COMMSCOPE®

FlexTwist®

Waveguide components

FlexTwist® waveguide components

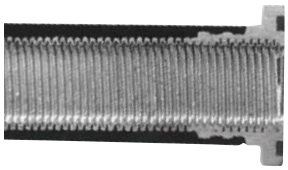
The value of a waveguide solution is in its performance—and its precision.

Your waveguide is a critical link in point-to-point and point-to-multipoint digital radio links—so measuring the value of your waveguide's performance is the same thing as measuring the value of your network itself. When every RF microwave environment is unique, waveguide must deliver in its physical, electrical and environmental characteristics. Who can you trust for a waveguide solution that provides optimal value where it matters most—in performance and precision?

The answer is CommScope, and our FlexTwist® waveguide solution.
With more than 900 flexible waveguide configurations, CommScope FlexTwist waveguide components provide an optimum solution for virtually any application.

- 3.3–40.0 GHz frequency range
- 10 waveguide sizes
- 300–1200 mm (12–48 in) assembly lengths

Each FlexTwist waveguide component is engineered to provide exceptional low-loss electrical performance. They are also designed for fast, accurate installation, even in the most challenging environments.



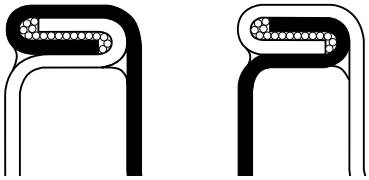
Core construction

The FlexTwist waveguide core is created by helically winding a silver-coated brass strip to form a continuous, uniform rectangular tube. A solder fillet is then wound around the core, creating a seal that eliminates RF and pressure leakage. A protective neoprene jacket provides additional mechanical support.

Controlled construction of the core results in an ideal form that provides repeatable return-loss and insertion-loss performance during flexing. Precision manufacturing enables CommScope to produce FlexTwist waveguide at frequencies up to 40 GHz.

Jacketing

A neoprene jacket provides environmental and mechanical protection to the precision performance core and enhances overall mechanical support. The jackets are highly resistant to oil and other fluids, as well as to ozone attack. This outer protective layer is vulcanized to the waveguide using thermal compression to support the convolutions during flexing. CommScope offers a neoprene protective covering to suit most needs.



FlexTwist waveguide core highlighting the solder fillet

Flanges

A full range of flange styles is available with each waveguide size as defined in the table. Flanges are offered to IEC-R and American E.I.A. WR specifications in brass material.

Excellent performance for your unique RF microwave environment

FlexTwist waveguide components provide excellent vibration isolation and eliminate many of the installation problems caused by misalignment. Recognized for the ability to aid in positioning and aligning parabolic reflectors in line-of-sight microwave radio links, FlexTwist waveguide components are used in a variety of military and commercial applications.

FlexTwist waveguide is designed and tested for applications ranging from 3.3 to 40.0 GHz and are available in a variety of lengths, from 300–1,200 mm (12-48 in). FlexTwist waveguide components are available with American or European standard flanges, making them suitable for a wide variety of applications.

All FlexTwist waveguide components are manufactured and tested at CommScope's ISO 14001–certified facilities.

Design characteristics

Average power

Average power handling is estimated based on figures derived from the peak power ratings indicated in IEC 636. All high-power performance specifications in this document have been calculated from existing data and are offered for advice only.

Peak power

The peak power handling capability is based on data published in IEC 636 for the lower end of the designated frequency band. It represents the theoretical breakdown value at a frequency of l.5 times cut-off. It assumes that breakdown in dry air and at normal temperature and pressure (N.T.P.) occurs at 30,000 V/cm. It also assumes a power safety factor of 2.25 and a voltage reflection factor of 0.2 (VSWR = 1.5) in the system under test. The duty cycle must be less than 0.001. The values provided in the tables are for information only.

Humidity and environmental characteristics

Environmental characteristics	
Operating temperature range	-55 to +100°C
Fluid resistance	Oil, ozone
Environmental resistance	Good

Humidity, in general, will not affect a flexible waveguide. However, low surface temperatures may cause condensation, which can penetrate non-sealed flanges through capillary action. Non-jacketed flexible waveguide is also prone to condensation. Long sections of waveguide should be sealed or regularly purged with dry air. When deployed in humid environments, a static desiccant or Dryline® dehydrator should be used to prevent moisture development.

FlexTwist waveguide is considered suitable for use in most environments, provided it is fitted with the standard neoprene jacket.

Vibration

Vibration of the flexible waveguide should be kept to a minimum if the unit is in a stressed (tensile) condition, as the rubber jacket may become more susceptible to ozone and environmental damage.

Design application, installation and handling instructions

FlexTwist waveguide components are not designed to be dimensionally equivalent to rigid waveguide, but they are designed to be electrically equivalent and compatible with the equivalent-size rigid waveguide.

FlexTwist waveguide components maintain return-loss and insertion-loss performance through flexing. Due to its design, FlexTwist cannot be considered “phase stable” when flexed, since this will alter the electrical length of the assembly.

RF power con be transmitted across the entire bond of the equivalent rigid waveguide size. Narrow bandwidth FlexTwist solutions are available in some frequency bonds in order to provide improved return loss performance.

In handling any FlexTwist waveguide component, particular attention must be paid to the minimum bend radius, per the specifications.

FlexTwist waveguide assembly lengths

FlexTwist waveguide components are available in a variety of standard lengths, from 300–1,200 mm, as shown in the specifications. The assembly length is the measured distance between the front face of both flanges. The standard recommended lengths represent a ±3 percent manufacturing tolerance.

Static bend radius

Static bend radius is the minimum bend to which an assembly may be subject without repeat movement (except as a consequence of small vibrations or axial expansions). CommScope designs FlexTwist waveguide with additional support at the flange to the flexible joint. However, care should be taken not to subject the back of the flange to the minimum static bend radius.

Testing

All CommScope FlexTwist waveguide components are tested for insertion-loss and return-loss swept over the stipulated frequency bond.

Use and limitations of flexible waveguide

Flexible waveguide is generally used to compensate for mechanical misalignment and thermal expansion, to facilitate installation and decouple the effects of vibration.

Flexible waveguide is not as robust as its rigid counterpart where excessive internal or external pressure can markedly alter the return loss.

Long lengths of flexible waveguide are not recommended over elliptical or rigid waveguide due to the inherently higher attenuation values.

Ordering information

The examples below describe the ezGuide™ numbering for flexible waveguide:

FlexTwist ordering information—F137CCS1 (eight characters in product code)

Product code	Waveguide size code	Flange A** code	Flange B** code	Frequency code	Length code	1 = 300 (12)
F	137	C	C	S	I	2 = 600 (24)
						3 = 900 (36)
Description: FlexTwist	WR 137	Flange A is a CPR137G	Flange B is a CPR137G	Frequency of GHz 5.850–8.200	Length is 300 mm/12 in	4 = 1000
						5 = 1200 (48)
						* Inches are for reference only.

Flange codes, descriptions and availability

Code	Flange type*	Description	Available for waveguide size codes
B	UG-Cover	Through holes, no gasket or choke grooves, square flange	028, 042, 062, 075, 090, 112
C	CPR( )G	Through holes, gasket groove, rectangular flange	090, 112, 137, 187, 229
E	CMR	Alternate tapped holes, no gasket groove, rectangular flange	090, 112, 137, 187
H	PDR	Through holes, gasket groove, rectangular flange	062, 075, 090, 112, 137, 187, 229
K	PBR	Through holes, gasket groove, no choke, square flange	028, 034, 042, 062, 075, 090, 112
L	UDR	Through holes, no gasket groove, rectangular flange	062, 075, 090, 112, 137, 187, 229
M	UBR	Through holes, no gasket groove, no choke, square flange	028, 034, 042, 062, 075, 090, 112

EIA	RCSC	IEC	Size code	Waveguide code	Frequency (GHz)
WR28	WG22	R320	028	S	26.50–40.00
–	–	–	–	A	37.00–40.00
WR34	WG21	R260	034	S	22.00–33.00
WR42	WG20	R220	042	S	17.70–26.50
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
–	–	–	–	B	10.7–11.7
WR112	WG15	R84	112	S	7.050–10.00
–	–	–	–	C	7.125–8.500
WR137	WG14	R70	137	S	5.850–8.200
–	–	–	–	B	6.425–7.125
–	–	–	–	C	7.125–7.750
–	–	–	–	D	5.725–6.425
WR187	WG12	R48	187	S	3.95–5.85
–	–	–	–	A	4.40–5.00
WR229	WG11A	R40	229	S	3.30–4.90
–	–	–	–	A	3.54–4.20

Ordering information

The jacket

A jacket will provide environmental and mechanical protection to the precision performance core as well as mechanical support. CommScope offers a neoprene protective covering to suit most needs. The neoprene jacket is vulcanized to the waveguide using thermal compression techniques. These vulcanized jackets provide support to the convolutions during flexing. The jackets are resistant to oil and other fluids and have a high resistance to ozone attack.

Flanges

A full range of flange styles is available with each waveguide size as defined in the table. Flanges are offered to IEC-R and American E.I.A. WR specifications in brass material.

Environmental Characteristics	
Operating temperature range	-55 to +100°C
Fluid resistance	Oil, ozone
Environmental resistance	Good

EIA	RCSC	IEC	Frequency (GHz)	VSWR[1]		Attenuation dB/m (dB/ft)	Average power watts	Peak power kW	Max twist deg/m (deg/ft)	Min E-bend radius mm (in)	Min H-bend radius mm (in)	Pressure lb/in (kPa)
				300–900 mm (12–36 in)	1000–1200 mm (48 in)							
WR28	WG22	R320	26.50–40.00	On request	On request	3.28 (1.00)	75	20	510 (155)	38 (1.5)	76 (3.0)	45 (310)
–	–	–	37.00–40.00	1.20	1.25	–	–	–	–	–	–	–
WR34	WG21	R260	22.00–33.00	1.20	1.25	2.95 (0.90)	75	20	510 (155)	38 (1.5)	76 (3.0)	45 (310)
WR42	WG20	R220	17.70–26.50	1.25	1.35	2.62 (0.80)	100	39	510 (155)	38 (1.5)	76 (3.0)	45 (310)
WR62	WG18	R140	12.40–18.00	1.10	1.20	0.99 (0.30)	400	100	445 (135)	52 (2.0)	102 (4.0)	45 (310)
WR75	WG17	R120	10.00–15.00	1.10	1.13	0.59 (0.18)	750	140	360 (110)	64 (2.5)	115 (4.5)	45 (310)
WR90	WG16	R100	8.20– 12.4	1.10	1.13	0.43 (0.13)	960	180	310 (95)	64 (2.5)	127 (5.0)	45 (310)
–	–	–	10.7– 11.7	1.03	1.05	–	–	–	–	–	–	–
WR112	WG15	R84	7.050–10.00	1.10	1.13	0.40 (0.12)	1,260	315	264 (80)	76 (3.0)	152 (6.0)	35 (240)
–	–	–	7.125–8.500	1.04	1.05	–	–	–	–	–	–	–
WR137	WG14	R70	5.850–8.200	1.10	1.10	0.30 (0.09)	2,000	500	214 (65)	102 (4.0)	204 (8.0)	35 (240)
–	–	–	6.425–7.125	1.03	1.05	–	–	–	–	–	–	–
–	–	–	7.125–7.750	1.03	1.05	–	–	–	–	–	–	–
–	–	–	5.725–6.425	1.03	1.05	–	–	–	–	–	–	–
WR187	WG12	R48	3.95– 5.85	1.10	1.10	0.17 (0.05)	3,000	1,250	165 (50)	165 (6.5)	330 (13.0)	35 (240)
–	–	–	4.40– 5.00	1.03	1.05	–	–	–	–	–	–	–
WR229	WG11A	R40	3.30– 4.90	1.10	1.10	0.13 (0.04)	4,000	1,550	132 (40)	165 (6.5)	330 (13.0)	35 (240)
–	–	–	3.54– 4.20	1.03	1.05	–	–	–	–	–	–	–

Notes
[1] VSWR figures are based on plain flanges. Degraded figures can be expected with choke flanges.

Everyone communicates. It's the essence of the human experience. *How* we communicate is evolving. Technology is reshaping the way we live, learn and thrive. The epicenter of this transformation is the network—our passion. Our experts are rethinking the purpose, role and usage of networks to help our customers increase bandwidth, expand capacity, enhance efficiency, speed deployment and simplify migration. From remote cell sites to massive sports arenas, from busy airports to state-of-the-art data centers—we provide the essential expertise and vital infrastructure your business needs to succeed. The world's most advanced networks rely on CommScope connectivity.

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Visit our website or contact your local CommScope representative for more information.

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