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Flexible & Rigid Waveguide Components
Terrestrial, Satcom & Wireless Applications

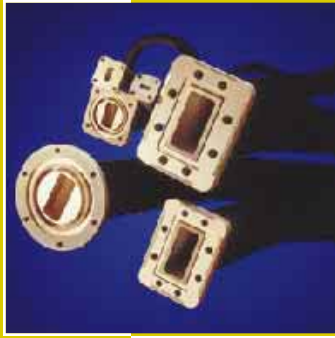


Technology that
talks to the world

mitec

Mitec Telecom

was established in 1973
as a manufacturer of quality
RF and Microwave products.



World class manufacturing certified to iso9002; flexible waveguide available from wr28 to wr284 with north american or european flange configurations.

Flexible Waveguide

ELECTRICAL SPECIFICATIONS FOR TWISTABLE M1640 & NON-TWISTABLE M1650

DASH NO.	IEC-R ()	E/A SIZE	MATCHING RIGID W/G INTERNAL DIMENSIONS	OPERATION FREQUENCY BAND	NOMINAL TEST FREQ. FOR ATTENUATION	MAXIMUM IL ATTENUATION	MAXIMUM VSWR CPR/CPR OR COV./COVER FLANGES		MAXIMUM VSWR PLAIN/CHOKE FLANGES		POWER RATING M1640	POWER RATING M1650
		WR	(in.)	(GHz)	(GHz)	(dB/ft.)	<36"	>36"	<36"	>36"	CW (kW)	CW (kW)
01	32	284	2.840 x 1.340	2.60 – 3.95	3.15	0.03	1.03	1.07	1.07	1.10	6.50	8.50
02	40	229	2.290 x 1.145	3.30 – 4.90	3.85	0.03	1.03	1.07	–	–	–	–
03	48	187	1.872 x 0.872	3.95 – 5.85	4.75	0.04	1.04	1.07	1.07	1.10	3.00	3.40
04	58	159	1.590 x 0.795	4.90 – 7.05	5.90	0.05	1.04	1.08	1.08	1.10	2.50	2.50
05	70	137	1.372 x 0.622	5.85 – 8.20	6.45	0.06	1.04	1.09	1.09	1.10	2.00	1.70
06	84	112	1.122 x 0.497	7.05 – 10.00	9.40	0.07	1.06	1.10	1.10	1.13	1.26	0.80
07	100	90	0.900 x 0.400	8.20 – 12.40	9.40	0.09	1.06	1.10	1.10	1.13	0.96	0.62
08	120	75	0.750 x 0.375	10.00 – 15.00	13.70	0.13	1.08	1.10	1.10	1.13	0.75	0.50
09	140	62	0.622 x 0.311	12.40 – 18.00	14.00	0.16	1.09	1.13	1.13	1.16	0.22	0.30
10	180	51	0.510 x 0.255	15.00 – 22.00	18.50	0.35	1.12	1.18	1.17	1.20	0.14	0.23
11	220	42	0.420 x 0.170	18.00 – 26.50	22.00	0.38	1.17	1.23	1.20	1.25	0.10	0.12
13	320	28	0.280 x 0.140	26.50 – 40.00	34.00	0.60	1.19		1.30-36"		0.10	N/A

ORDERING INFORMATION

MODEL NO.	W/G SIZE	LENGTH (in. or mms)	JACKET	*FLANGES & FLANGE FINISH
M1640	07	12	N	06 - 07 - U

MITEC PART NUMBER – M1640-07-12-N-06-07-U

The above is a WR90 Flex Twist 12"-long neoprene jacket with cover and choke flanges – flanges unplated irridited & polished.

Specify flanges – flange numeric codes (see last page)

*Brass unless otherwise requested

JACKET/PAINT	FLANGE FINISH CODES	
	Code	Finish
P = Black paint (M1650 only)	C	Both flanges cadmium-plated and passivated
S = Silicone	U	Both flanges unplated irridited and polished
N = Neoprene	S	Both flanges silver-plated
	T	Both flanges tin-plated

See next page for mechanical specifications.

Revised Feb 05 2003



Mechanical Specifications

for Twistable M1640 & Non-Twistable M1650

DASH NO	IEC-R ()	EIA SIZE WR	TWIST & NON-TWIST (M1640 & M1650)				TWIST ONLY (M1640)			MAXIMUM OPERATING PRESSURE	
			BENDING RATING				TWISTING RATING				
			STATIC		REPEATED		STATIC	REPEATED	LENGTH	M1640 psig	M1650 psig
			E-plane Rad (in.)	H-plane Rad (in.)	E-plane Rad (in.)	H-plane Rad (in.)	Tolerance (±deg./ft.)	Twist (±deg./ft.)	Non-twist (±in./ft.)		
01	32	284	7.0	14.0	28.0	56.0	32	8	1/8	20	40
02	40	229	6.5	13.0	26.0	52.0	40	10	1/8	30	40
03	48	187	6.5	13.0	26.0	52.0	48	12	1/8	30	40
04	58	159	5.0	10.0	20.0	40.0	56	14	1/8	30	40
05	70	137	4.0	8.0	16.0	32.0	64	16	1/8	30	40
06	84	112	3.0	6.0	12.0	24.0	80	20	1/8	35	50
07	100	90	2.5	5.0	10.0	20.0	96	24	1/8	45	50
08	120	75	2.5	4.5	10.0	20.0	112	28	1/8	45	50
09	140	62	2.0	4.0	8.0	16.0	136	34	1/8	45	50
10	180	51	2.0	4.0	8.0	16.0	136	34	1/8	45	60
11	220	42	1.5	3.0	6.0	12.0	155	45	1/8	45	60
13	320	28	T.B.A.								

CONSTRUCTION

The basic construction of the guide is similar for both twistable and non-twistable versions and, irrespective of size or individual specification, consists of an inner core, two connecting flanges soft-soldered into position, and a protective outer jacket.

THE CORE

The core is manufactured from pre-convoluted brass strip helically wound to extremely close tolerances around a rectangular mandrel.

Twistable cores (M1640) are silver-clad and are locked by a plated copper sealing wire inserted into their seam during winding.

At this stage pressurization is not possible. In order to hold pressure the flexible twistable waveguide must be encased in a rubber jacket.

Non-twistable cores (M1650) are also silver-clad and are locked by solder wire which is then melted to form a continuous solder fillet running the entire length of the seam. (M1650) can be pressurized without a rubber jacket.

NEOPRENE

- Shore hardness: 45° -50°
- Operating temp.: -50°C to + 100°C

SILICONE

- Shore hardness: 50° -55°
- Operating temp.: -55°C to + 135°C



These filters have been specifically designed for Satellite Earth Stations and VSAT applications. The Transmit Reject Filters are used in the receivers and reject any spurious signals at the transmit frequency. The Receive Reject Filters are used in the transmitter and reflect any spurious signals at the receive frequencies. The tables gives an indication of MITEC's capability in these filters. There is a significant number of other designs and MITEC's powerful computer-aided-design capability can easily accommodate customer specified filters.

Transmit Reject (Low Loss) Bandpass Filters

MODEL NO.	WAVEGUIDE SIZE	PASSBAND OPERATING FREQUENCY (GHz)	MIN. PASSBAND RETURN LOSS (dB)	MAX. PASSBAND INSERTION LOSS (dB)	REJECT BAND (GHz)	MINIMUM REJECTION (dB)	LENGTH (in.)
M1052-1	WR229	3.700 – 4.200	26	0.035	5.925 – 6.425	60	6.35
M1052-2	WR229	3.700 – 4.200	28	0.035	5.925 – 6.425	60	6.50
M1052-3	WR229	3.625 – 4.200	25	0.040	5.850 – 6.425	60	6.50
M1052-4	WR229	3.700 – 4.200	28	0.035	5.785 – 6.425	60	6.50
M1052-5	WR229	3.625 – 4.200	25	0.035	5.850 – 6.425	55	6.35
M3870	WR229	3.625 – 4.800	19	0.080	5.800 – 7.100	50	6.50
M1154-1	WR75	10.950 – 11.700	26	0.150	14.000 – 14.500	60	5.50
M1154-2	WR75	11.700 – 12.200	26	0.150	14.000 – 14.500	60	5.00
M1154-3	WR75	11.700 – 12.200	26	0.150	14.000 – 14.500	60	5.50
M1549	WR75	12.250 – 12.750	23	0.270	14.000 – 14.500	65	6.12
M1618	WR75	11.700 – 12.200	26	0.120	14.000 – 14.500	35	5.00
M1983	WR75	11.700 – 12.700	26	0.250	14.000 – 14.500	70	6.50
M2043	WR75	10.950 – 12.200	25	0.250	14.000 – 14.500	70	8.00
M2157	WR75	12.250 – 12.750	26	0.180	14.000 – 14.500	70	5.79
M2958	WR75	10.950 – 12.750	20	0.250	14.000 – 14.500	60	4.15

Receive Reject (High Power) Bandpass Filters

MODEL NO.	WAVEGUIDE SIZE	PASSBAND OPERATING FREQUENCY (GHz)	MIN. PASSBAND RETURN LOSS (dB)	MAX. PASSBAND INSERTION LOSS (dB)	REJECT BAND (GHz)	MINIMUM REJECTION (dB)	LENGTH (in.)	POWER (kW)
M1126	WR137	5.840 – 7.100	23	0.100	3.400 – 4.800	70	7.62	3.0
M3152	WR75	13.900 – 14.800	24	0.200	10.950 – 12.750	80	6.20	2.0

ORDERING INFORMATION

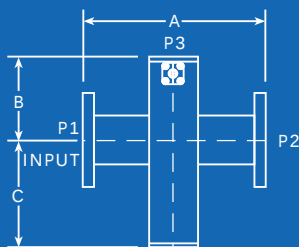
1. Specify model number.
2. Flange Types available for above filters WR229 & WR137 CPR-G or CPR-F, WR75 CPR-G, CPR-F, Cover or Cover Groove (M3152 cover flange style only).



General specifications

- Coupling value is 25 dB min. and 60 dB max.
- Coupling accuracy and flatness depend on frequency and bandwidth, typical values are ± 0.5 dB over 500 MHz.
- Minimum directivity is 20 dB.
- Return loss in main arm typically exceeds 26 dB.
- Return loss in secondary arm typically exceeds 19 dB (coupling-dependent).

Single Arm Cross-Guide Couplers



M0906
M0907

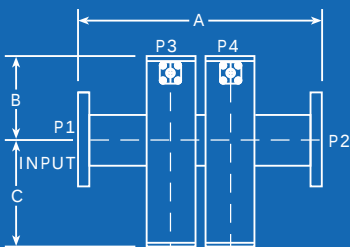
MODEL NO.	WAVEGUIDE SIZE	DIMENSION (in.)		
		A	B	C
M*** - 01	284	7.50	3.75	5.00
M*** - 02	229	7.00	3.50	4.75
M*** - 03	187	6.50	3.25	4.50
M*** - 04	159	6.00	3.00	4.00
M*** - 05	137	5.25	3.00	4.00
M*** - 06	112	4.20	2.10	3.00
M*** - 07	90	4.00	2.00	2.75
M*** - 08	75	3.75	1.87	2.50
M*** - 09	62	3.50	1.75	2.37
M*** - 10	51	3.10	1.50	2.25
M*** - 11	42	2.20	1.10	1.50

MODELS

M0906 – 2 waveguide ports, 1 coaxial type SMA port, 1 terminated port. (WR284 n/a)

M0907 – 2 waveguide ports, 1 coaxial type N port, 1 terminated port. (WR62, WR51 & WR42 n/a)

Double and Triple Arm Cross-Guide Couplers



M1671
M1672

MODEL NO.	WAVEGUIDE SIZE	DIMENSION (in.)		
		A	B	C
M*** - 01	284	7.50	3.75	5.00
M*** - 02	229	7.00	3.50	4.75
M*** - 03	187	6.50	3.25	4.50
M*** - 04	159	6.00	3.00	4.00
M*** - 05	137	6.00	3.00	4.00
M*** - 06	112	4.20	2.10	3.00
M*** - 07	90	4.00	2.00	2.75
M*** - 08	75	3.75	1.87	2.50
M*** - 09	62	3.50	1.75	2.37
M*** - 10	51	3.10	1.50	2.25
M*** - 11	42	2.20	1.10	1.50

MODELS

M1671 – Type N Double Arm Coupler. (WR42, WR51 & WR62 n/a)

M1672 – Type SMA Double Arm Coupler. (WR284 n/a)

M1673 – Type N Triple Arm Coupler. (WR42, WR51 & WR62 n/a)

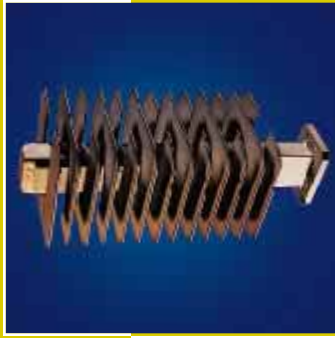
M1674 – Type SMA Triple Arm Coupler.

ORDERING INFORMATION

1. Specify model number by including*** appropriate model number.
2. Specify coupling value, e.g., -25 for 25 dB min.
3. Specify coupling direction, e.g., reverse or forward, by adding R or F to coupling value.
4. Specify flange code (see last page).
5. Specify if pressurization is required.
6. Specify frequency range.

ORDERING EXAMPLE

MODEL NO.	COUPLING 1st ARM	COUPLING 2nd ARM	FLANGES P1-P2
M1671-08	25F	35R	06 - 06



MITEC medium power short terminations can be used in various applications. The absorbing element, made of silicone carbide, is mechanically secured to the waveguide section and can withstand elevated temperatures. Full band VSWR 1.40 /for any W/G size.

Medium Power Terminations

MODEL NO.	WAVEGUIDE SIZE	LENGTH (in.)	MAXIMUM VSWR ANY 10% OF BANDWIDTH	POWER RATING (W)
M0929-01	284	9.25	1.10	275
M0929-02	229	8.75	1.10	225
M0929-03	187	8.25	1.10	175
M0929-04	159	7.00	1.10	125
M0929-05	137	6.00	1.10	75
M0929-06	112	5.00	1.10	75
M0929-07	90	5.00	1.10	75
M0929-08	75	3.25	1.10	75
M0929-09	62	4.00	1.10	75
M0929-10	51	3.75	1.10	40
M0929-11	42	3.50	1.10	40

These are single element terminations with a power dissipation ranging from 3000 Watts for WR284 to 220 Watts for WR42, using convection cooling. Use of forced air cooling will increase the power dissipation capacity by about 50%. Maximum VSWR 1.10 optimized over any 10% of bandwidth.

High Power Terminations

MODEL NO.*	WAVEGUIDE SIZE	POWER RATING (W)		DIMENSION A (in.)	DIMENSION B (in.)
		CONVECTION COOLING	FORCED AIR COOLING		
M1233-01	284	3000	4500	20.50	8.00
M1233-03	187	1800	2600	15.00	5.75
M1233-04	159	1500	2200	13.00	5.00
M1233-05	137	1200	1800	12.00	4.50
M1233-06	112	900	1300	10.00	4.00
M1233-07	90	700	1000	7.50	3.50
M1233-08	75	400	600	6.50	3.00
M1233-09	62	300	400	5.00	2.50
M1233-10	51	200	300	4.25	2.00
M1233-11	42	150	220	4.00	1.75

ORDERING INFORMATION

1. Specify model number.
2. Specify center frequency.
3. Specify flange code (see last page).

*M1233 – Flat flange style only.

ORDERING EXAMPLE

MODEL NO.	FREQUENCY	FLANGE
M0929-05	6.14	02

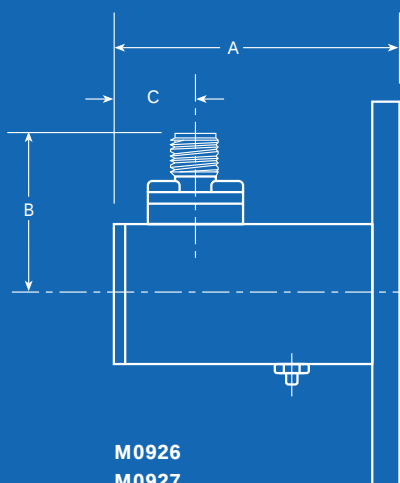


MITEC's waveguide to coax transitions are a means of adapting from coaxial to waveguide transmission line or vice versa. All models operate over the full waveguide frequency range. However, better VSWR performance is available over 10% of the waveguide band.

Waveguide to Type "N" Female Adaptor

MODEL NO.	W/G SIZE	FREQUENCY RANGE (GHz)	MAXIMUM VSWR	DIMENSION (in.)		
				A	B	C
M0926-01	284	2.60 – 3.95	1.15	2.50	1.61	1.20
M0926-02	229	3.30 – 4.90	1.10	2.25	1.50	0.90
M0926-03	187	3.95 – 5.85	1.20	2.25	1.36	0.70
M0926-04	159	4.90 – 7.05	1.15	2.25	1.32	0.60
M0926-05	137	5.85 – 8.20	1.15	2.00	1.23	0.60
M0926-06	112	7.05 – 10.10	1.20	1.88	1.17	0.50
M0926-07	90	8.20 – 12.40	1.20	1.63	1.11	0.50
M0926-08	75	10.00 – 15.00	1.20	1.63	1.10	0.50
M0926-09	62	12.40 – 18.00	1.18	1.63	1.10	0.50
M0926-10	51	15.00 – 22.00	1.30	1.63	1.00	0.50

Waveguide to Type "SMA" Female Adaptor



M0926
M0927

MODEL NO.	W/G SIZE	FREQUENCY RANGE (GHz)	MAXIMUM VSWR	DIMENSION (in.)		
				A	B	C
M0927-02	229	3.30 – 4.90	1.15	2.25	1.13	0.90
M0927-03	187	3.95 – 5.85	1.20	2.00	1.00	0.70
M0927-04	159	4.90 – 7.05	1.15	1.75	0.96	0.70
M0927-05	137	5.85 – 8.20	1.15	1.50	0.87	0.60
M0927-06	112	7.05 – 10.10	1.20	1.35	0.81	0.40
M0927-07	90	8.20 – 12.40	1.20	1.25	0.75	0.40
M0927-08	75	10.00 – 15.00	1.25	1.00	0.74	0.356
M0927-09	62	12.40 – 18.00	1.25	1.00	0.69	0.30
M0927-10	51	15.00 – 22.00	1.30	1.00	0.67	0.30
M0927-11	42	18.00 – 26.50	1.35	1.00	0.62	0.30

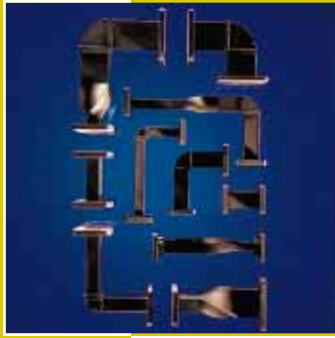
SMA also available with male connector.

ORDERING INFORMATION

1. Specify model number.
2. Specify flange code (see last page).
3. Specify frequency range.

ORDERING EXAMPLE

MODEL NO.	FLANGE
M0927-07	02



rectangular waveguide Straight sections could be ordered for any length up to 144 inches. Short straight sections may also be used as flange adaptors.

M1240 – Waveguide Straight Sections

MODEL NO.	WAVEGUIDE SIZE	MINIMUM LENGTH (in.)
M1240-01	284	3
M1240-02	229	3
M1240-03	187	3
M1240-04	159	3
M1240-05	137	3
M1240-06	112	2
M1240-07	90	2
M1240-08	75	2
M1240-09	62	1
M1240-10	51	1
M1240-11	42	1
M1240-13	28	1

ORDERING EXAMPLE

MODEL NO.	LENGTH (INCHES)	FLANGE
M1240-06	144	01-02

MITEC PART NUMBER – M1240-06-144-01-02

specifies a straight rectangular WR112 waveguide section having a length of 144 inches with a CPR-G and a CPR-F cover flanges. Unless otherwise specified, material will be copper & painted black.

Rectangular waveguide twist sections can be defined by the size of the waveguide, types of flanges, desired length (subject to the minimum specified in the table), desired amount of twist (0° to 90°) and direction of twist (right or left) from flange A to B.

M1246 – Waveguide Twist Sections

MODEL NO.	WAVEGUIDE SIZE	MINIMUM LENGTH (in.)
M1246-01	284	9.25
M1246-02	229	8.00
M1246-03	187	7.00
M1246-04	159	6.00
M1246-05	137	4.50
M1246-06	112	3.75
M1246-07	90	2.75
M1246-08	75	2.25
M1246-09	62	2.00
M1246-10	51	1.50
M1246-11	42	1.25
M1246-13	28	1.00

ORDERING EXAMPLE

MODEL NO.	DIRECTION & ANGLE	LENGTH (in.)	FLANGE
M1246-06	R90	8	06-07

MITEC PART NUMBER – M1246-06-R90-8-06-07

specifies a rectangular waveguide WR112, right 90° twist, 8 inches long, with flange UG cover and UG choke. Unless otherwise specified, material will be copper & painted black.

See last page for flange code.

Waveguide Bend Assemblies

M1699 – 90° CAST BENDS (INDOOR USE)				M1245 – 90° SWEPT BENDS (OUTDOOR USE)			
MODEL NO.	W/G SIZE	MIN. LENGTH		MODEL NO.	W/G SIZE	MIN. LENGTH	
		E BEND	H BEND			E BEND	H BEND
M1699-01	284	3.75	3.25	M1245-01	284	6.00	9.00
M1699-02	229	3.25	2.75	M1245-02	229	4.00	8.00
M1699-03	187	2.75	2.25	M1245-03	187	4.00	7.00
M1699-04	159	2.75	2.25	M1245-04	159	4.00	5.00
M1699-05	137	2.25	2.00	M1245-05	137	3.00	4.00
M1699-06	112	2.00	1.75	M1245-06	112	3.00	3.00
M1699-07	90	1.75	1.25	M1245-07	90	1.25	1.75
M1699-08	75	1.50	1.37	M1245-08	75	0.75	1.00
M1699-09	62	1.37	1.25	M1245-09	62	0.75	1.00
M1699-10	51	1.25	1.12	M1245-10	51	0.75	1.00
M1699-11	42	1.00	1.00	M1245-11	42	0.75	1.00
M1699-13	28	1.00	1.00	M1245-13	28	0.50	0.75

Note: All dimensions are in inches. Unless otherwise specified, material will be copper & painted black.

ORDERING INFORMATION

1. Specify model Number.
2. Specify 'E' or 'H' Bend (90°).
3. Specify A and B lengths in inches.
4. Specify flange code (see last page).
5. Specify frequency range.

ORDERING EXAMPLE

MODEL NO.	BEND TYPE	A DIM	B DIM	FLANGE
M1699-05	E90	10	12.5	04-05

MITEC PART NUMBER – M1699-5-E90-10-12.5-04-05

Low Power – Mylar Pressure Windows

MODEL NO.	FLANGE TYPE	WAVEGUIDE SIZE	FREQ. RANGE (GHz)	MAXIMUM VSWR	MAX PRESSURE (psig)
M1326	CPR	229	3.50 – 4.20	1.03	5
M1388	CPR	187	3.95 – 5.85	1.03	5
M1370	UG	187	3.95 – 5.85	1.03	5
M1328	CPR	159	4.90 – 7.05	1.03	5
M1325	CPR	137	5.90 – 8.20	1.03	10
M1282	UG	137	5.90 – 8.20	1.03	5
M1231	CPR	112	7.05 – 10.00	1.04	10
M1207	UG	112	7.05 – 10.00	1.04	10
M1701	CPR	90	8.20 – 12.40	1.03	5
M1371-1	UG	90	8.20 – 12.40	1.03	5
M1327	CPR	75	10.00 – 15.00	1.04	5
M1372	UG	75	10.00 – 15.00	1.04	5
M1373	UG	62	12.40 – 18.00	1.04	5
M2365	UG	51	15.0 – 22.00	1.12	5
M2029	UG	42	18.0 – 26.00	1.12	5
M2319	UG	28	26.5 – 40.00	1.12	5

Note: Power 10W, c.w. max.

ORDERING INFORMATION

1. Specify model number.
2. Specify center frequency of operating frequency require.*

MODEL NO.	CENTER FREQUENCY (GHz)
M1327	12

*Note: Bandwidth is 10% of center frequency with a minimum of 700 MHz.

High Power – Ceramic Pressure Windows

MODEL NO.	FLANGE TYPE	WAVEGUIDE SIZE	FREQ. RANGE (GHz)	MAXIMUM VSWR	POWER HANDLING (kW)
M2317	UG	187	5.400 – 5.700	1.12	1.0
M1563	CPR	159	5.900 – 6.500	1.10	5.0
M3183	UG	137	5.925 – 6.425	1.10	3.0
M1628	CPR	137	5.925 – 6.650	1.10	3.0
M1560	UG	75	14.00 – 14.50	1.15	1.5
M2372	CPR	75	14.00 – 14.50	1.15	1.5

Flange Numeric Codes

- 01 CPR style grooved (CPRG)
- 02 CPR style flat (CPRF)
- 03 CMR style standard hole pattern
- 04 CMR style all clear holes
- 05 CMR style all tapped holes
- 06 Cover style
- 07 Choke style
- 08 Special customer specified type
- 09 PDR style (European CPRG)
- 10 UDR style (European CPRF)
- 11 UBR style (European cover)
- 12 PBR style (European cover groove)
- 13 CBR style (European choke)
- 14 CAR style (European)
- 15 PAR style (European)
- 16 UAR style (European)
- 17 UER style (European CMR all clear)
- 18 Cover style with o-ring groove

MITEC ALSO DESIGNS AND MANUFACTURES:

- Output arms (sub-assemblies)
- Switching combining networks
- VPC (variable power combiners)
- Waveguide and coax circulators and isolators.

Consult our sales team for more details regarding your particular requirements.

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