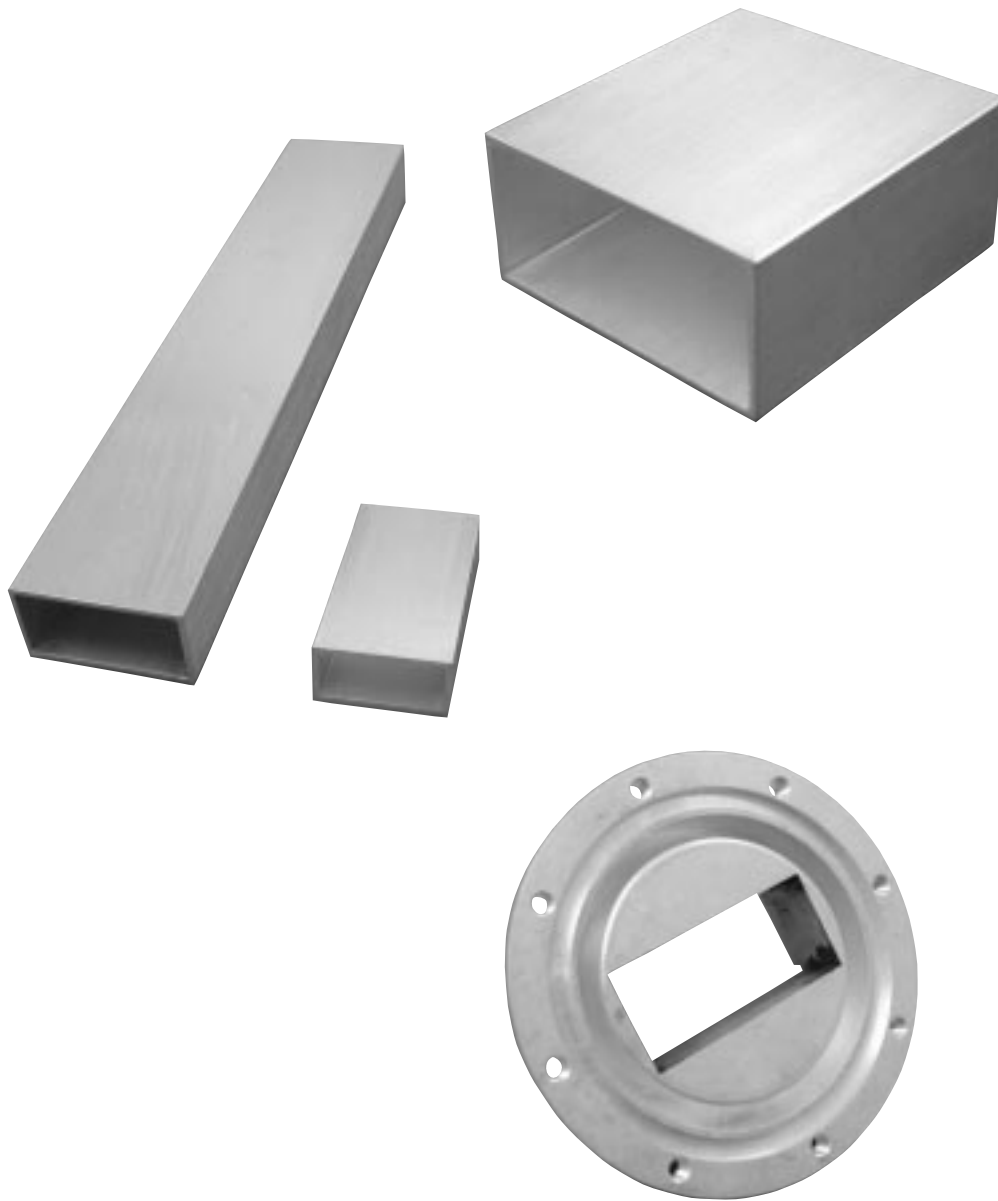


Section 5

Flanges & Waveguide



Introduction

MDL has a complete line of precision waveguide and flanges. Our waveguide meets the requirements of MIL-W-85. Where complex waveguide network design require small, ultra precise tubing, MDL provides tolerances down to $\pm 0.0005''$. Special parameters and inside finishes down to 10 micro-inches are available.

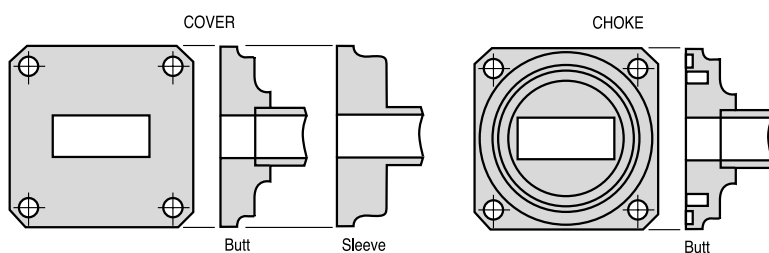
All MDL flanges meet the requirements of MIL-F-3922 and AN U/G specifications. Dual flanges are available both in aluminum and copper alloys. The dual flange employ a sleeve type mounting in which the waveguide feeds through the flange making up a common wall.

MDL can supply many other special configurations, hole sizes and patterns to meet specific customer requirements.

Flanges

Waveguide Size		Flange Type	Aluminum			Brass			Mounting Holes (REF)	Gasket Model No.
EIA (ID)	RG (REF)*		Model No.	MIL F-3922	AN No. U/G	Model No.	MIL F-3922	AN No. U/G		
WR12 .112x.061	99/U (S)	COVER SLEEVE	-	-	-	F12BST	67-003	387/U	(4)NO.4-40	-
	274/U (B)	CONTACT SLEEVE	-	-	-	K12BSC	66-001	1522/U	(4).104 DIA	-
WR15 .148x.074	98/U (S)	COVER SLEEVE	-	-	-	F15BST	67-002	385/U	(4)NO.4-40	-
	273/U (B)	CONTACT SLEEVE	-	-	-	K15BSC	66-002	1523/U	(4).104 DIA	-
WR22 .224x.112	97/U (S)	COVER SLEEVE	-	-	-	F22BST	67-001	383/U	(4)NO.4-40	-
	272/U (B)	CONTACT SLEEVE	-	-	-	K22BST	65-001	1521/U	(4)NO.4-40	-
WR28 .280x.140	96/U (S)	COVER SLEEVE	F28ASC	-	-	F28BSC	54-003	599/U	(4).116 DIA	-
	271/U (B)	COVER BUTT	F28ABC	-	-	F28BBC	58-001	-	(4).116 DIA	-
		CHOKE BUTT	C28ABT	-	-	C28BBT	59-005	600A/U	(4)NO. 4-40	28GA12
WR42 .420x.170	53/U (B)	COVER SLEEVE	F42ASC	54-002	597/U	F42BSC	54-001	595/U	(4).116 DIA	-
	121/U (A)	COVER BUTT	F42ABC	-	-	F42BBC	-	-	(4).116 DIA	-
		66/U (S)	CHOKE BUTT	C42ABT	59-004	598 A/U	C42BBT	59-003	596 A/U	(4)NO. 4-40
WR51 .510x.255	351/U (A)	COVER SLEEVE	F51ASC	-	-	F51BSC	-	-	(4).144 DIA	-
	352/U (B)	COVER BUTT	F51ABC	70-024	-	F51BBC	70-022	-	(4).144 DIA	-
		353/U (B)	CHOKE BUTT	C51ABT	69-005	-	C51BBT	69-004	-	(4)NO.6-32
WR62 .622x.311	349/U (A)	COVER SLEEVE	F62ASC	53-006	1665/U	F62BSC	53-005	419/U	(4).144 DIA	-
	91/U (B)	COVER BUTT	F62ABC	70-020	-	F62BBC	70-019	-	(4).144 DIA	-
		107/U (S)	CHOKE BUTT	C62ABT	59-002	1666/U	C62BBT	59-001	541A/U	(4)NO.6-32
WR75 .750x.375	346/U (B)	COVER SLEEVE	F75ASC	53-008	-	F75BSC	53-007	-	(4).144 DIA	-
	347/U (A)	COVER BUTT	F75ABC	70-017	-	F75BBC	70-016	-	(4).144 DIA	-
		CHOKE BUTT	C75ABT	59-011	-	C75BBT	59-010	-	(4)NO.6-32	75GA12
WR90 .900x.400	52/U (B)	COVER SLEEVE	F90ASC	53-003	135/U	F90BSC	53-001	39/U	(4).169 DIA	-
	67/U (A)	COVER BUTT	F90ABC	54-014	-	F90BBC	54-013	-	(4).169 DIA	-
		CHOKE BUTT	C90ABT	59-008	136B/U	C90BBT	59-006	40B/U	(4)NO.8-32	90GA22
WR102 1.020x.510	320/U (B)	COVER SLEEVE	F102ASC	-	-	F102BSC	-	-	(4).169 DIA	-
	COVER BUTT	F102ABC	70-014	-	F102BBC	70-013	1493/U	(4).169 DIA	-	
		CHOKE BUTT	C102ABT	69-002	-	C102BBT	69-001	1494/U	(4)NO.8-32	102GA12
WR112 1.122x.497	51/U (B)	COVER SLEEVE	F112ASC	53-004	138/U	F112BSC	53-002	51/U	(4).169 DIA	-
	68/U (A)	COVER BUTT	F112ABC	54-012	-	F112BBC	54-011	-	(4).169 DIA	-
		CHOKE BUTT	C112ABT	59-009	137B/U	C112BBT	59-007	52B/U	(4)NO.8-32	112GA32
WR137† 1.372x.622	50/U (B)	COVER SLEEVE	F137ASC	55-002	441/U	F137BSC	55-001	344/U	(6).199 DIA	-
	106/U (A)	COVER BUTT	F137ABC	-	-	F137BBC	-	-	(6).199 DIA	-
		CHOKE BUTT	C137ABT	60-002	440B/U	C137BBT	60-001	343B/U	(6)NO.10-32	137GA12
WR187† 1.872x.872	49/U (B)	COVER SLEEVE	F187ASC	57-001	407/U	F187BSC	57-002	149A/U	(8).199 DIA	-
	95/U (A)	COVER BUTT	F187ABC	-	-	F187BBC	-	-	(8).199 DIA	-
		CHOKE BUTT	C187ABT	62-001	406B/U	C187BBT	62-002	148C/U	(8)NO. 10-32	187GA12
WR284† 2.840x1.340	48/U (B)	COVER SLEEVE	F284ASC	56-002	584/U	F284BSC	56-001	53/U	(8).257 DIA	-
	75/U (A)	COVER BUTT	F284ABC	-	-	F284BBC	-	-	(8).257 DIA	-
		CHOKE BUTT	C284ABT	61-001	585A/U	C284BBT	61-002	54B/U	(8)NO.1/4-20	284GA12

Notes: * Waveguide Material: (B)-Brass (A)-Aluminum (S)-Silver
† Flanges are circular and not rectangular as pictured below.



Flanges

Waveguide Size		Flange Type	Aluminum			Brass			Mounting Holes (REF)	Gasket Model No.
EIA (ID)	RG (REF)*		Model No.	MIL F-3922	AN No. U/G	Model No.	MIL F-3922	AN No. U/G		

CPR Flanges

WR90 .900x.400	52/U (B)	FLAT BUTT	CPR90AFC	52-022	1737/U	CPR90BFC	52-021	1736/U	(8).169 DIA	-
	67/U (A)	GROOVED BUTT	CPR90AGC	52-044	1361/U	CPR90BGC	52-043	1360/U		90GA52
WR112 1.122x.497	51/U (B)	FLAT BUTT	CPR112AFC	52-020	1735/U	CPR112BFC	52-019	1734/U	(8).169 DIA	-
	68/U (A)	GROOVED BUTT	CPR112AGC	52-042	1359/U	CPR112BGC	52-041	1358/U		112GA42
WR137 1.372x.622	50/U (B)	FLAT BUTT	CPR137AFC	52-018	1733/U	CPR137BFC	52-017	1732/U	(8).196 DIA	-
	106/U (A)	GROOVED BUTT	CPR137AGC	52-040	1357/U	CPR137BGC	52-039	1356/U		137GA22
WR159 1.590x0.795	343/U (B)	FLAT BUTT	CPR159AFC	52-016	1731/U	CPR159BFC	52-015	1730/U	(8).257 DIA	-
	344/U (A)	GROOVED BUTT	CPR159AGC	52-038	1355/U	CPR159BGC	52-037	1354/U		159GA12
WR187 1.872x.872	49/U (B)	FLAT BUTT	CPR187AFC	52-014	1729/U	CPR187BFC	52-013	1728/U	(8).257 DIA	-
	95/U (A)	GROOVED BUTT	CPR187AGC	52-036	1353/U	CPR187BGC	52-035	1352/U		187GA22
WR229 2.290x1.145	340/U (B)	FLAT BUTT	CPR229AFC	52-012	1727/U	CPR229BFC	52-011	1726/U	(10).257 DIA	-
	341/U (A)	GROOVED BUTT	CPR229AGC	52-034	1351/U	CPR229BGC	52-033	1350/U		229GA12
WR284 2.840x1.340	48/U (B)	FLAT BUTT	CPR284AFC	52-010	1725/U	CPR284BFC	52-009	1724/U	(10).257 DIA	-
	75/U (A)	GROOVED BUTT	CPR284AGC	52-032	1349/U	CPR284BGC	52-031	1348/U		284GA22
WR340 3.400x1.700	112/U (B)	GROOVED SLEEVE	CPR340ASC	58-012	554A/U	CPR340BSC	58-011	553A/U	(10).266 DIA	340GA22
	113/U (A)	FLAT BUTT	CPR340AFC	52-008	1713/U	CPR340BFC	52-007	1712/U	(10).266 DIA	-
		GROOVED BUTT	CPR340AGC	52-030	1347/U	CPR340BGC	52-029	1346/U		340GA12
WR430 4.300x2.150	104/U (B)	GROOVED SLEEVE	CPR430ASC	58-010	437B/U	CPR430BSC	58-009	435B/U	(10).266 DIA	430GA22
	105/U (A)	FLAT BUTT	CPR430AFC	52-006	1711/U	CPR430BFC	52-005	1716/U	(10).266 DIA	-
		GROOVED BUTT	CPR430AGC	52-028	1345/U	CPR430BGC	52-027	1344/U		430GA12
WR510 5.100x2.550	337/U (B)	FLAT BUTT	CPR510AFC	52-004	1717/U	CPR510BFC	52-003	1715/U	(10).266 DIA	-
	338/U (A)	GROOVED BUTT	CPR510AGC	52-026	1719/U	CPR510BGC	52-025	1718/U		510GA12
WR650 6.500x3.250	69/U (B)	GROOVED SLEEVE	CPR650ASC	58-008	418B/U	CPR650BSC	58-007	417B/U	(10).330 DIA	650GA22
	103/U (A)	FLAT BUTT	CPR650AFC	52-002	1720/U	CPR650BFC	52-001	1714/U		-
		GROOVED BUTT	CPR650AGC	52-024	1343/U	CPR650BGC	52-023	1362/U		650GA12

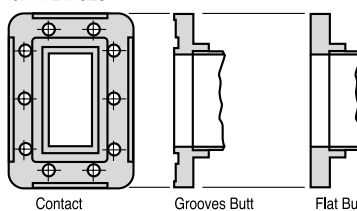
Waveguide Size		Flange Type	Aluminum			Brass			Mounting Holes (REF)	Gasket Model No.
EIA (ID)	RG (REF)*		Model No.	MIL F-3922	AN No. U/G	Model No.	MIL F-3922	AN No. U/G		

CMR Flanges

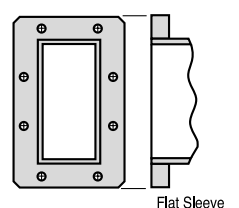
WR90 .900x.400	52/U (B)	FLAT SLEEVE	CMR90AST/C	63-008	1483/U	CMR90BST/C	63-004	1478/U	(4).147(4)6-32	-
	67/U (A)									
WR112 1.122x.497	51/U (B)	FLAT SLEEVE	CMR112AST/C	63-007	1482/U	CMR112BST/C	63-003	1477/U	(4).147(4)6-32	-
	68/U (A)									
WR137 1.372x.622	50/U (B)	FLAT SLEEVE	CMR137AST/C	63-006	1481/U	CMR137BST/C	63-002	1476/U	(4).147(4)6-32	-
	106/U (A)									
WR187 1.872x.872	49/U (B)	FLAT SLEEVE	CMR187AST/C	63-005	1480/U	CMR187BST/C	63-001	1475/U	(4).147(4)6-32	-
	95/U (A)									
WR284 2.840x1.340	48/U (B)	FLAT SLEEVE	CMR284AST/C	64-002	1484/U	CMR284BST/C	64-001	1479/U	(6).173(6)8-32	-

Notes: * Waveguide Material: (B)-Brass
(A)-Aluminum (S)-Silver
CPR = Contact Pressure Rectangular Flange
CMR = Contact Miniature Rectangular Flange

CPR FLANGES



CMR FLANGES

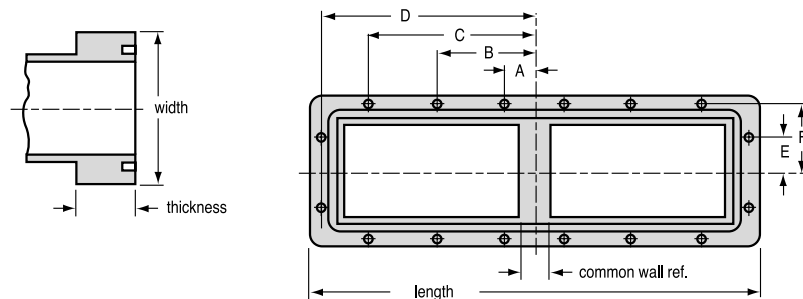


Dual Sidewall Flanges

MDL sidewall flanges are available in a wide variety of waveguide sizes, in aluminum and copper alloys. The dual sidewall flat flanges employ a sleeve type mounting in which the waveguide feeds through the flange completely. The common wall is formed by the component to which the flange is brazed. The choke type flange uses butt type mounting. In addition to the flange models listed, MDL can supply many other hole sizes and drill patterns to meet specific customer's requirements.

W/G Size	Common Wall Thickness (inches)	Mounting	Type	Holes Number	Holes Size	MDL Model No.*	Outside Dimensions			Hole Location Dimensions*						New Gasket No.
							Length	Width	Thickness	A	B	C	D	E	F	
WR62 .622-.311	.040	sleeve	clear	4	.144 dia.	62FS132	1.765	1.327	.124			.753			.481	62GA 16
				4	6-32 thr'd	62FS142	1.735	1.297	.094			.747		.475		
RG91/U	.040	sleeve	clear	6	.144 dia.	62FS152	1.765	1.327	.124	0.00		.753			.481	62GA 16
RG107/U			tap	6	6-32 thr'd	62FS162	1.735	1.297	.094	0.00		.747		.475		
WR90 .900-.400	.050	sleeve	clear	4	.169 dia.	90FS132	2.593	1.640	.186			1.088			.643	90GA 16
				4	8-32 thr'd	90FS142	2.593	1.610	.156			1.082		.637		
RG52/U	.050	sleeve	clear	6	.169 dia.	90FS152	2.593	1.640	.186	0.00		1.088			.643	90GA 16
RG67/U			tap	6	8-32 thr'd	90FS162	2.563	1.610	.156	0.00		1.082		.637		
WR90 .120	.120	sleeve	clear	4	.169 dia.	90FS332	2.593	1.640	.186			1.123			.643	90GA 46
				4	8-32 thr'd	90FS342	2.563	1.610	.156			1.117		.637		
			tap	6	.169 dia.	90FS352	2.593	1.640	.186	0.00		1.123			.643	90GA 46
				6	8-32 thr'd	90FS362	2.563	1.610	.156	0.00		1.117		.637		
WR112 1.122-.497	.064	sleeve	clear	10	.169 dia.	112FS102	3.233	1.390	.233	0.00	.727		1.449	.364	.543	112GA 16
				10	8-32 thr'd	112FS112	3.203	1.360	.203	0.00	.721		1.443	.358	.537	
RG51/U	.064	sleeve	clear	10	.199 dia.	137FS52	3.815	1.625	.237	0.00	.856		1.711	.312	.617	137GA 16
RG106/U				10	10-24 thr'd	137FS62	3.785	1.595	.231	0.00	.852		1.707	.310	.615	
WR187 1.872-.872	.128	sleeve	clear	12	.196 dia.	187FS52	5.046	2.046	.358	.502	1.502		3.331	.502	.831	187GA16
				12	10-32 thr'd	187FS62	5.016	2.016	.328	.498	1.498		3.327	.498	.827	
RG49/U	.128	sleeve	clear	12	.261 dia.	284FS32	7.233	2.733	.358	.752	2.252		3.362	.851	1.112	284GA 16
RG75/U				12	1/4-20 thr'd	284FS42	7.203	2.703	.328	.748	2.248		3.358	.847	8.27	

Notes: *These flange dimensions and models are for reference only.
Actual groove must be machines on flange face after assembly has been brazed.
Dimensions seperated by a dashed line are min./max.



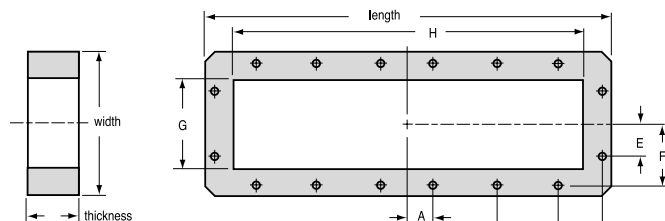
Dual Sidewall Flanges

W/G Size	Common Wall Thickness (inches)	Mounting Type	Holes Number	Holes Size	MDL Model No.	Outside Dimensions			Hole Location Dimensions*						
						Length	Width	Thickness	A	B	C	D	E	F	G

Dual Sidewall Flat Flanges

WR28 .280-.140 RG96/U	.040 sleeve	clear	6	.116 dia.	28FS12	1.22	.77	.17	0.00		.502			.272	.222	.683
		tap	6	4-40 thr'd	28FS22	1.18	.73	.13	0.00		.498			.268	.225	.686
	.090 sleeve	clear	6	.116 dia.	28FS42	1.22	.77	.17	0.00		.502			.272	.222	.733
tap		6	4-40 thr'd	28FS52	1.18	.73	.13	0.00		.498			.268	.225	.736	
WR42 .420-.170 RG53/U RG121/U RG66/U	.040 sleeve	clear	4	.116 dia.	42FS12	1.358	.890	.140			.551			.336	.253	.963
		tap	4	4-40 thr'd	42FS22	1.328	.860	.110			.549			.334	.256	.966
	.090 sleeve	clear	4	.116 dia.	42FS32	1.405	.890	.140			.576			.336	.253	1.013
tap		4	4-40 thr'd	42FS42	1.375	.860	.110			.574			.334	.256	1.016	
WR62 .622-.311 RG91/U RG107/U	.040 sleeve	clear	4	.144 dia.	62FS52	1.765	1.327	.140			.753			.481	.394	1.367
		tap	4	6-32 thr'd	62FS62	1.735	1.297	.110			.747			.475	.397	1.370
		clear	6	.144 dia.	62FS72	1.765	1.327	.140	0.00		.753			.481	.394	1.367
	.090 sleeve	tap	6	6-32 thr'd	62FS82	1.735	1.297	.110	0.00		.747			.475	.397	1.370
		clear	4	.144 dia.	62FS92	1.765	1.327	.140			.753			.481	.394	1.417
		tap	4	6-32 thr'd	62FS102	1.735	1.297	.110			.747			.475	.397	1.420
WR90 .900-.400 RG52/U RG67/U	.040 sleeve	clear	4	.169 dia.	90FS52	2.593	1.640	.186			1.088			.643	.503	1.953
		tap	4	8-32 thr'd	90FS62	2.563	1.610	.156			1.088			.637	.506	1.956
		clear	6	.169 dia.	90FS72	2.593	1.640	.186	0.00		1.088			.643	.503	1.953
	.120 sleeve	tap	6	8-32 thr'd	90FS82	2.563	1.610	.156	0.00		1.088			.637	.506	1.956
		clear	4	.169 dia.	90FS92	2.593	1.640	.186			1.123			.643	.503	2.023
		tap	4	8-32 thr'd	90FS102	2.563	1.610	.156			1.117			.637	.506	2.026
WR112 1.122-.497 RG51/U RG68/U	.064 sleeve	clear	10	.169 dia.	112FS62	3.233	1.390	.265	0.00	.727	1.449	.364	.543	.628	2.439	
		tap	10	8-32 thr'd	112FS72	3.203	1.360	.235	0.00	.721	1.443	.358	.537	.631	2.442	
	.150 sleeve	clear	10	.169 dia.	112FS82	3.233	1.390	.265	0.00	.727	1.449	.364	.543	.628	2.525	
		tap	10	8-32 thr'd	112FS92	3.203	1.360	.235	0.00	.721	1.443	.358	.537	.631	2.528	
	WR137 1.372-.622 RG50/U RG106/U	.074 sleeve	clear	10	.199 dia.	137FS12	3.815	1.625	.265	0.00	.856	1.711	.312	.617	.754	2.951
			tap	10	10-24 thr'd	137FS22	3.785	1.595	.235	0.00	.852	1.707	.310	.615	.757	2.954
WR187 1.872-.872 RG49/U RG95/U	.128 sleeve	clear	12	.196 dia.	187FS12	5.046	2.046	.390	.502	1.502	2.331	.502	.831	1.005	4.008	
		tap	12	10-32 thr'd	187FS22	5.016	2.016	.360	.498	1.498	2.327	.498	.827	1.008	4.011	
WR284 2.840-1.340 RG48/U RG75/U	.160 sleeve	clear	12	.261 dia.	284FS12	7.233	2.733	.390	.752	2.252	3.362	.851	1.112	1.505	6.010	
		tap	12	1/4-20 thr'd	284FS22	7.203	2.703	.360	.748	2.248	3.358	.847	1.108	1.510	6.015	

Notes: *These flange dimensions and models are for reference only.
Actual groove must be machined on flange face after assembly has been brazed.
Dimensions separated by a dashed line are min./max.



Dual Sidewall Flanges

W/G Size	Common Wall Thickness (inches)	Mounting	Type	Holes Number	Size	MDL Model No.*	Outside Dimensions			Hole Location Dimensions*			Gasket No.
							Length	Width	Thickness	A	B	C	

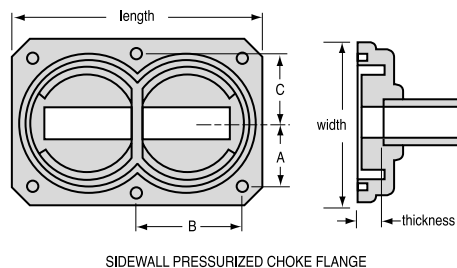
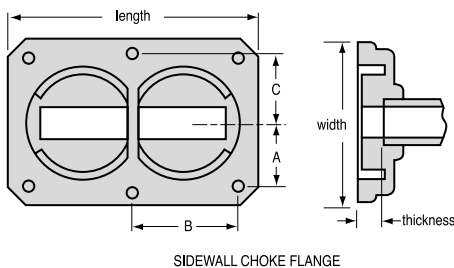
Dual Sidewall Choke Flanges

WR42 .420-.170 RG53/U RG121/U RG66/U	.040	butt	clear	4	.116 dia.	42FS 70	1.390	1.015	.163	.392	.502	
			tap	4	4-40 thr'd	42FS 80	1.360	.985	.157	.388	.498	
WR62 .622-.311 RG91/U RG107/U	.040	butt	clear	6	.144 dia.	62FS 32	1.765	1.327	.253	.480	.752	.480
			tap	6	6-32 thr'd	62FS 42	1.735	1.297	.247	.476	.748	.476
WR90 .900-.400 RG52/U RG67/U	.050	butt	clear	6	.169 dia.	90FS 32	2.608	1.640	.315	.642	1.087	.642
			tap	6	8-32 thr'd	90FS 42	2.578	1.610	.309	.638	1.083	.638
WR112 1.122-.497 RG51/U RG68/U	.064	butt	clear	6	.169 dia.	112FS 42	3.077	1.890	.440	.739	1.271	.807
			tap	6	8-32 thr'd	112FS 52	3.047	1.860	.434	.735	1.267	.803

W/G Size	Common Wall Thickness (inches)	Mounting	Type	Holes Number	Size	MDL Model No.*	Outside Dimensions			Hole Location Dimensions*			Gasket No.
							Length	Width	Thickness	A	B	C	

Dual Sidewall Pressurized Choke Flanges

WR42 .420-.170 RG53/U RG121/U RG66/U	.040	butt	clear	4	.116 dia.	42FS10	1.390	1.015	.163	.392	.502	42GA12	
			tap	4	4-40 thr'd	42FS20	1.360	.985	.157	.388	.498		
			clear	4	.116 dia.	42FS30	1.358	.890	.163	.336	.551	42GA12	
			tap	4	4-40 thr'd	42FS40	1.328	.860	.157	.334	.549		
WR62 .622-.311 RG91/U RG107/U	.040	butt	clear	4	.144 dia.	62FS12	1.765	1.327	.253	.480	.752	62GA12	
			tap	4	6-32 thr'd	62FS22	1.735	1.297	.247	.476	.748		
WR90 .900-.400 RG52/U RG67/U	.050	butt	clear	4	.169 dia.	90FS12	2.608	1.640	.315	.642	1.087	90GA12	
			tap	4	8-32 thr'd	90FS22	2.578	1.610	.309	.638	1.083		
WR112 1.112-.497 RG51/U RG68/U	.064	butt	clear	6	.169 dia.	112FS22	3.077	1.890	.440	.739	1.271	.807	112GA12
			tap	6	8-32 thr'd	112FS32	3.047	1.860	.434	.735	1.267	.803	
	.150	butt	tap	6	8-32 thr'd	112FS12	3.218	1.890	.443	.739	1.314	.807	112GA22
							3.188	1.860	.433	.735	1.310	.803	



Notes: *Dimensions separated by a dashed line are min./max.

Reference

Designation	Recommended Operating Frequency Range For TE ₀₁ Mode		Cut Off For TE ₀₁ Mode		Power Rating (megawatts) (see note 1) 1.25fc 1.9fc	Theoretical Attenuation Lowest to Highest Frequency (dB/100ft.)	JAN WG RG ()	Material Alloy	JAN FLANGE		Dimensions (inches)			
	IEC R ()	EIA WR ()	IEC (GHz) 1.25fc 1.9fc	EIA (GHz)					Frequency (GHz)	Wavelength (cm)	Choke UG ()/U	Cover UG ()/U	EIA WG WR ()	Inside

Reference Table of Rigid Rectangular Waveguide Data and Fittings

	3	2300	0.32-0.49	0.32-0.49	0.256	116.84	246-348	.040-.027	290	Alum.			2300	23.000-11.500	0.020	23.376-11.876	.020	0.188
	4	2100	0.35-0.53	0.35-0.53	0.281	106.68	205-290	.046-.031	291	Alum.			2100	21.000-10.500	0.020	21.376-10.876	.020	0.188
	5	1800	0.41-0.62	0.41-0.62	0.328	91.44	150-213	.058-.039	201	Alum.			1800	18.000-9.000	0.020	18.250-9.250	.020	0.125
	6	1500	0.49-0.75	0.49-0.75	0.393	76.20	104-148	.076-.051	202	Alum.			1500	15.000-7.500	0.015	15.350-7.750	.015	0.125
	8	1150	0.64-0.98	0.64-0.96	0.513	58.40	61.5-87.1	.113-.076	203	Alum.			1150	11.500-5.750	0.015	11.750-6.000	.015	0.125
	9	975	0.76-1.15	0.75-1.12	0.605	49.53	44.2-62.6	.145-.098	204	Alum.			975	9.750-4.875	0.010	10.000-5.125	.010	0.125
	12	770	0.96-1.46	0.96-1.45	0.766	39.12	27.6-39.1	.206-.140	205	Alum.			770	7.700-3.850	0.010	7.950-4.100	.010	0.125
L	14	650	1.14-1.73	1.12-1.70	0.908	33.02	19.6-27.8	.317-.214 .266-.180	69 103	Brass Alum.	417A* 417B*		650	6.500-3.250	0.010	6.660-3.410	.010	0.080
	18	510	1.45-2.20	1.45-2.20	1.157	25.91	12.09-17.1	.456-.309 .382-.259	337 338	Brass Alum.			510	5.100-2.550	0.010	5.260-2.710	.010	0.080
W	22	430	1.72-2.61	1.70-2.60	1.372	21.84	8.6-12.2	.588-.399 .494-.334	104 105	Brass Alum.	435A* 437A*		430	4.300-2.150	0.008	4.460-2.310	.008	0.080
	26	340	2.17-3.30	2.20-3.30	1.736	17.27	5.4-7.6	.837-.567 .702-.475	112 113	Brass Alum.	553* 554*		340	3.400-1.700	0.005	3.560-1.860	.005	0.080
S	32	284	2.60-3.95	2.60-3.95	2.078	14.43	3.5-5.0	1.136-.777 .953-.652	48 75	Brass Alum.	54B 585A	53 584	284	2.840-1.340	0.005	3.000-1.500	.005	0.080
	40	229	3.22-4.90	3.30-4.90	2.577	11.63	2.44-3.46	1.514-1.026 1.270-.860	340 341	Brass Alum.			229	2.290-1.145	0.005	2.418-1.273	.005	0.064
C	48	187	3.94-5.99	3.95-5.85	3.152	9.510	1.52-2.15	2.140-1.467 1.795-1.231	49 95	Brass Alum.	148C 406D	149A 407	187	1.872-0.872	0.005	2.000-1.000	.005	0.064
	58	159	4.64-7.05	4.90-7.05	3.711	8.078	1.17-1.66	2.617-1.773 2.195-1.487	343 344	Brass Alum.			159	1.590-0.795	0.004	1.718-0.923	.004	0.064
	70	137	5.38-8.17	5.85-8.20	4.301	6.970	0.79-1.12	3.470-2.390 2.910-2.004	50 106	Brass Alum.	343B 440B	344 441	137	1.372-0.622	0.04	1.500-0.750	.004	0.064
X _L	84	112	6.58-10.00	7.05-10.00	5.259	5.700	0.52-0.73	4.761-3.292 3.993-2.761	51 68	Brass Alum.	52B 137B	51 138	112	1.122-0.497	0.004	1.250-0.625	.004	0.064
	102	(7.23)-(11.0)	7.00-11.0	7.00-11.0	5.785	5.182	0.48-0.68	5.093-3.450 4.272-2.894	320	Brass Alum.	149A 1493		102	1.020-0.510	0.003	1.148-0.638	.003	0.064
X _S	100	90	8.20-12.5	8.20-12.40	6.557	4.572	0.33-0.47	6.614-4.570 5.547-3.833	52 67	Brass Alum.	40B 136B	39 135	90	0.900-0.400	0.003	1.000-0.500	0.003	0.050
	120	75	9.84-15.0	10.00-15.00	7.868	3.810	0.26-0.34	8.078-5.472 6.775-4.590	346 347	Brass Alum.			75	0.750-0.375	0.003	0.850-0.475	0.003	0.050
K _U	140	62	11.9-18.0	12.4-18.0	9.486	3.160	0.18-0.25	10.696-7.246 8.971-6.077 6.762-4.581	91 349 107	Brass Alum. Silver	541A	419	62	0.622-0.311	0.002	0.702-0.391	0.003	0.040
	180	51	14.5-22.0	15.0-22.0	11.574	2.590	0.12-0.17	14.406-9.759 12.082-8.185	352 351	Brass Alum.			51	0.510-0.255	0.0025	0.590-0.335	0.003	0.040
K	220	42	17.6-26.7	18.0-26.5	14.047	2.137	0.066-0.094	22.042-15.464 18.487-12.970 13.936-9.778	53 121 66	Brass Alum. Silver	596A 598A	595 597	42	0.420-0.170	0.0020	0.500-0.250	0.003	0.040
	260	34	21.7-33.0	22.0-33.0	17.328	1.730	0.053-0.076	26.465-17.928 22.197-15.036	354 355	Brass Alum.			34	0.340-0.170	0.0020	0.420-0.250	0.003	0.040
K _A	320	28	26.4-40.1	26.5-40.0	21.08	1.422	0.036-0.051	35.413-23.989 29.701-20.120 22.391-15.168	271 96	Brass Alum. Silver	600A	599	28	0.280-0.140	0.0015	0.360-0.220	0.220	0.040
Q	400	22	33.0-50.1	33.0-50.0	26.34	1.138	0.023-0.033	49.491-33.526 41.508-28.119 31.292-21.198	272 97	Brass Alum. Silver		383	22	0.224-0.112	0.0010	0.304-0.192	0.002	0.040
	500	19	39.3-59.7	40.0-60.0	31.36	0.956	0.016-0.023	64.367-43.603 40.697-27.569	358	Brass Silver		1529*	19	0.188-0.094	0.0010	0.268-0.174	0.002	0.040
V	620	15	49.9-75.8	50.0-75.0	39.86	0.752	0.010-0.144	92.152-62.425 58.265-39.470	273 98	Brass Silver		385	15	0.148-0.074	0.0010	0.228-0.154	0.002	0.040
	740	12	60.5-92.0	60.0-90.0	48.35	0.620	0.0069-0.0098	123.128-83.409 77.85-52.737	274 99	Brass Silver		387	12	0.122-0.061	0.0005	0.202-0.141	0.002	0.040
	900	10	73.8-112	75-110.0	59.01	0.508	0.0046-0.0066	165.920-112.397 104.906-71.065	359	Brass Silver		1528*	10	0.100-0.050	0.0005	0.180-0.130	0.002	0.040
	1200	8	92.3-140	90.0-140.0	73.6	0.406	0.0030-0.0042	146.611-99.317	278	Silver		1527*	8	0.0800-0.0400	0.0003	0.120-0.080	0.001	0.020
	1400	7	113-173	110.0-170.0	90.9	0.330	0.0019-0.0028	200.185-135.609	276	Silver		1525*	7	0.0650-0.0325	0.00025	0.105-0.073	0.001	0.020
	1800	5	145-220	140.00-220.0	115.7	0.259	0.0012-0.0017	288.036-195.120	275	Silver		1524*	5	0.0510-0.0255	0.00025	0.091-0.066	0.001	0.020
	2200	4	172-261	170.0-260.0	137.3	0.218	0.00086-0.00122	372.048-252.032	277	Silver		1526*	4	0.0430-0.0215	0.00020	0.083-0.062	0.001	0.020
	2600	3	220-335	220.0-325.0	176.2	0.170	0.00054-0.00076	529.155-358.459		Silver			3	0.0340-0.0170	0.00020	0.156 dia	0.001	

Notes: 1 True theoretical values at 1 atmos. Dry air at 20°C, no safety factor included.
* Contact Flange

Waveguide Tubing

Precision Tolerances

MDL specializes in the production of extremely precise waveguides. The Company's facilities and completely modern production line – originally installed in 1966 and upgraded annually – is capable of processing from 20 feet to 20,000 feet lots. Finish, straightness and size tolerances are superior to MIL-W-85/1A.

Micro-Precision for Small Waveguide (.0005)

Where complex waveguide network design requires small, ultra precise tubing, the Company provides tolerances down to $\pm .0005"$. MDL maintains its own carbide die shop for control of critical aspect of high quality waveguide production.

Inside High Finish

Special parameters and inside high finishes down to 10 micro-inches are available at additional cost.

The chart illustrates the full range of standard waveguide sizes and materials with corresponding MIL Spec Cross References. For comprehensive information on Stainless Steel, Nickel and Copper Clad Invar and other base metals and materials, please contact our sales offices or plant directly.

Designations Frequency GHz		Waveguide Type			Inner Dimensions Inches (mm)		Outer Dimensions Inches (mm)		Tolerance Inner Dimensions Inches (mm)		Wall Thickness Nominal	Approx. Weight Pounds Per Foot (oz)
EIA	IEC	Material	MIL-W-85C	MIL W-85/X Dash No.	a ₁	b ₁	a ₂	b ₂	STD	PREC		
WR28 26.5-40.0	R320 26.4-40.1	Coin Silver	RG-96/U	3-006	.280	.140	.360	.220	.0015	.0008	.040	2.64
		Copper Alloy	RG-271/U	3-008	(7.11)	(3.56)	(9.14)	(5.59)	(.038)	(.020)	(1.02)	2.64
		6061AL		3-009								.050
WR42 18.0-26.5	R220 17.6-26.7	Coin Silver	RG-63/U	1-106	.420	.170	.500	.250	.002	.001	.040	3.537
		OF-		1-100	(10.67)	(4.32)	(12.70)	(6.35)	(.05)	(.025)	(1.02)	.2017
		Copper Alloy	RG-53/U	1-102								.205
		1100 AL	RG-121/U	1-103								.0627
		6061 AL		1-104								.0627
WR51 15.0-22.0	R180 14.5-22.0	OF-	RG-352/U	1-094	.510	.255	.590	.335	.0025	.001	.040	.262
		Copper Alloy	RG-353/U	1-096	(12.95)	(6.48)	(14.99)	(8.51)	(.063)	(.025)	(1.02)	.259
		1100 AL	RG-351/U	1-097								.079
		6061 AL		1-098								.079
		6063 AL		1-181								.079
WR62 12.4-18.0	R140 11.9-18.0	OF-		1-087	.622	.311	.702	.391	.0025	.001	.040	.314
		Copper Alloy	RG-91/U	1-089	(15.80)	(7.90)	(17.83)	(9.93)	(.063)	(.025)	(1.02)	.311
		1100 AL	RG-349/U	1-090								.0948
		6061 AL		1-091								.0948
WR75 10.0-15.0	R120 9.84-15.0	OF-		1-081	.750	.375	.850	.475	.003	.001	.050	.475
		Copper Alloy	RG-346/U	1-085	(19.05)	(9.53)	(21.59)	(12.07)	(.08)	(.025)	(1.27)	.470
		1100 AL	RG-347/U	1-083								.143
		6061 AL		1-084								.143
WR90 8.2-12.4	R100 8.2-12.5	OF-		1-075	.900	.400	1.000	.500	.004	.001	.050	.543
		Copper Alloy	RG-52/U	1-079	(22.86)	(10.16)	(25.40)	(12.70)	(.10)	(.025)	(1.27)	.537
		1100 AL	RG-67/U	1-077								.1638
		6061 AL		1-078								.1638
	Hvy Wall Hvy Wall Hvy Wall Hvy Wall Nar Hgt	OF-		2-008	.900	.400	1.100	.600	.004	.001	.100	1.086
		OF-		2-009	.900	.400	1.300	.800	.004	.001	.200	2.172
		Alum*			.900	.400	1.100	.600	.004	.001	.100	.3276
		Alum*			.900	.400	1.300	.800	.004	.001	.200	.6552
		*+			.900	.200	1.000	.300	.004	.001	.050	1.38
WR102 7.05-11.0		OF-		1-156	1.020	.510	1.148	.638	.003	.002	.064	1.20
		Copper Alloy	RG-320/U	1-155	(25.91)	(12.95)	(29.16)	(16.21)	(.08)	(.05)	(1.63)	1.15
		1100 AL		1-157								.330
		6061 AL		1-158								.330
		6063 AL		1-160							.330	

Waveguide Tubing

Designations Frequency GHz		Waveguide Type			Inner Dimensions Inches (mm)		Outer Dimensions Inches (mm)		Tolerance Inner Dimensions Inches (mm)		Wall Thickness Nominal	Approx. Weight Pounds Per Foot (oz)	
EIA	IEC	Material	MIL-W-85C	MIL W-85/X Dash No.	a ₁	b ₁	a ₂	b ₂	STD	PREC			
WR112 7.05-10.0	R84 6.58-10.0	OF-		1-069	1.122	.497	1.250	.625	.004	.002	.064	.867	
		Copper Alloy	RG-51/U	1-073	(28.50)	(12.62)	(31.75)	(15.88)	(.10)	(.05)	(1.63)	.858	
		1100 AL	RG-68/U	1-071								.260	
		6061 AL		1-072								.260	
		6063 AL		1-177								.260	
	Hvy Wall	OF-		2-007	1.122	.497	1.378	.753	.004	.002	.128	1.734	
	Hvy Wall	Alum*			1.122	.497	1.378	.753	.004	.002	.128	.52	
	Nar Hgt	*+			1.122	.248	1.250	.376	.004	.002	.064		
	WR137 5.85-8.20	R70 5.38-8.17	OF-		1-063	1.372	.622	1.500	.750	.004	.002	.064	1.06
			Copper Alloy	RG-50/U	1-067	(34.85)	(15.80)	(38.10)	(19.05)	(.10)	(.05)	(1.63)	1.03
1100 AL			RG-106/U	1-065								.33	
6061 AL				1-066								.33	
6063 AL				1-176								.33	
Nar Hgt		*+			1.372	.311	1.500	.439	.004	.002	.064		
WR159 4.90-7.05	R58 4.64-7.05	OF-		1-057	1.590	.795	1.718	.923	.005	.002	.064	1.248	
		Copper Alloy	RG-343/U	1-061	(40.39)	(20.19)	(43.64)	(23.44)	(.13)	(.05)	(1.63)	1.235	
		1100 AL	RG-344/U	1-059								.376	
		6061 AL		1-060								.376	
		6063 AL		1-175								.376	
	Nar Hgt	*+			1.590	.397	1.718	.525	.005	.002	.064		
WR187 3.95-5.85	R48 3.94-5.99	OF-		1-051	1.872	.872	2.000	1.000	.005	.003	.064	1.426	
		Copper Alloy	RG-49/U	1-055	(47.55)	(22.15)	(50.80)	(25.40)	(.13)	(.08)	(1.63)	1.411	
		1100 AL	RG-95/U	1-053								.43	
		6061 AL		1-054								.43	
		6063 AL		1-174								.43	
	Hvy Wall	OF-		2-006	1.872	.872	2.122	1.122	.005	.003	.125	2.84	
	Hvy Wall	1100 AL		2-003	1.872	.872	2.172	1.172	.005	.003	.150	1.00	
	Hvy Wall	6063 AL		2-005	1.872	.872	2.172	1.172	.005	.003	.150	1.00	
	Nar Hgt	*+			1.872	.436	2.000	.564	.005	.003	.064		
	WR229 3.30-4.90	R40 3.22-4.90	OF-		1-045	2.290	1.145	2.418	1.273	.006	.003	.064	1.769
Copper Alloy			RG-340/U	1-049	(58.17)	(29.08)	(61.42)	(32.33)	(.15)	(.08)	(1.63)	1.751	
1100 AL			RG-341/U	1-047								.533	
6061 AL				1-048								.533	
6063 AL				1-173								.533	
Nar Hgt		*+			2.290	.572	2.418	.700	.006	.003	.064		
WR284 2.60-3.95	R32 2.60-3.95	OF-		1-039	2.840	1.340	3.000	1.500	.006	.004	.080	2.694	
		Copper Alloy	RG-48/U	1-043	(72.14)	(34.04)	(76.20)	(38.10)	(.15)	(.10)	(2.03)	2.666	
		1100 AL	RG-75/U	1-041								.812	
		6061 AL		1-042								.812	
		6063 AL		1-172								.812	
		1100 AL		2-001	2.840	1.340	3.238	1.738	.006	.004	.199	2.03	
		6061 AL	RG-375U	2-002	(72.14)	(34.04)	(82.25)	(44.15)	(.15)	(.10)	(5.05)	2.03	
	6063 AL		2-004								2.03		
Nar Hgt	*+			2.840	.670	3.000	.830	.006	.004	.080			
				2.840	.400	3.000	.560	.006	.004	.080			

Notes: *Specify Material Required
+ Other Heights Available On Request

