B	7.750 - 8.500	1.10	On Request
				C	7.125 - 8.500	1.15	On Request
WR137	WG14	R70	137	S	5.850 - 8.200	1.15	On Request
				A	5.850 - 6.425	1.10	On Request
				B	6.425 - 7.125	1.10	On Request
				C	7.125 - 7.750	1.10	On Request
				D	5.725 - 6.425	1.10	On Request
				E	7.425 - 7.925	1.10	On Request
WR159	WG13	R58	159	S	4.900 - 7.050	1.15	On Request
				A	5.725 - 6.425	1.10	On Request
WR187	WG12	R48	187	S	3.95 - 5.85	1.20	On Request
				A	4.40 - 5.00	1.10	On Request
WR229	WG11	R40	229	S	3.30 - 4.90	1.10	On Request

** The frequency range for these components is too high for normal operation of Type N or SMA coaxial interfaces.
Coaxial interface Codes: Type N Female (N), SMA Female (S).

Rectangular Waveguide Components

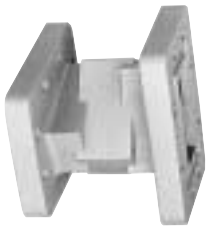


Pressure Inlet

Pressure Window

Field Flange

Silver Solder Flange



Premium 90º Step-Twist

Pressure Inlet is 0.62-1.00 inches (16-25 mm) thick, depending on waveguide size, machined brass section with 1/8" female pipe thread and plug. Unit does not have a pressure window.

Pressure Window. Maximum pressure for window is 10 lb/in^2 (70 kPa). Unit does not have a pressure inlet. High power versions for earth station applications are presented on page 212.

Thickness of standard pressure windows:

All except 55000A-42, -75, -90, -137, -187, 112587, 110088 .....0.06 in (1.5 mm)

55000A-75, -137, -187, 110088: ....0.229 in (5.8 mm)

55000A-42, 112587: .....0.375 in (9.5 mm)

Pressure Window/Inlet. Combination of above pressure window and pressure inlet.

Field Flanges are for field fabrication of waveguide sections for use on interior waveguide runs. Flange hardware and pressure gasket are included. Use soft solder to attach.

Silver Solder Flanges are manufactured to EIA or MIL specifications. The flanges are not intended for field installation. Hardware is not included. Material is brass.

Flange Gaskets and Hardware. Andrew waveguide components are supplied with hardware and flange sealing gasket. Waveguide components with identical or compatible flange (for example, choke and cover), are supplied with one flange hardware kit. If the flanges differ or are incompatible (for example, PDR and PBR), one hardware kit for each flange is supplied.

Andrew IEC hardware kits do not include shouldered bolts (according to IEC154-2), however the set screws provided allow these kits to be cost effective while minimizing flange misalignment VSWR. The quoted VSWR for all IEC flanged components for all Andrew waveguide components are achievable using the hardware kits supplied.

Premium 90° Step-Twist. Recommended for very high channel density systems. The Step-Twist can be used when space is limited.

Other Components with UG Choke/UG Cover, U.S. MIL Standard Flanges

Waveguide Size	WR187	WR137	WR112	WR90	WR75	WR62	WR42
Choke Flange	UG-148C/U	UG-343B/U	UG-52B/U	UG-40B/U	WR75	UG-541A/U	UG-596A/U
Cover Flange	UG-149A/U	UG-344/U	UG-51/U	UG-39/U	WR75	UG-419/U	UG-595/U
Pressure Inlet	55675-187	55675-137	55675-112	55675-90	55675-75	55675-62	55675-42
Pressure Window	55000A-187	55000A-137	55000-112	55000A-90	55000A-75	55000-62	55000A-42
Pressure Window / Inlet	–	53648-137	–	53648-90	53648-75	–	53648-42
Field Choke Flange	53015-187	53015-137	53015-112	53015-90	53015-75	53015-62	53015-42
Field Cover Flange	53025-187	53025-137	53025-112	53025-90	53025-75	53025-62	53025-42
Silver Solder Choke Flange	52084	17690	52153	22534	51752	53238	53558
Silver Solder Cover Flange	52086-2	19048-3	52152-2	19056-2	51745-2	53239-2	53559-2
Flange Hardware Kit	55224-187	55224-137	55224-112	55224-90	55224-75	55224-62	55224-42
Flange Gasket	10683-307	10683-304	10683-305	10683-329	10683-312	10683-319	10683-328

Other Components with PBR Series, IEC Standard Flanges

Waveguide Size	R84	R100	R120	R140	R220	R320
Both Flanges	PBR84	PBR100	PBR120	PBR140	PBR220	PBR320
Pressure Inlet	–	–	243495-120	243495-140	243495-220	243495-320
Pressure Window	243498-84	243498-100	110088	110089	112587	112626
Silver Solder Flange	–	–	108671-2	110107	110037	110079
Flange Hardware Kit	100845-12	100845-13	100845-8	100845-11	106838	107031
Flange Gasket	114111	10683-75	10683-74	114110	10683-71	10683-451

Other Components with CPR Series, EIA Standard Flanges

Waveguide Size	WR229	WR187	WR159	WR137	WR112	WR90
Both Flanges	CPR229G	CPR187G	CPR159G	CPR137G	CPR112G	CPR90G
90° Step Twist	65230-229	–	65230-159	65230-137†	–	–
Pressure Inlet	55674-229	55674-187	55674-159	55674-137	55674-112	55674-90
Pressure Window	55001-229	55001-187	55001-159	55001-137	55001-112	55001-90
Pressure Window/Inlet	–	–	55463-159	55463-137	55463-112	55463-90
Field Flange	56045-229	56045-187	56045-159	56045-137	56045-112	56045-90
Silver Solder Flange	55456-1	56309-1	54754-1	62137-3	54560-1	54681-2
Flange Hardware Kit	55219-229	55219-187	55219-159	55219-137	55219-112	55219-90
Full Thickness Flange Gasket	31619	55688	54769	28030	32349	31861
Half Thickness Gasket	55072-229	55072-187	55072-159	55072-137	55072-112	55072-90

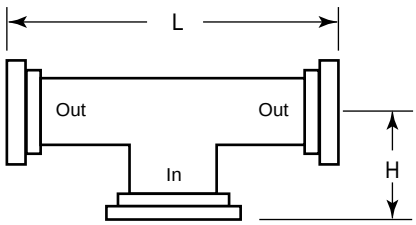
Other Components with PDR Series, IEC Standard Flanges

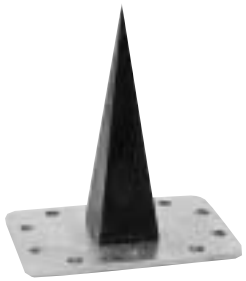
Waveguide Size	R40	R48	R70	R84	R100	R120	R140	R180
Both Flanges	PDR40	PDR48	PDR70	PDR84	PDR100	PDR120	PDR140	PDR180
Pressure Inlet	114112-40	114112-48	114112-70	114112-84	114112-100	114112-120	114112-140	On Request
Pressure Window	223306-40	223306-48	223306-70	223306-84	223306-100	223306-120	223306-140	223306-180
Silver Solder Flange	110066	221715-48	221715-70	221715-84	221715-100	221715-120	221715-140	110181
Flange Hardware Kit	100899-5	107709	106803	100845-6	107132	100845-3	100845-7	107681
Flange Gasket	106945	107710	104246	107192	107144	106337	107206	107682

† Specify 5.925-6.425, 6.425-7.125, or 7.125-7.750 GHz

High Power Components for Earth Station Applications

Waveguide Size	Frequency Band, GHz	Flex Twist and Flex (No Twist) 1 ft (0.3 m)	2 ft (0.6 m)	3 ft (0.9 m)	Pressure Window Type No.	Average Power watts	Flange Mates with	VSWR max. (R.L., dB)
Flex-Twist Section								
WR137	5.925-6.425	**162047-12**	**162047-24**	**162047-36**	–	2900	CRP137G	1.10 (26.4)
WR75	10.95-14.5	**163228-12**	**163228-24**	**163228-36**	–	1000	Cover and Cover/Gasket	1.10 (26.4)
Flex (No Twist) Section								
WR137	5.850-8.200	**162048-12**	**162048-24**	**162048-36**	–	4400	CPR137G	1.10 (26.4)
Pressure Window								
WR137	5.850-6.425	–	–	–	**202378**	1000	CPR137G	1.10 (26.4)
					202378-2	5000	CPR137G	1.10 (26.4)
WR159	5.850-6.425	–	–	–	**202378-5**	5000	CPR159G	1.10 (26.4)
WR75	14.0-14.5	–	–	–	**202378-3**	2000	Choke and cover	1.10 (26.4)
					202378-4	500	Choke and cover	1.10 (26.4)





Power Dividers have 1.03 maximum VSWR, within the operating band stated in the table below. Insertion loss is 3 ±0.25 dB for each port. Power divides from "In" port to "Out" ports. Refer to diagram. Power dividers cannot be used as combiners.

Standard Termination Loads for unused rectangular waveguide port of dual polarized microwave antennas. Maximum VSWR is 1.10. Low VSWR loads for use with circular waveguide transitions are listed on page 223. Flange blanking plates, and termination loads used with IEC flange types are available on request.

Two-Way Power Dividers

Waveguide Type	Frequency Band, GHz	Flanges Mate With	Dimensions in (mm) L	H	Type No.
WR75	12.7-13.2	WR75 Choke or Cover**	5.00 (127)	1.38 (33)	**62832-127**
WR137	5.925-6.425	UG-344/U, UG-343B/U**	5.00 (127)	1.69 (43)	**62835-59**
WR137	6.425-7.125	UG-344/U, UG-343B/U**	5.00 (127)	1.69 (43)	**62835-64**
WR137	6.425-7.125	CPR137G	5.00 (127)	1.69 (43)	**62844-64**

**Compatible cover/gasket flanges mate with either choke or cover flanges.

Standard Termination Loads

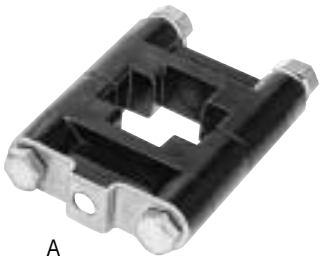
Mates with Flange Type	Load Type No.
CPR229G	**39099-229**
CPR187G	**39099-187**
UG-148C/U	**39098-187**
CPR159G	**39099-159**
CPR137G	**39099-137**
UG-343B/U	**39098-137**
CPR112G	**39099-112**
UG-52B/U	**39098-112**
CPR90G	**39099-90**
UG-40B/U	**39098-90**
WR75 Choke	**39098-75**
UG-596A/U	**39098-42**
7/8" EIA Flange	**43734**

Hangers. Hardware is stainless steel. Attach using angle adapter or threaded rod support kit described below.

A Rigid Hanger .....Type **19007-(*)**

A Sliding Hanger .....Type **19008-(*)**

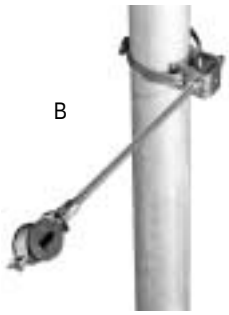
*Insert numeral portion of EIA waveguide designation, for example, 19007-137 is rigid hanger for WR137 waveguide.



A

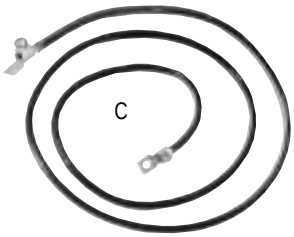
B **Flex-Twist Hanger Assembly**. Use to improve stability and protect flexible waveguide. Includes stainless steel clamp, rod, and form-it rubber grommet.

Waveguide	Type Number
WR28	**244106-320**
WR42	**244106-220**
WR62	**244106-140**
WR75	**244106-120**
WR90	**244106-100**
WR112	**244106-84**
WR137	**244106-70**
WR159	**244106-58**
WR187	**244106-48**
WR229	**244106-40**



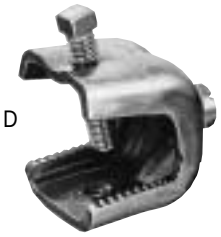
B

C **Current By-Pass Kit**. Five feet (1.5 m) of No. 6 copper wire and lugs to provide a low-loss current path around flexible waveguide sections .....Type **49486**



C

D **Angle Adapter Kit**. Includes 10 stainless steel clamps to mount hangers to angle support members up to 7/8 in (22 mm) thick.....Type **31768A**



D

E **Threaded Rod Support Kit**. Stainless steel. Use to mount hangers away from supporting structure, under waveguide bridge and inside equipment room. Includes 3/8" diameter threaded rod, nuts and washers. Attach to ceiling using included ceiling mounting plate.

12 in (305 mm) rod .....Type **31771**
12 in (305 mm) rod, kit of 5 .....Type **31771-4**
24 in (610 mm) rod .....Type **31771-9**
24 in (610 mm) rod, kit of 5 .....Type **31771-6**

E

Rectangular Waveguide Flanges

A majority of Andrew standard flanges utilized in North America are based on EIA (Electronic Industry Association) or U. S. Military (MIL) standards. IEC (International Electrotechnical Commission) standards are utilized throughout other parts of the world. EIA, MIL and IEC flanges are compatible but not identical. Variations in equivalent flanges include slight differences in nominal dimensions, tolerances, gasket style and thickness, and addition or deletion of alignment pins and holes or alignment bolts. Compatible flanges are listed in the tables on the following pages. The three basic types of flanges utilized throughout the industry are unpressurizable contact, pressurizable contact, and choke/cover flanges. It should be noted that these three flange types are not interchangeable.

Unpressurizable Contact Flanges

CMR and UER Series Contact Flanges are not pressurizable and do not require gaskets. CMR flanges are always rectangular in shape, have alternate tapped and clear holes and are secured with bolts only. The IEC equivalents have all clear holes and are secured with bolts, nuts and lock washers.

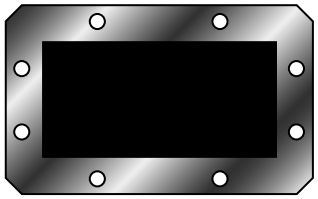


Figure 1
Unpressurizable Contact Flange – Always Rectangular

Unpressurizable Contact Flanges

Waveguide Type, EIA	Flange Series Equivalents EIA	IEC	Fig. No.	Dimensions, Inches (Millimeters)
WR90	CMR90	UER100	1	1.77 x 1.27 (45.0 x 32.3)
WR112	CMR112	UER84	1	2.02 x 1.38 (51.3 x 35.1)
WR137	CMR137	UER70	1	2.28 x 1.53 (57.9 x 38.9)
WR159	CMR159	UER58	1	2.50 x 1.75 (63.5 x 44.5)
WR187	CMR187	UER48	1	2.78 x 1.78 (70.6. x 45.2)
WR229	CMR229	UER40	1	3.16 x 2.00 (80.3 x 50.8)

Flange Availability

Flange Type	Waveguide Size										
	WR28	WR42	WR51	WR62	WR75	WR90	WR112	WR137	WR159	WR187	WR229
Choke	●	●		●	●	●	●	●		●	
Cover	●	●		●	●	●	●	●		●	
CPR( )G						●	●	●	●	●	●
CPR( )F						●	●	●	●	●	●
CMR						●	●	●	●	●	●
CMR Through								●			
CMR Tapped								●			
PDR		●	●	●	●	●	●	●	●	●	●
PBR	●	●		●	●	●	●				
UDR				●	●	●	●			●	
UBR	●	●	●	●	●	●	●				
PAR								●		●	
CBR	Available upon request										
BRJ	Available upon request										
UER								●			
UAR	Available upon request										
Cover/Gasket	●	●		●	●	●	●	●		●	

Choke, Cover and Cover/Gasket Flanges

Choke, cover and cover/gasket flanges are square or round, depending on waveguide size. U. S. MIL and IEC versions are interchangeable. The flanges are pressurizable and require gaskets to ensure proper sealing. The flanges mate as explained below and as specified in the Mating Information table.

Choke Flanges - CBR, CAR and Equivalent UG Series include a gasket groove, choke, and tapped holes for mating with cover flanges. Two choke flanges cannot be mated.

Cover Flanges - UBR, UAR and Equivalent UG Series are flat, without a gasket groove, and have clear holes for mating with choke flanges and other cover flanges. Use of a special seal is required for pressurization of two mating cover flanges.

Cover/Gasket Flanges - PBR and PAR Series are flat, include a gasket groove, and have clear holes for mating with cover, choke, or other cover/gasket flanges. Cover/gasket flanges use a single gasket when mated with cover flanges and a double gasket when mated with choke flanges or other cover/gasket flanges.

C-Series HELIAX® Elliptical Waveguide Connectors (for example, 252DCT) are functionally identical to PAR/PBR (cover gasket) series and the above mating information applies.


Figure 2

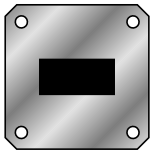


Figure 3

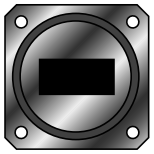


Figure 4

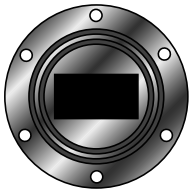


Figure 5

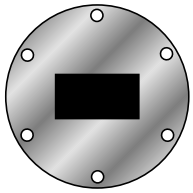


Figure 6

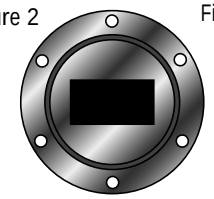


Figure 7

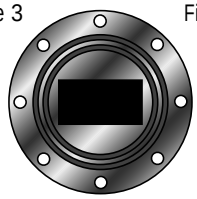


Figure 8

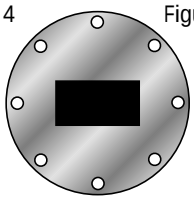


Figure 9

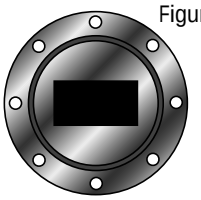


Figure 10

Choke, Cover and Cover/Gasket Flanges

Waveguide Type, EIA	Choke Flanges U.S. MIL	IEC	Fig No.	Cover Flanges U.S. MIL	IEC	Fig No.	Cover/Gasket Flanges IEC	Fig No.	Flange Dimensions Inches (Millimeters)
WR42	UG-596A/U	CRR220	2	UG-595/U	UBR220	3	PBR220	4	0.88 (22.4) sq.
WR62	UG-541A/U	CBR140	2	UG-419/U	UBR140	3	PBR140	4	1.31 (33.3) sq.
WR75	51752*	CBR120	2	51745*	UBR120	3	PBR120	4	1.50 (38.1) sq.
WR90	UG-40B/U	CBR100	2	UB-39/U	UBR100	3	PBR100	4	1.63 (41.4) sq.
WR112	UG-52B/U	CBR84	2	UG-51/U	UBR84	3	PBR84	4	1.88 (47.8) sq.
WR137	UG-343B/U	CAR70	5	UG-344/U	UAR70	6	PAR70	7	3.13 (79.5) dia.
WR159	–	CAR58	5	–	UAR58	6	PAR58	7	3.38 (85.9) dia.
WR187	UG-148C/U	CAR48	8	UG-149A/U	UAR48	9	PAR48	10	3.63 (92.2) dia.
WR284	UG-54B/U	CAR32	8**	UG-53/U	UAR32	9**	PAR32	10**	5.31 (134.9) dia.

*Andrew type numbers for WR75 flanges. **Bolt hole positions are rotated 22.5° from the positions shown.

CPR and PDR series contact flanges are rectangular in shape and have clear holes secured with bolts and nuts. The flanges are pressurizable and require gaskets to ensure proper sealing. The flanges mate as explained below and as specified in the Mating Information table.

CPR( )G Series include a gasket groove and mate with another CPR( )G using the supplied full thickness gasket and U. S. hardware.

PDR Series include a gasket groove and mate with another PDR using the supplied two gaskets and metric hardware. Compared with CPR( )G, PDR flanges have deeper gasket grooves and use different gaskets.

CPR( )F Series do not include a gasket groove and, when mated with another CPR( )F, require a special seal. CPR( )F mates with CPR( )G using a CPR half gasket (order separately from table below).

To Mate CPR( )G with PDR use one CPR half thickness gasket (order separately from table below) and the gasket supplied with the PDR flange. Except where noted otherwise in the table, either U.S. (CPR) or metric (PDR) hardware can be used. Small tolerance differences between U. S. and metric hardware to mate CPR/PDR flanges result in negligible VSWR contributions.

"E-Series" HELIAX Elliptical Waveguide Connectors (for example, 252DET) are functionally identical to CPR( )G series and the above mating information applies.

Pressure Windows normally do not have gasket grooves and include one CPR half-thickness gasket for mating with CPR( )G series flanges.

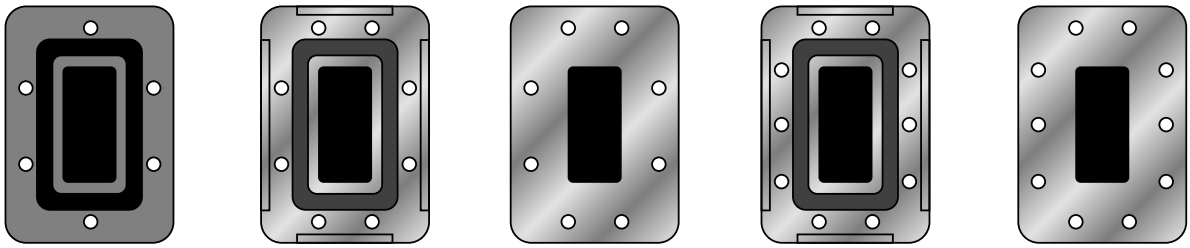


Figure 1 Figure 2 Figure 3 Figure 4 Figure 5

Various Contact Flanges – Always Rectangular

Pressurizable Contact Flanges

Waveguide Type, EIA	With Groove EIA	With Groove MIL Type	With Groove IEC	With Groove Fig. No.	Without Groove EIA	Without Groove MIL Type	Without Groove Fig. No.	Dimensions, Inches (Millimeters)
WR75	–	–	PDR120	1	–	–	–	1.94 x 1.57 (49.2 x 39.9)
WR90	CPR90G	UG-1360/U	PDR100*	2	CPR90F	UG-1736/U	3	2.09 x 1.59 (53.1 x 40.4)
WR112	CPR112G	UG-1358/U	PDR84*	2	CPR112F	UG-1734/U	3	2.50 x 1.75 (63.5 x 44.5)
WR137	CPR137G	UG-1356/U	PDR70**	2	CPR137F	UG-1732/U	3	2.69 x 1.94 (68.3 x 49.3)
WR159	CPR159G	UG-1354/U	PDR58	2	CPR159F	UG-1730/U	3	3.19 x 2.44 (81.0 x 62.0)
WR187	CPR187G	UG-1352/U	PDR48	2	CPR187F	UG-1728/U	3	3.50 x 2.50 (88.9 x 63.5)
WR229	CPR229G	UG-1350/U	PDR40	4	CPR229F	UG-1726/U	5	3.88 x 2.75 (98.6 x 69.9)
WR284	CPR284G	UG-1348/U	PDR32	4	CPR284F	UG-1724/U	5	4.50 x 3.00 (114 x 76.2)
WR340	CPR340G	UG-1346/U	PDR26	4	CPR340F	UG-1712/U	5	5.44 x 3.75 (138 x 95.3)
WR430	CPR430G	UG-1344/U	PDR22	4	CPR430F	UG-1716/U	5	6.34 x 4.19 (161 x 106)

*Mates with equivalent CPR series flange with 4 mm hardware only. **Mates with equivalent CPR series flange with U.S. #10 hardware only.

Mating Information

Choke/Cover Flanges (Square or Round)

	Choke UG	Choke CBR, PBR	Cover UG	Cover UBR,UAR	Cover/Gasket PBR, PAR
Choke UG	Does NOT Mate	Does NOT Mate	Mates	Mates	Mates
Choke CBR, CAR	Does NOT Mate	Does NOT Mate	Mates	Mates	Mates
Cover UG	Mates	Mates (NOT pressurizable)	Mates (NOT pressurizable)	Mates	Mates
Modified UG Cover w/ Gasket Groove	Mates	Mates	Mates	Mates	Mates
Cover UBR, UAR	Mates	Mates (NOT pressurizable)	Mates (NOT pressurizable)	Mates	Mates
Cover/Gasket PBR, PAR, #	Mates	Mates	Mates	Mates	Mates

Also applies to "C-series " and "M-series" (Metric) HELIAX® elliptical waveguide connectors (for example, 252DCT, 252DCMT).

Contact Flanges (Rectangular)

	CPR( )G	CPR( )F	PDR
CPR90G†	Mates	Mates using Half Thickness Gasket 55072-90*	Mates using Half Thickness Gasket 55072-90* and 4 mm Hardware**
CPR112G†	Mates	Mates using Half Thickness Gasket 55072-112*	Mates using Half Thickness Gasket 55072-112 * and 4 mm Hardware**
CPR137G†	Mates	Mates using Half Thickness Gasket 55072-137*	Mates using Half Thickness Gasket 55072-137 *and #10 Hardware***
CPR159G†	Mates	Mates using Half Thickness Gasket 55072-159*	Mates using Half Thickness Gasket 55072-159* and Either Hardware Supplied
CPR187G†	Mates	Mates using Half Thickness Gasket 55072-187*	Mates using Half Thickness Gasket 55072-187* and Either Hardware Supplied
CPR229G†	Mates	Mates using Half Thickness Gasket 55072-229*	Mates using Half Thickness Gasket 55072-229* and Either Hardware Supplied
CPR284G†	Mates	Mates using Half Thickness Gasket 55072-284*	Mates using Half Thickness Gasket 55072-284* and Either Hardware Supplied
CPR90F	Mates using Half Thickness Gasket 55072-90*	Mates (NOT Pressurizable)	Mates using 4 mm Hardware**
CPR112F	Mates using Half Thickness Gasket 55072-112*	Mates (NOT Pressurizable)	Mates using 4 mm Hardware**
CPR137F	Mates using Half Thickness Gasket 55072-137*	Mates (NOT Pressurizable)	Mates using #10 Hardware***
CPR159F	Mates using Half Thickness Gasket 55072-159*	Mates (NOT Pressurizable)	Mates using Either Hardware Supplied
CPR187F	Mates using Half Thickness Gasket 55072-187*	Mates (NOT Pressurizable)	Mates using Either Hardware Supplied
CPR229F	Mates using Half Thickness Gasket 55072-229*	Mates (NOT Pressurizable)	Mates using Either Hardware Supplied
CPR284F	Mates using Half Thickness Gasket 55072-284*	Mates (NOT Pressurizable)	Mates using Either Hardware Supplied
PDR180†	Does NOT Mate	Does NOT Mate	Mates
PDR140†	Does NOT Mate	Does NOT Mate	Mates
PDR120†	Does NOT Mate	Does NOT Mate	Mates
PDR100†	Mates using Half Thickness Gasket 55072-90* and 4mm Hardware**	Mates using 4 mm Hardware**	Mates
PDR84†	Mates using Half Thickness Gasket 55072-112 * and 4mm Hardware**	Mates using 4 mm Hardware**	Mates
PDR70†	Mates using Half Thickness Gasket 55072-137 * and #10 Hardware***	Mates using #10 Hardware***	Mates
PDR48†	Mates using Half Thickness Gasket 55072-187* and Either Hardware Supplied	Mates using Either Hardware Supplied	Mates
PDR40†	Mates using Half Thickness Gasket 55072-229* and Either Hardware Supplied	Mates using Either Hardware Supplied	Mates
CMR	Mates with CMR and UER "ONLY"		
UER	Mates with CMR and UER "ONLY"		

* Purchase separately ** Supplied in PDR Hardware Kit *** Supplied in CPR Hardware Kit

† Also applies to "E-series" and "M-series" (Metric) HELIAX® elliptical waveguide connectors (for example, 252DET , 252DEMT).

Lowest Attenuation

Circular waveguide offers substantially lower attenuation than elliptical or rectangular waveguide. This can result in the use of smaller antennas, reducing tower loading and saving antenna cost.

Dual Polarization Capability

A single waveguide run can carry two polarizations with 30 dB minimum isolation, eliminating the need for a second waveguide run.

Full Range of Transitions and Components

Simplifies system planning. All elements are designed to work together, maximizing system performance.

General

Circular waveguide is used for long vertical feeder runs in systems where multiband capability is needed or where low attenuation is critical. The axial symmetry of circular waveguide allows the simultaneous propagation of two orthogonal TE_{11} modes. A single waveguide run can carry two polarizations with 30 dB minimum isolation.

Electrical Characteristics

Closed and Open Systems. Circular waveguide systems which have circular-to-rectangular transitions at both ends are considered “closed” systems. Horn-reflector antennas fed directly with circular waveguide have only one circular-to-rectangular transition (at the bottom) and are considered “open”.

Attenuation curves are illustrated on pages 230 and 231. Add 0.3 dB to allow for the transitions in a “closed” system and 0.15 dB in an “open” system.

VSWR (Return Loss, dB) for a complete single-polarized system, of any length, including straight sections and transitions (except 17.7 - 19.7 GHz), is guaranteed 1.04 (34.2) maximum and is typically 1.03 (36.6) maximum. A similar dual-polarized system is guaranteed 1.06 (30.7) maximum and is typically 1.04 (34.2) maximum. A single or dual polarized 17.7 - 19.7 GHz system is guaranteed 1.15 (23.1) maximum.

RML (reconverted mode level) is the level of higher order mode energy reconverted to the dominant mode in a circular waveguide system. In a closed system, higher modes become trapped within the circular waveguide because they cannot propagate in the connecting rectangular waveguide. Ground delay distortion and noise result when a portion of this energy, delayed in time, is reconverted to the dominant mode. Andrew circular waveguide systems are designed for minimum RML. Each circular-to-rectangular transition includes a non-linear tapered circular-to-circular transition section to minimize the generation of unwanted modes and prevent their propagation into the circular-to-rectangular transition section. In addition, Andrew offers a circular-to-rectangular transition with a built-in mode filter (for TM_{01} and TE_{21}) for use at the bottom of a closed system. These unwanted modes are not trapped in an “open” system and the bottom mode filter is, therefore, not needed. However, depending on the operating frequency, the TM_{11} mode can sometimes be generated in an “open” system and a TM_{11} mode filter (described on page 223) may be required.

Circular Waveguide Straight Sections

Andrew circular waveguide is made of heavy-wall high conductivity copper tubing, specially coated to prevent corrosion and deterioration of attenuation characteristics. Stainless steel hardware and flange gaskets are included. Order straight sections from table below.

Frequency Band Codes

Operating Band, GHz	Circular Waveguide Frequency Band Code	Antenna Frequency Band Code
3.54-4.2	-11	-35
5.925-6.425	-3	-59
6.425-7.125	-4	-65
7.125-7.7	-5	-71
7.725-8.500	-7	-77
10.7-11.7	-8	-107
12.2-12.7	-9	-122
12.7-13.25	-10	-127
17.7-19.7	-23	-180

Straight Section Ordering Information

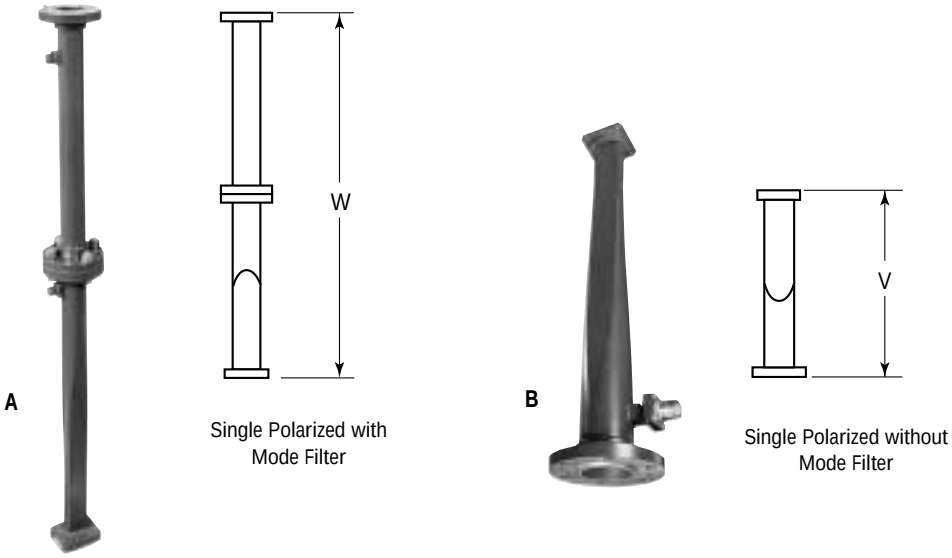
Length	Flanges	WC281	WC166	WC109
Recommended Operating Bands, GHz*** (Specify Operating Band)		3.54-4.2 5.925-6.425 10.7-11.7 6.425-7.125	5.925-6.425 6.425-7.125 7.125-7.750 7.725-8.500 10.7-11.7	10.7-11.7 12.2-12.7 12.7-13.25 17.7-19.7
20 ft*	**Fixed**	**244936-240-(†)**	**57458-240-(†)**	**54346-240-(†)**
Special Length	Fixed Swivel/Fixed	244936-(**)-(†) 244932-(**)-(†)	57458-(**)-(†) 244923-(**)-(†)	54346-(**)-(†) 54345-(**)-(†)
Weight, lb/ft (kg/m)		3.6 (5.4)	2.8 (4.2)	1.2 (1.8)

* Standard straight sections shipped from Scotland are 6 meters.
** Specify length in inches or millimeters.
*** For other bands, contact Andrew.
† Insert frequency band code from table.

These transitions convert from circular-to-rectangular waveguides at one or both ends of the vertical run. Transitions include swivel flanges to simplify installation and polarization alignment. Both rectangular waveguide inputs on dual-polarized transitions enter the circular waveguide in the same plane†. This simplifies installation and routing. Alignment pins, flange hardware, pressure gaskets, and circular waveguide taper sections are included with the transition.

"Open" horn-reflector antenna systems use one transition without a mode filter at the bottom of the circular waveguide run. All other antenna systems use transitions at the top and bottom of the circular waveguide run. For these, a transition without a mode filter is used at the top and a transition with a mode filter is used at the bottom.

† Patented United States 3,924,205; Canada 965,852; United Kingdom 1,394,334; Italy 984,278 and pending in other countries.



Single Polarized with Mode Filter

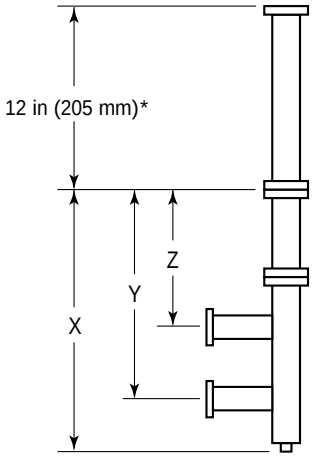
Single Polarized without Mode Filter

Single Polarized Circular-to-Rectangular Waveguide Transitions**

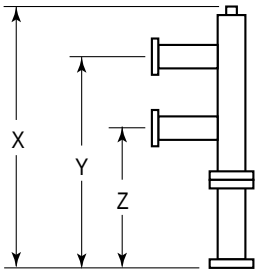
Frequency Band, GHz	Rectangular Flange Mates with EIA or Mil	IEC***	With Mode Filter (A)	No Mode Filter (B)	Dimensions, in (mm) V	W
WC166						
5.925-6.425	CPR137G	PDR70	**65239-3**	**58016A-3**	18.0 (457)	30.0 (762)
6.425-7.125	CPR137G	PDR70	**65240-1**	**64157A-1**	18.0 (457)	30.0 (762)
7.125-7.750	CPR137G	PDR70	**65322-1**	**65321A-1**	18.0 (457)	30.0 (762)
7.725-8500	CPR112G	PDR84	**65323-3**	**57459A-3**	18.5 (470)	30.5 (775)
WC109						
10.700-11.700	CPR90G	PDR100	**65242-107**	**57222A-107**	13.6 (345)	25.6 (650)
12.200-12.700	WR75 Cover/Gasket*	–	**65242-122**	**57222A-122**	13.8 (351)	25.8 (655)
12.700-13.250	WR75 Cover/Gasket*	–	**67550**	**67549**	13.8 (351)	25.8 (655)

* Andrew "Cover/Gasket" flanges mate with either choke or cover flanges or the corresponding HELIAX® elliptical waveguide connectors.
** Not applicable for horn-reflector antenna systems. Use dual polarized transition with one port terminated with load. (page 223)
*** For detailed information on mating flanges refer to pages 214-218.

Circular-to-Rectangular Waveguide Transitions



Dual Polarized with Mode Filter



Dual Polarized without Mode Filter

* Except 160515-177 is 18 in (457 mm)

Dual Polarized Circular-to-Rectangular Waveguide Transitions

Frequency Band, GHz	Rectangular Flange Mates with EIA or Mil	Rectangular Flange Mates with IEC**	With Mode Filter (C)	No Mode Filter (D)	Dimensions, in (mm) X	Y	Z
WC281							
3.700-4.200	CPR229G	PDR40	–	**69385**	32.8 (833)	30.1 (765)	23.0 (584)
WC166							
5.925-6.425	CPR137G	PDR70	**65236-1**	**62866A-1**	19.9 (505)	16.9 (429)	11.4 (190)
5.925-6.425	CPR159G	PDR58	**65237-1**	**64159A-1**	19.9 (505)	16.9 (429)	11.4 (190)
6.425-7.125	CPR137G	PDR70	**65238-1**	**64147A-1**	19.9 (505)	16.9 (429)	11.4 (190)
7.125-7.750	CPR137G	PDR70	**65324-1**	**64848A-1**	17.3 (439)	14.3 (363)	9.8 (249)
7.725-8.500	CPR112G	PDR84	**65316-1**	**64703A-1**	19.1 (485)	16.1 (409)	12.0 (305)
10.700-11.700	CPR90G	PDR100	–	**69383**	23.0 (584)	22.0 (559)	17.6 (447)
WC109							
10.700-11.700	CPR90G	PDR100	**65241-107**	**64100A-107**	14.1 (358)	11.1 (282)	8.6 (218)
12.200-12.700	WR75 Cover/Gasket*	–	**65241-122**	**64100A-122**	12.6 (320)	9.6 (244)	7.4 (188)
12.700-13.250	–	PDR120	**69876**	**69877**	10.5 (267)	9.6 (244)	7.4 (188)
12.700-13.250	WR75 Cover/Gasket*	–	**68999**	**68998**	12.6 (320)	9.6 (244)	7.4 (188)
17.700-19.700	UG-596A/U, UG-595U	CBR220, UBR220, PBR220	**160515-177**††	**160516-177**††	16.8 (427)	15.6 (396)	14.0 (356)

• Andrew "Cover/Gasket" flanges mate with either choke or cover flanges or the corresponding HELIAX® elliptical waveguide connectors.

** For detailed information on mating flanges refer to pages 214-218.

†† Includes termination load for single polarized applications.

A Termination Load for unused rectangular waveguide port of dual-polarized transitions. Maximum VSWR is 1.02 within the operating bands specified for transitions. Pressurizable.

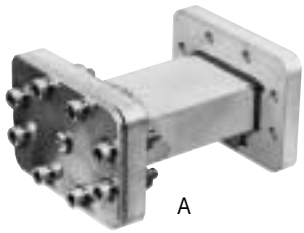
Flange Type	Load Type No.
CPR90G	**62901-90**
CPR112G	**62901-112**
CPR137G	**62901-137**
CPR159G	**62901-159**
CPR229G	**62901-229**
WR75 Cover/Gasket	**62900-75**
WR112 Cover/Gasket	**62900-112**
WR137 Cover/Gasket	**62900-137**

B Axial Ratio Compensator. Rotatable clamp installed at the bottom of the circular waveguide run and adjusted to provide maximum polarization isolation. One required for single-polarized run. One, two, or three are required (see table) for dual-polarized runs.

For	Photo Ref.	Clamp Type No.	Maximum Length of Waveguide, ft (m) 1 Clamp	2 Clamps	3 Clamps
WC281	B	**64271**	200 (60)	400 (120)	600 (180)
WC166	B	**57568**	200 (60)	400 (120)	600 (180)
WC109	B	**54348**	150 (45)	300 (90)	450 (135)

Horn-Reflector System Mode Filter. Reduces group delay ripple by TM_{11} higher order mode to less than 3 nanoseconds per hop. Recommended for dual-band systems and single-band systems operating in the higher of the two frequency bands listed in the table. Not required for waveguide runs shorter than 25 feet (7.6 m). Top flange is WC281.

Bottom Flange	Frequency Bands, GHz	Type No.	Length in (mm)
WC281	3.6-4.2, 5.925-6.425	**69907**	42 (1067)
WC281	3.6-4.2, 6.425-7.125	**69908**	72 (1829)
WC281	5.925-6.425, 10.7-11.7	**162240**	78 (1981)
WC269	3.6-4.2, 5.925-6.425	**69485**	42 (1067)
WC166	5.925-6.425, 10.7-11.7	**69910**	57 (1448)



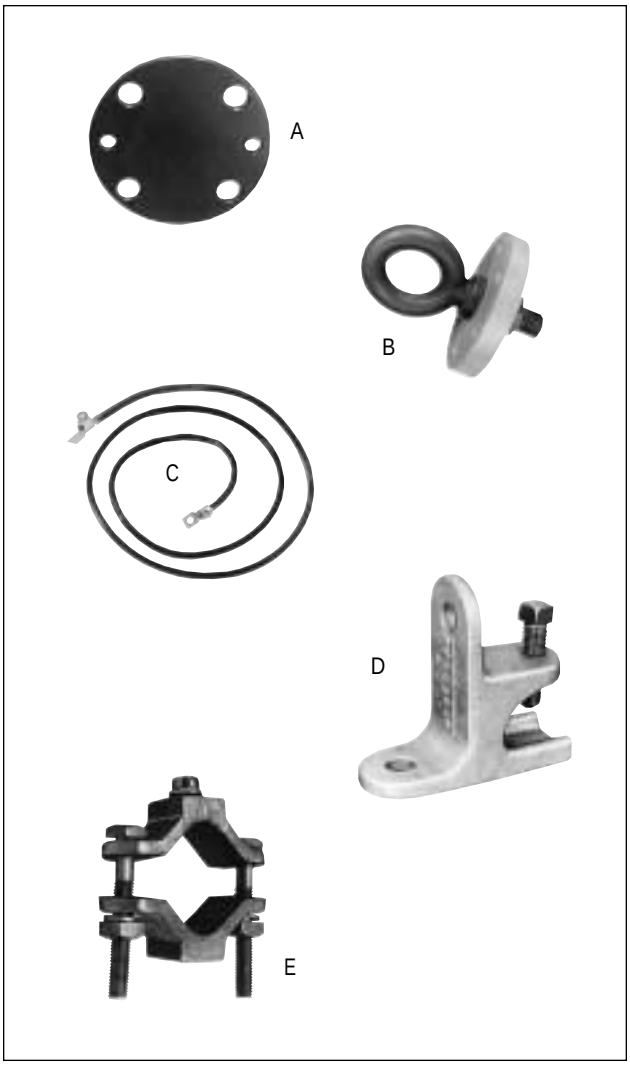
A

B

Taper Transitions convert from one circular waveguide size to another or from circular to square waveguide. Stainless steel hardware and flange gaskets are included.

From	To	Transition Type No.	Length in (mm)
Circular-to-Circular Waveguide			
WC281 Swivel	WC269	**69273**	6 (152)
WC281 Swivel	WC212	**49545**	18 (457)
WC281 Swivel	WC205	**69272**	18 (457)
WC281 Swivel	WC166	**69271**	18 (457)
WC281 Swivel	WC109	**69269**	18 (457)
WC269 Swivel	WC212	**69492**	18 (457)
WC166	WC109	**69277**	11 (279)
WC166	WC75	**69382**	17 (432)
WC109	WC75	**55648**	6 (152)
Circular-to-Square Waveguide			
WC281	WS176	**202559**	30 (762)
WC166	WS108	**205137**	19 (483)

Accessories



A **Alignment Shorting Plate**. A brass plate used during initial alignment. It is installed at the top of the run while the axial ratio compensator is adjusted. See table below.

B **Pulling Head**. Attaches to top waveguide section flange. Waveguide sections can be assembled at ground level and the entire assembly lifted into place on the tower (not required if sections are to be lifted individually and assembled on the tower). See table below.

C **Current By-Pass Kit**. Five feet of No. 6 copper wire and lugs to provide a low-loss current path around flexible waveguide sections .....Type **49486**

WC281 Waveguide Flange Alignment Wrench. (Not shown) Vice grip wrench with stainless steel rollerbearing chain .....Type **48607**

Flange Hardware Kit (Not shown) Includes a set of hex-head bolts, nuts, lock washers, and pressure gaskets, sufficient to join two circular waveguide flange units. This hardware kit is provided with each section of circular waveguide and is also available individually. All hardware is stainless steel. See table below.

Adapters

D **Angle Member Adapter Kit** of 1 for mounting sliding or spring/sliding hangers to angle or flat tower members up to 7/8 in (22 mm) thick.....Type **13555A**

E **Round Member Adapter Kit** of 10. Includes two cast iron clamp halves with stainless steel hardware for mounting hangers to round tower members 1-3 in (25-75 mm) in diameter .....Type **65500**

Accessory Type Numbers

	WC281	WC166	WC109
Alignment Shorting Plate	**64382**	**57569**	**56207**
Pulling Head	**64775-281**	**64775-166**	**64775-109**
Flange Hardware Kit	**48614**	**57570-1**	**54109**

Circular Waveguide Support Systems

The Andrew standard support system uses the rigid, spring/sliding, and sliding hangers. This system is available for all sizes except WC281. Typical system planning information is presented on pages 219 and 220. A second method, for horn-reflector antennas, is KS compatible and uses sliding restrainers. It is available for WC281 and WC166.

Andrew Standard Circular Waveguide Support System Components

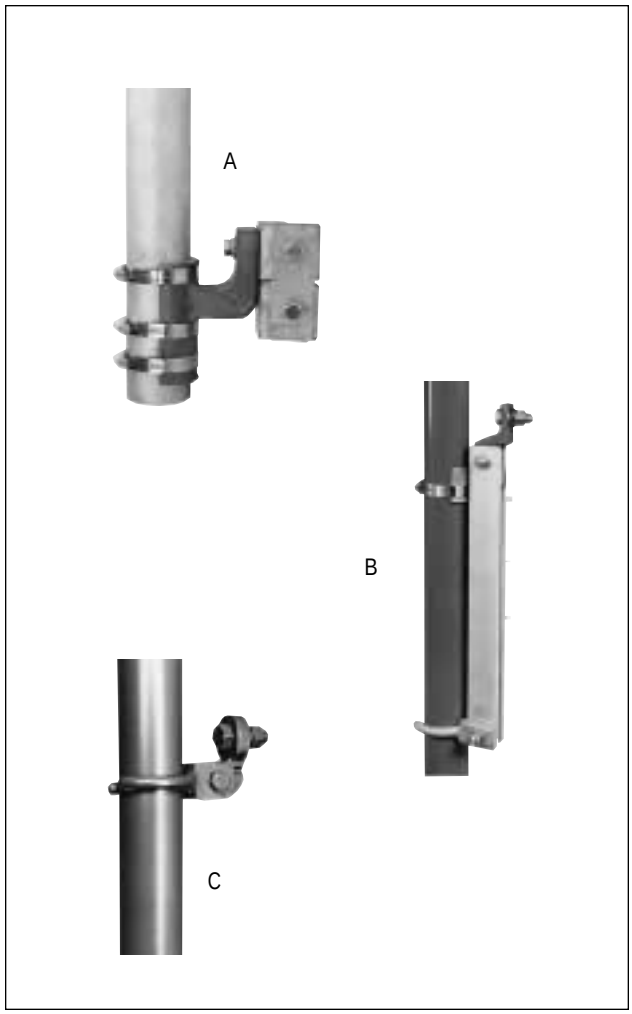
Hangers are used to mount circular waveguide in a spring-suspended system on a tower or other support structure and to accommodate the differential expansion and between between the waveguide and the tower or support structure. Hangers are brass with 3/8" stainless steel mounting hardware.

Tower members should be drilled only with the consent of the tower manufacturer because of possible weakening of the structure. If holes are not provided and cannot be drilled, angle members or round member adapters are used to attach the hangers to the tower.

A **Rigid Hangers** anchor the circular waveguide to the tower at the top of the waveguide run. Includes one heavy-duty angle adapter. See table below.

B **Spring/Sliding Hangers** support the waveguide, limit lateral motion, and accommodate differential expansion and contraction. See table below.

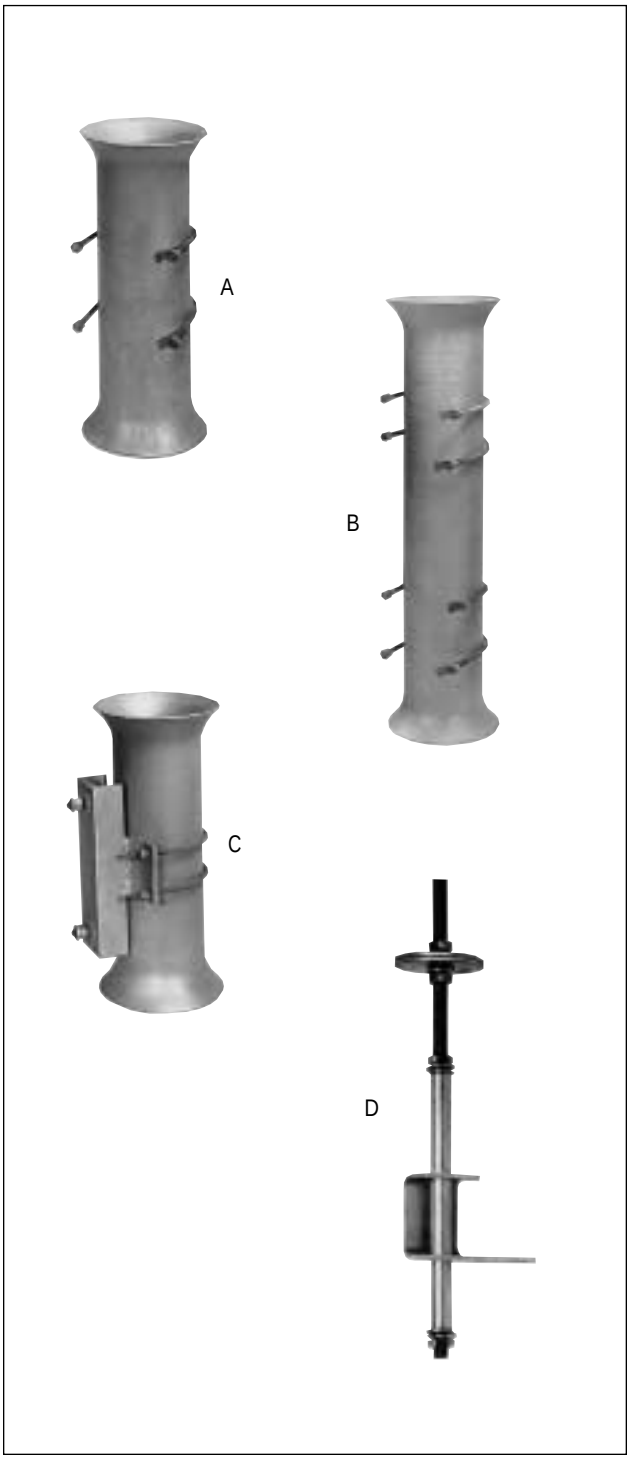
C **Sliding Hangers** limit lateral motion. See table below.



Hangers

Waveguide	Rigid	Sliding	Spring/Sliding
WC166	**69932**	**69933**	**69934**
WC109	**19007A-109**	**19008A-109**	**19009A-109**

Hanger Placement. One rigid hanger is required 6 to 12 in (150 to 300 mm) below the top waveguide section flange. For horn-reflector antenna systems, the rigid hanger is used only during installation. It is replaced with a spring/sliding hanger after the waveguide run is in place. For WC109 and WC166, sliding hangers and spring/sliding hangers are used alternately at 8 to 12 ft (2.4 to 3.7 m) intervals.



KS Compatible Circular Waveguide Support System Components

In this system the entire weight of the circular waveguide run is supported at the mounting frame assembly of the horn-reflector antenna using the waveguide support assembly and support plate. The Wilson bolt assembly allows precision height adjustment of the waveguide run and sliding restrainers restrict the lateral movement of the waveguide.

A **Sliding Restrainer**, 18 in (460 mm). Position every 12 ft 6-1/4 in at all circular waveguide flange joints. Includes two 3/8" x 6" on-center U-bolts and hardware to interface with customer-supplied support brackets. See table below.

B **Sliding Restrainer**, 30 in (760 mm). Position every 12 ft 6-1/4 in at all circular waveguide flange joints. Used in place of item A (above) beyond 175 ft (55 m) below the support plate for certain KS tower applications. Includes four 3/8" x 6" on-center U-bolts and hardware to interface with customer-supplied support brackets. See table below.

C **Sliding Restrainer, Bottom**. Use on flange joint at the bottom of the circular waveguide run. Includes bracket and hardware for attachment to network slot angles. See table below.

Sliding Restrainer Type Numbers

Size	18 in (460 mm)	30 in (760 mm)	Bottom
WC281	**48602**	**48603**	**48604**
WC166	**49008**	**49009**	**49010**

Connecting Waveguides

The circular waveguide run is connected to the antenna and the radio equipment using HELIAX® elliptical waveguide and/or rectangular waveguide components. These are described in detail on pages 156-218.

D **Elliptical Waveguide Sliding Support**. For use with 4-port combiner or dual polarized circular-to-rectangular transition to eliminate the requirement for flexible waveguide sections. Accommodates vertical movement and provides support to the elliptical waveguide near the network end of the run. Use with elliptical waveguide hangers described on page 194 .....Type **200970**

Pressurization

Microwave waveguides should be maintained under dry air or dry nitrogen pressure to prevent moisture condensation. All sizes are pressurizable to 10 lb/in^2 (70 kPa). Check antenna pressurization limits to ensure antenna limits are not being exceeded. Pressurization equipment is described on pages 242-271.

dB and dBm

The dB is a logarithmic unit comparing two power levels.

$$dB = 10 \log_{10} \frac{P_1}{P_2}$$

Where P_1 is the larger power
If P_1 = 10 watts and P_2 = 1 watt, then
$dB = 10 \log_{10} \frac{10}{1} = 10$ dB

The dBm is a comparison to a reference power of 1 milliwatt (0.001 watt).

$$dBm = 10 \log_{10} \frac{P_1}{0.001}$$

Free Space Propagation Attenuation (Isotropic)

Imperial Units:

$$L_{fs} = 96.6 + 20 \log_{10} D + \log_{10} f$$

Where L_{fs} = loss in free space in dB
D = path length in miles
f = frequency in GHz

Metric Units:

$$L_{fs} = 92.5 + 20 \log_{10} D + 20 \log_{10} f$$

Where L_{fs} = loss in free space in dB
D = path length in kilometers
f = frequency in GHz

Calculating Receive Signal Level and Antenna Gain

When transmitter power is expressed in dBm and all other units are expressed in dB, receive power in dBm can be calculated using the following formula:

$$P_r = P_t - L_{w1} - L_{f1} + G_{a1} - L_{fs} + G_{a2} - L_{w2} - L_{f2}$$

Where:
P_r = receive power level (dBm)
P_t = transmit power (dBm)
L_w = transmission line losses
L_f = filter losses
L_{fs} = free space path loss
G_{a1} = transmit antenna gain
G_{a2} = receive antenna gain

Thus for a 6.175 GHz system with a transmit power of 5 watts (37 dBm) and 200 feet of Type EWP52 HELIAX® elliptical waveguide (attenuation 1.2 dB/100 feet) at each end, filter losses of 0.5 dB at each end, and Andrew UHX8-59, UHX8-59 antennas at each end (Mid-band Gain 41.3 dB) over a path 30 miles long (L_{fs} = 141.9 per preceding example).

P_r = 37- 2.4 -.5 + 41.3 - 141.9 + 41.3 - 2.4 - .5 = 28.1dBm

When the minimum receive signal level required to meet performance objectives (C) is known and the necessary fade margin (FM) is added, the total antenna gain (Gt) required can be calculated using the following expression:

$$G_t = P_t - L_{w1} - L_{f1} - L_{fs} - L_{w2} - L_{f2} - FM\ 96\ C$$

In the above system with a transmit power of 5 watts (37 dBm), 200 feet of EWP52 elliptical waveguide (attenuation of 1.2 dB/100 ft) at each end, filter losses of 0.5 dB at each end, operating over a 30 mile path, assuming a receive signal threshold level requirement (C) of -70 dBm and a desired fade margin of 38 dB, the total antenna gain (G_t) required is:

G_t = 37 - 2.4 - .5 - 141.9 - 2.4 - .5 - 38 - (-70) = -78.7

To achieve the system performance goal, a negative gain (loss) of 78.76 dB must be made up by the gain of the antennas. If antennas with equal gain are used at each end of the path, each antenna must then have a gain of 39 dB. Andrew UHX8-59 antennas with a mid-band gain of 41.3 dB will, therefore, satisfy the requirement.

Calculation of System Return Loss

Resultant system return loss is governed by the phase relations between the standing waves of individual components and cannot be precisely calculated. The resultant return loss can be estimated, however, using the procedure described below. The 0.7 multiplication factor, mentioned in Step 5, is based on data taken by Andrew on thousands of antenna systems. Properly installed transmission systems will typically measure well within the calculated resultant return loss. Andrew specifications include safety margins and components are typically better than the published return loss specifications. For this reason, systems using all Andrew components will usually ensure much better system return loss performance than the calculated values.

Step 1. Convert VSWR or RL to reflection coefficients, in decimal form, for all components in the system.

Step 2. Divide components into three groups:

Top (antenna, radome, flex, etc.)

Transmission Line (waveguide or cable feeder)

Bottom (flex, elbow, pressure window, etc.)

Step 3. Add the reflection coefficient of all top components and convert the total to RL. Double the calculated attenuation in dB of the transmission line feeder and add this to the previous figure. Then convert the total back to a reflection coefficient.

Step 4. To the final reflection coefficient obtained in Step 3, add the reflection coefficient of the transmission line and all bottom components.

Step 5. Multiply the total reflection coefficient from Step 4 by 0.7 and convert the result to VSWR or return loss.

Example

Steps 1 and 2:

Antenna/Transmission Line System

		VSWR	Reflection Coefficient
Top Components	Antenna	1.06	0.029
	Flex Section	1.03	0.015
Transmission Line	Waveguide, Attenuation: 2.36 dB	1.06	0.029
Bottom Components	Flex Section	1.03	0.015
	Pressure Window	1.01	0.005

Step 3:

(1) Add top components [0.029 + 0.015 = 0.044]

(2) Convert to return loss [27.1 dB]

(3) Double Transmission Line attenuation [2 x 2.36 = 4.72 dB]

(4) Add (2) and (3) [27.1 + 4.72 = 31.8 dB]

(5) Convert 31.8 dB to reflection coefficient = 0.026

Step 4:

(6) Add (5) and transmission line and bottom component [0.026 + 0.029 + 0.015 + 0.005 = 0.075]

Step 5:

(7) Multiply (6) by 0.7 [0.075 x 0.7 = 0.0525] Convert to VSWR = 1.1 [1.1 is est. peak system VSWR] Convert to Return Loss = 25.5 [25.5 dB is estimated peak system return loss]

Definitions

Return loss, RL, is the decibel ratio of the incident voltage to the reflected voltage.

Reflection coefficient, $|\Gamma|$ is the numerical ratio of the reflected voltage to the incident voltage.

Voltage Standing Wave Ratio, VSWR, is the numerical ratio of the maximum voltage to the minimum voltage that would exist on the uniform reference transmission line.

Conversion Formulas

The following formulas can be used for determining values not listed in the table below.

$$RL = -20 \log_{10} (|\Gamma|)$$

$$|\Gamma| = \frac{VSWR - 1}{VSWR + 1}$$

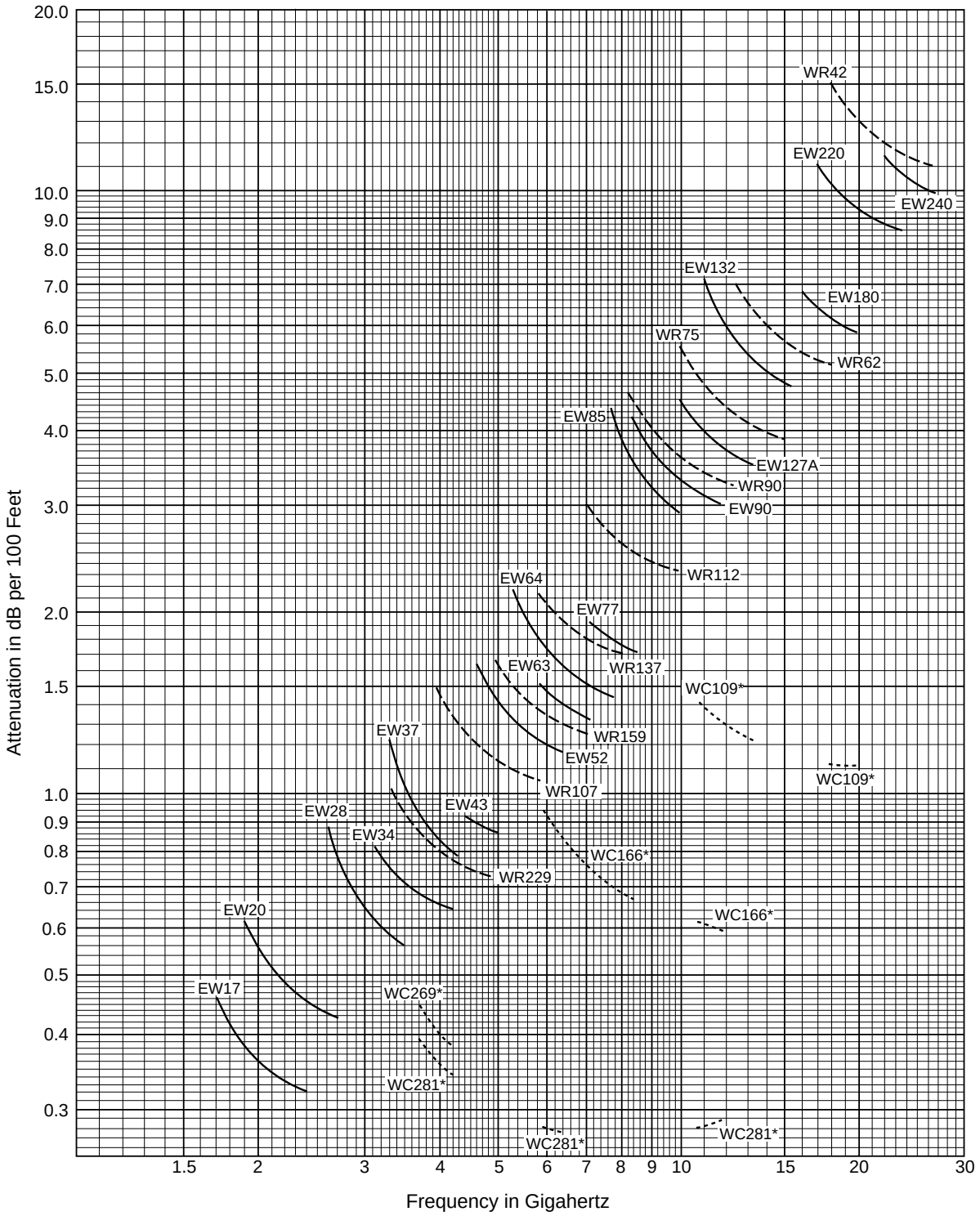
$$|\Gamma| = \text{antilog}_{10} \frac{(-RL)}{20}$$

$$VSWR = \frac{1 + |\Gamma|}{1 - |\Gamma|}$$

Conversion Table

Return Loss, dB	Reflection Coefficient, %	VSWR	Return Loss, dB	Reflection Coefficient, %	VSWR	Return Loss, dB	Reflection Coefficient, %	VSWR	Return Loss, dB	Reflection Coefficient, %	VSWR
14.0	19.95	1.50	22.0	7.943	1.173	30.0	3.162	1.065	38.0	1.259	1.025
14.2	19.50	1.48	22.2	7.762	1.168	30.2	3.090	1.064	38.2	1.230	1.025
14.4	19.05	1.47	22.4	7.586	1.164	30.4	3.020	1.062	38.4	1.202	1.024
14.6	18.62	1.46	22.6	7.413	1.160	30.6	2.951	1.061	38.6	1.175	1.024
14.8	18.20	1.44	22.8	7.244	1.156	30.8	2.884	1.059	38.8	1.148	1.023
15.0	17.78	1.43	23.0	7.079	1.152	31.0	2.818	1.058	39.0	1.122	1.023
15.2	17.38	1.42	23.2	6.918	1.149	31.2	2.754	1.057	39.2	1.096	1.022
15.4	16.98	1.41	23.4	6.761	1.145	31.4	2.692	1.055	39.4	1.072	1.022
15.6	16.60	1.40	23.6	6.607	1.141	31.6	2.630	1.054	39.6	1.047	1.021
15.8	16.22	1.39	23.8	6.457	1.138	31.8	2.570	1.053	39.8	1.023	1.021
16.0	15.85	1.38	24.0	6.310	1.135	32.0	2.512	1.052	40.0	1.000	1.020
16.2	15.49	1.37	24.2	6.166	1.131	32.2	2.255	1.050	40.2	0.9772	1.020
16.4	15.14	1.36	24.4	6.026	1.128	32.4	2.399	1.049	40.4	0.9550	1.019
16.6	14.79	135	24.6	5.888	1.125	32.6	2.344	1.048	40.6	0.9333	1.019
16.8	14.45	1.34	24.8	5.754	1.122	32.8	2.291	1.047	40.8	0.9210	1.018
17.0	14.13	1.33	25.0	5.563	1.119	33.0	2.239	1.046	41.0	0.8913	1.018
17.2	13.80	1.32	25.2	5.495	1.116	33.2	2.188	1.045	41.2	0.8710	1.018
17.4	13.49	1.31	25.4	5.370	1.114	33.4	2.138	1.044	41.4	0.8710	1.017
17.6	13.18	1.30	25.6	5.248	1.111	33.6	2.089	1.043	41.6	0.8318	1.017
17.8	12.88	1.30	25.8	5.129	1.108	33.8	2.042	1.042	41.8	0.8128	1.016
18.0	12.59	1.29	26.0	5.012	1.106	34.0	1.995	1.041	42.0	0.7943	1.016
18.2	12.30	1.28	26.2	4.898	1.103	34.2	1.950	1.040	42.2	0.7762	1.016
18.4	12.02	1.27	26.4	4.786	1.101	34.4	1.905	1.039	42.4	0.7586	1.015
18.6	11.75	1.27	26.6	4.677	1.098	34.6	1.862	1.038	42.6	0.7413	1.015
18.8	11.48	1.26	26.8	4.571	1.096	34.8	1.820	1.037	42.8	0.7244	1.015
19.0	11.22	1.25	27.0	4.467	1.094	35.0	1.778	1.036	43.0	0.7079	1.014
19.2	10.96	1.25	27.2	4.365	1.091	35.2	1.738	1.035	43.2	0.6918	1.014
19.4	10.72	1.24	27.4	4.266	1.089	35.4	1.698	1.035	43.4	0.6761	1.014
19.6	10.47	1.234	26.7	4.169	1.087	35.6	1.660	1.034	43.6	0.6607	1.013
19.8	10.23	1.228	27.8	4.074	1.085	35.8	1.622	1.033	43.8	0.6457	1.013
20.0	10.00	1.222	28.0	3.981	1.083	36.0	1.585	1.032	44.0	0.6310	1.013
20.2	9.772	1.217	28.2	3.890	1.081	36.2	1.549	1.031	44.2	0.6166	1.012
20.4	9.550	1.211	28.4	3.802	1.079	36.4	1.514	1.031	44.4	0.6026	1.012
20.6	9.333	1.206	28.6	3.715	1.077	36.6	1.479	1.030	44.6	0.5888	1.012
20.8	9.120	1.201	28.8	3.631	1.075	36.8	1.445	1.029	44.8	0.5754	1.012
21.0	8.931	1.196	29.0	3.548	1.074	37.0	1.413	1.029	45.0	0.5623	1.011
21.2	8.710	1.191	29.2	3.467	1.072	37.2	1.380	1.028	45.2	0.5495	1.011
21.4	8.511	1.186	29.4	3.388	1.070	37.4	1.349	1.027	45.4	0.5370	1.011
21.6	8.318	1.181	29.6	3.311	1.068	37.6	1.318	1.027	45.6	0.5248	1.011
21.8	8.128	1.177	29.8	3.236	1.067	37.8	1.288	1.026	45.8	05129	1.010

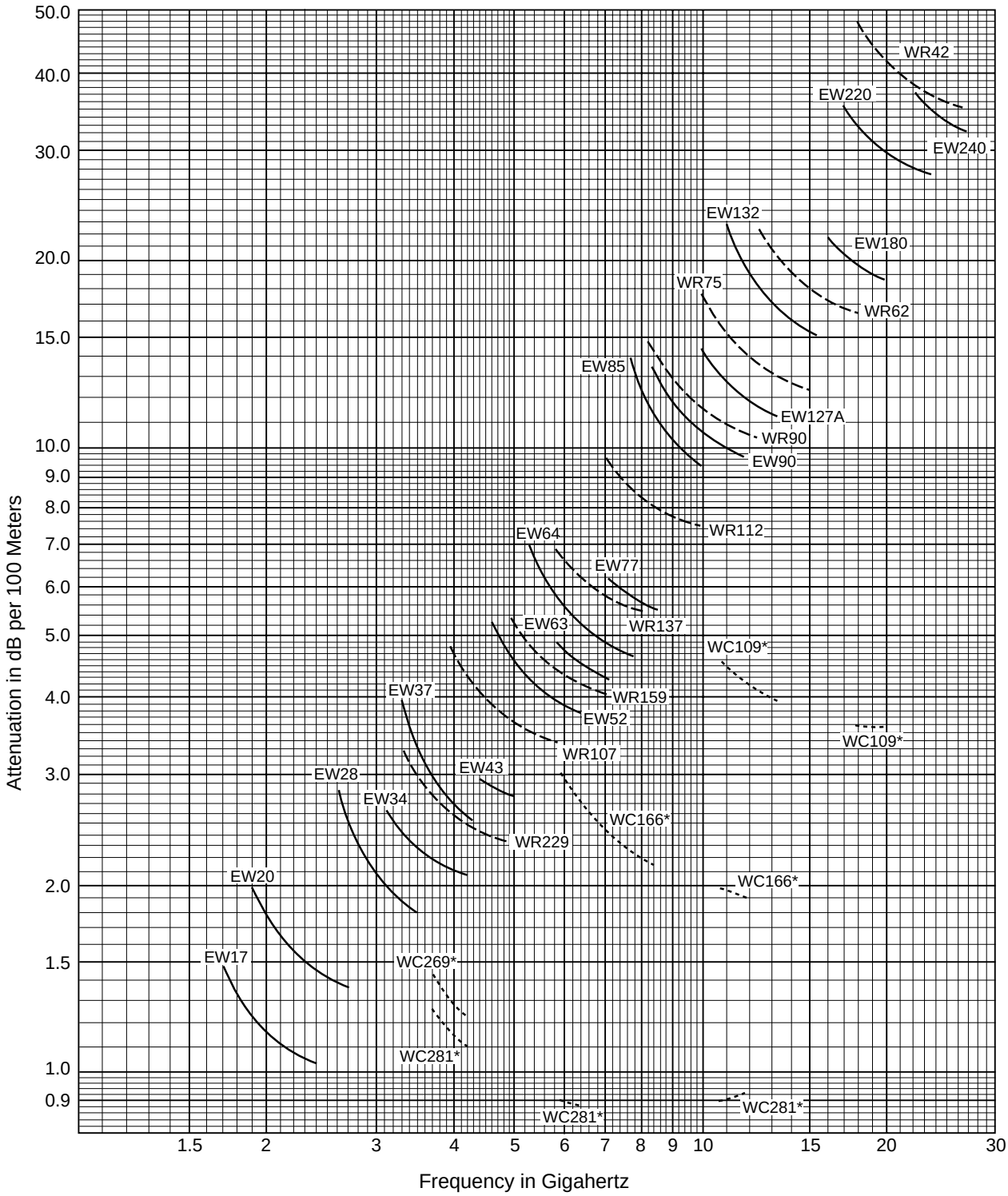
Waveguide Attenuation
(Imperial Units)



Attenuation curves based on:
- VSWR 1.0
- Ambient Temperature 24° C (75° F)
- High Conductivity Copper

The above attenuation curves are guaranteed within ±5%

*Does not include transition or network losses. See page 219.



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- VSWR 1.0
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