Rigid Transmission Line Product Catalog

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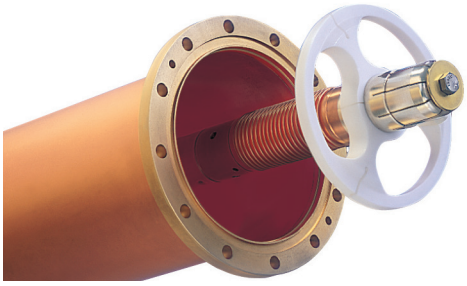
Table of Contents

Product Overview

ERI manufactures a wide range of rigid transmission line products and components for broadcast applications. These products are manufactured at ERI's main facility in Chandler, Indiana, USA from the highest quality materials and with the latest fabrication technologies.

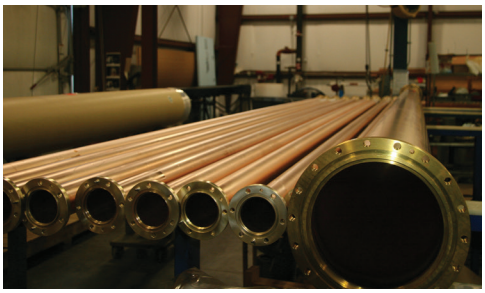
MACXLine® Rigid Line with Bellows Inner Connector



Made with heavy wall extruded copper inner and outer conductors, MACXLine® Rigid Line with Bellows Inner Connector is designed for exceptional reliability and long life. Six sizes, ranging from 3-1/8-inch through 8-3/16-inch, are available in original MACXLine®. ERI offers solutions optimized to meet your needs. ERI's field proven bellows expansion compensator accommodates the differential expansion between the inner and outer conductor and vertical and horizontal spring hangers are designed to support the system and compensate for differential expansion between the tower and vertical and horizontal runs. All the required system components and installation accessories can also be purchased from ERI.

StandardLine Rigid Transmission Line

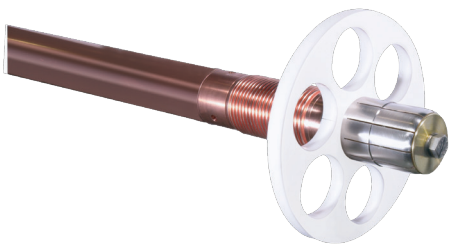
ERI StandardLine rigid coaxial transmission line is available in sizes from 7/8-inch to 8-3/16-inch. All required system components and installation accessories can be purchased from ERI. These components are fabricated from the same high-quality materials as MACXLine, but they do not include a bellows section for differential expansion compensation. This product is recommended only for very short runs and for indoor application only. This product family also includes unflanged rigid transmission line components in sizes from 7/8-inch to 6-1/8-inch, 50-ohm, for indoor use.



1329Line™ Rigid Transmission Line

ERI offers complete aluminum outer/copper inner conductor rigid transmission line systems in 3-1/8 inch, 4 1/16-inch and 6 1/8-inch (both 50 and 75-ohm) sizes. Not only does the elimination of the copper outer conductor reduce component prices, but the reduced weight decreases the support component complexity, cost and effort required to install the transmission line system. ERI's field proven bellows expansion compensator accommodates the differential expansion between the inner and outer conductor and vertical and horizontal spring hangers support the system and compensate for differential expansion between the tower and vertical and horizontal runs. This product family also includes unflanged rigid transmission line components in sizes from 1-5/8-inch to 6-1/8-inch, 50-ohm, for indoor use.

Inners Only™ Inner Conductors Replacement System



MACXLine® transmission lines are available as Inners Only™ replacements. Since MACXLine® lengths are identical to those of standard rigid line, it is an excellent choice for any application. Conventional rigid transmission line systems require maintenance after just ten years to avoid premature burnout of bullet-style connectors. MACXLine® Inners Only™ replacements provide the ultimate in operational dependability at about half the cost of a new installation. You swap your wornout, failure-prone bullets and inner conductors for the most dependable components in the industry while reusing your expensive outer conductors, which are normally good for many more years of service.

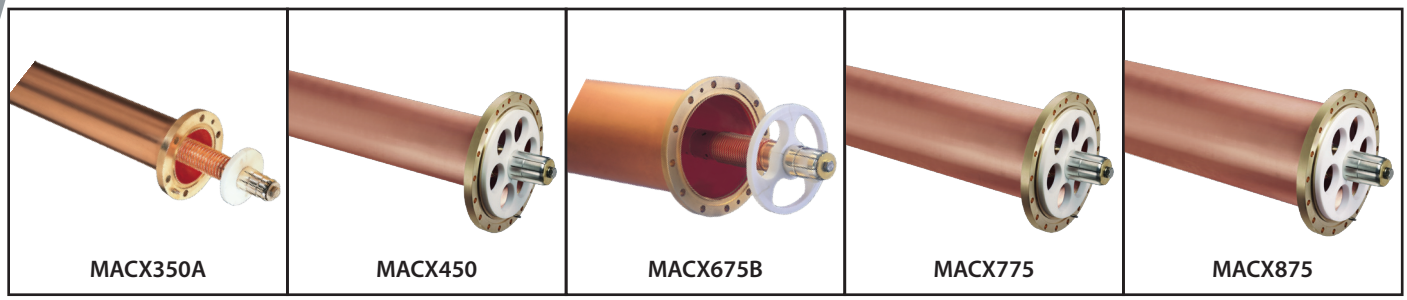



ERI is an authorized distributor for CommScope air and foam dielectric HELIAX®1 products and accessories to the broadcast market. In addition, ERI also offers CommScope terrestrial microwave antennas, elliptical waveguide products and DryLine®2 membrane dehydrators and pressurization accessories.

ERI's Headquarters and Manufacturing Facility.

General Product Information

MACXLine® Rigid Coaxial Transmission Line



MACX350A	MACX450	MACX675B	MACX775	MACX875

MACX650 not shown

During broadcasting, RF heating of the inner and outer connectors causes differential expansion between them. With original design rigid transmission line, this expansion is compensated for with sliding metal bullets. Eventually this produces wear, hot spots—and burnout. Experienced broadcast consultants recommend replacing these bullets every seven years to avoid sudden failure.

The solution to eliminating sliding-contact wear is to eliminate the sliding. All expansion of the ERI, patented, MACXLine® inner connector is taken up with a flexible, built-in bellows; once put into service. Burnout and bullet replacement are eliminated. This advantage comes with no VSWR penalty or significant cost premium.

MACXLine® is manufactured by ERI from high conductivity copper tubing, outer conductors. Extra strength, custom PTFE dielectric disk insulators maintain precise mechanical alignment. Each section comes complete with a bullet/bellows assembly, stainless steel flange hardware and pressure sealing O ring gasket.

WIDELine™ Broadband Rigid Coaxial Transmission Line

ERI's MACXLine® is also available configured as a WIDELine™ that allows multiplex DTV television signals and minimize VSWR spikes, while extending the life of their transmission line. WIDELine™ wideband transmission line is made up of different length sections to minimize the addition of reflections. The result is excellent VSWR performance of a maximum of 1.1:1 over all UHF-TV channels in the U.S. FCC core spectrum.

For example, a 1,480-foot run of WIDELine™ transmission line (8-3/16-inch, 75-ohm) was calculated to have a maximum VSWR of slightly more than 1.08. Actual field results may vary, but VSWR will not exceed 1.1:1 for any UHF-TV channel 14 through 51.

ERI WIDELine™ transmission line also protects your investment by eliminating problems caused by sliding bullet-type connections found in conventional rigid transmission line. Conventional rigid line is capable of accepting future changes in frequency assignments, with acceptable VSWR performance, however, its service life is limited by the rubbing of its connection points, which can ultimately lead to bullet burnout or arc-over. WIDELine™ transmission line incorporates a unique, patented bellows section into each inner conductor that compensates for differential expansion between the inner and outer conductors. Mechanical wear from sliding contacts is thus eliminated. The result is extremely long life. Since 1984, more than 200 broadcasters have selected transmission line using this technology, without a single failure due to bullet burnout. WIDELine™ is available in 3-1/8-inch,4-1/16-inch, 6-1/8-inch, 7-3/16-inch and 8-3/16-inch sizes.

DUALine™ Custom-Length, Dual-Channel, Rigid Transmission Line

If full wideband performance is not required, ERI will calculate the optimum rigid line section length to minimize VSWR, by using a proprietary computer program. Sections would normally be 20 feet long, or somewhat shorter and would all be the same length to simplify installation. This solution is ideal for applications where the DTV and NTSC signals are combined in a single line, as it typically results in outstanding VSWR performance (depending on which channels are combined).

Inners Only™ Inner Conductors Replacement System

MACXLine® transmission lines are available as Inners Only™ replacements. Since MACXLine® lengths are identical to those of standard rigid line, it is an excellent choice for any application.

Conventional rigid transmission line systems require maintenance after just ten years to avoid premature burnout of bullet-style connectors. By upgrading with ERI Inners Only™ before your existing transmission line fails, you avoid the disaster of dead air.

MACXLine® Inners Only™ replacements provide the ultimate in operational dependability at about half the cost of a new installation. You swap your worn-out, failure-prone bullets and inner conductors for the most dependable components in the industry while reusing your expensive outer conductors, which are normally good for many more years of service.

Rigid Line Common Specifications

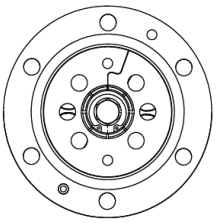
Size, Impedance	Outer Material	Velocity	Cutoff Frequency	Peak Power Rating	Production Test Voltage
7/8-inch, 50-ohm	CU	99.8%	6000 MHz	41 kW	6 kV D.C.
1-5/8-inch, 50-ohm	CU and AL	99.8%	3000 MHz	150 kW	11 kV D.C.
3-1/8-inch, 50-ohm	CU and AL	99.8%	1600 MHz	440 kW	19 kV D.C.
4-1/16-inch, 50-ohm	CU and AL	99.8%	1262 MHz	710 kW	24 kV D.C.
6-1/8-inch, 50-ohm	CU and AL	99.8%	806 MHz	1500 kW	35 kV D.C.
6-1/8-inch, 75-ohm	CU and AL	99.8%	830 MHz	1060 kW	36 kV D.C.
7-3/16-inch, 75-ohm	CU	99.8%	752 MHz	1430 kW	42 kV D.C.
8-3/16-inch, 75-ohm	CU	99.8%	698 MHz	1800 kW	47 kV D.C.

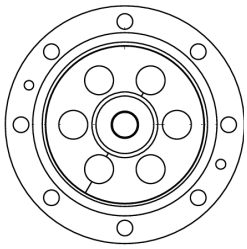
		Outer Conductor		Inner Conductor	
Size, Impedance	Outer Material	Outer Diameter	Inner Diameter	Outer Diameter	Inner Diameter
7/8-inch, 50-ohm	CU	0.875-in (22-mm)	0.785-in (20-mm)	0.341-in (9-mm)	0.291-in (7-mm)
1-5/8-inch, 50-ohm	CU and AL	1.625-in (41-mm)	1.527-in (39-mm)	0.664-in (17-mm)	0.588-in (15-mm)
3-1/8-inch, 50-ohm	CU and AL	3.125-in (79-mm)	3.027-in (77-mm)	1.315-in (33-mm)	1.231-in (31-mm)
4-1/16-inch, 50-ohm	CU and AL	4.062-in (103-mm)	3.935-in (100-mm)	1.711-in (43-mm)	1.631-in (41-mm)
6-1/8-inch, 50-ohm	CU	6.125-in (156-mm)	5.981-in (152-mm)	2.600-in (66-mm)	2.520-in (64-mm)
6-1/8-inch, 75-ohm	CU	6.125-in (156-mm)	5.981-in (152-mm)	1.711-in (43-mm)	1.631-in (41-mm)
6-1/8-inch, 50-ohm	AL	6.125-in (156-mm)	5.981-in (152-mm)	2.600-in (66-mm)	2.520-in (64-mm)
6-1/8-inch, 75-ohm	AL	6.125-in (156-mm)	5.981-in (152-mm)	1.711-in (43-mm)	1.631-in (41-mm)
7-3/16-inch, 75-ohm	CU	7.150-in (182-mm)	7.000-in (178-mm)	2.000-in (51-mm)	1.920-in (49-mm)
8-3/16-inch, 75-ohm	CU	8.150-in (207-mm)	8.000-in (203-mm)	2.293-in (58-mm)	2.229-in (57-mm)

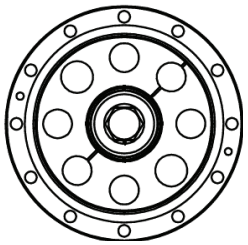
	Flange Information					
Size	Overall Diameter		Bolt Circle		Number of Bolts	Bolt Size
7/8-inch	2.250-in	(57-mm)	1.750-in	(44-mm)	3	1/4-20
1-5/8-inch	3.500-in	(89-mm)	2.812-in	(71-mm)	4	5/16 in
3-1/8-inch	5.188-in	(132-mm)	4.375-in	(111-mm)	6	3/8 in
4-1/16-inch	6.188-in	(157-mm)	5.375-in	(137-mm)	8	3/8 in
6-1/8-inch	8.120-in	(206-mm)	7.375-in	(187-mm)	12	3/8 in
7-3/16-inch	9.500-in	(241-mm)	8.750-in	(222-mm)	14	3/8 in
8-3/16-inch	11.000-in	(279-mm)	10.312-in	(262-mm)	18	3/8 in

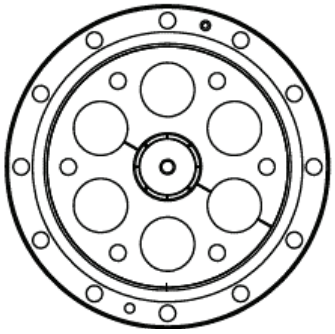

7/8-inch, 50-ohm

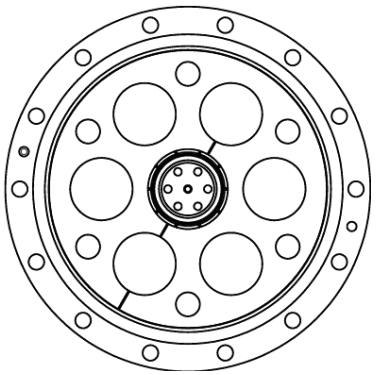

1-5/8-inch, 50-ohm

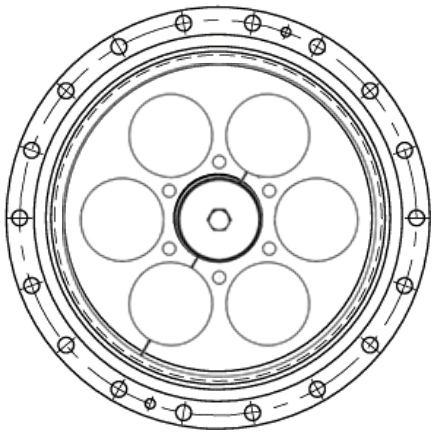

3-1/8-inch, 50-ohm


4-1/16-inch, 50-ohm


6-1/8-inch, 50-ohm


6-1/8-inch, 75-ohm


7-3/16-inch, 75-ohm


8-3/16-inch, 75-ohm

Recommended Transmission Line Section Lengths

Rigid transmission line is manufactured in flanged sections of a fixed length. At each flange section all, rigid coaxial inner connectors exhibit a minor deviation from the characteristic impedance of the transmission line. This deviation causes a small amount of power to be reflected back to the RF source (VSWR). By using the correct fixed line length, the VSWR buildup occurs outside the system's designed operating frequency. This needs to be considered for both digital television and FM service.

US Television Channels

20.00-foot (6.096 m) Section Length

Channels: 2, 3, 5, 6, 7, 8, 9, 11, 12, 14, 15, 18, 19, 22, 23, 27, 31, 32, 35, 36

19.75-foot (6.020 m) Section Length

Channels: 16, 20, 24, 28, 33

19.5-foot (5.944 m) Section Length

Channels: 4, 10, 13, 17, 21, 25, 26, 29, 30, 34

FM Radio Frequencies

Foot (Meter)	MHz
20.00 (6.096) Sections	88.1 - 95.9
	100.3 - 107.9
19.50 (5.944) Sections	96.1 - 98.3
19.00 (5.791) Sections	98.5 - 100.1
17.50 (5.342) Sections	88.1 – 107.9

Television channels listed are preferred, others may also be acceptable. Contact ERI for more information.

Rigid Line Attenuation and Power Handling

ERI 7/8-Inch Rigid Transmission Lines

Channel	Freq. (MHz)	Attn. (dB/100 feet)	Attn. (dB/100 meters)	Average Power (kw)	Channel	Freq. (MHz)	Attn. (dB/100 feet)	Attn. (dB/100 meters)	Average Power (kw)
201	88	0.346	1.136	4.7	251	98.1	0.365	1.199	4.5
202	88	0.347	1.137	4.7	252	98.3	0.366	1.200	4.5
203	89	0.347	1.138	4.7	253	98.5	0.366	1.201	4.5
204	89	0.347	1.140	4.7	254	98.7	0.366	1.202	4.4
205	89	0.348	1.141	4.7	255	98.9	0.367	1.203	4.4
206	89	0.348	1.142	4.7	256	99.1	0.367	1.205	4.4
207	89	0.349	1.144	4.7	257	99.3	0.368	1.206	4.4
208	90	0.349	1.145	4.7	258	99.5	0.368	1.207	4.4
209	90	0.349	1.146	4.7	259	99.7	0.368	1.208	4.4
210	90	0.350	1.147	4.7	260	99.9	0.369	1.210	4.4
211	90	0.350	1.149	4.7	261	100.1	0.369	1.211	4.4
212	90	0.350	1.150	4.7	262	100.3	0.369	1.212	4.4
213	91	0.351	1.151	4.6	263	100.5	0.370	1.213	4.4
214	91	0.351	1.152	4.6	264	100.7	0.370	1.214	4.4
215	91	0.352	1.154	4.6	265	100.9	0.370	1.216	4.4
216	91	0.352	1.155	4.6	266	101.1	0.371	1.217	4.4
217	91	0.352	1.156	4.6	267	101.3	0.371	1.218	4.4
218	92	0.353	1.158	4.6	268	101.5	0.372	1.219	4.4
219	92	0.353	1.159	4.6	269	101.7	0.372	1.220	4.4
220	92	0.354	1.160	4.6	270	101.9	0.372	1.222	4.4
221	92	0.354	1.161	4.6	271	102.1	0.373	1.223	4.4
222	92	0.354	1.163	4.6	272	102.3	0.373	1.224	4.4
223	93	0.355	1.164	4.6	273	102.5	0.373	1.225	4.4
224	93	0.355	1.165	4.6	274	102.7	0.374	1.226	4.4
225	93	0.355	1.166	4.6	275	102.9	0.374	1.228	4.4
226	93	0.356	1.168	4.6	276	103.1	0.375	1.229	4.4
227	93	0.356	1.169	4.6	277	103.3	0.375	1.230	4.3
228	94	0.357	1.170	4.6	278	103.5	0.375	1.231	4.3
229	94	0.357	1.171	4.6	279	103.7	0.376	1.232	4.3
230	94	0.357	1.173	4.6	280	103.9	0.376	1.234	4.3
231	94	0.358	1.174	4.6	281	104.1	0.376	1.235	4.3
232	94	0.358	1.175	4.6	282	104.3	0.377	1.236	4.3
233	95	0.359	1.176	4.5	283	104.5	0.377	1.237	4.3
234	95	0.359	1.178	4.5	284	104.7	0.377	1.238	4.3
235	95	0.359	1.179	4.5	285	104.9	0.378	1.239	4.3
236	95	0.360	1.180	4.5	286	105.1	0.378	1.241	4.3
237	95	0.360	1.181	4.5	287	105.3	0.378	1.242	4.3
238	96	0.360	1.183	4.5	288	105.5	0.379	1.243	4.3
239	96	0.361	1.184	4.5	289	105.7	0.379	1.244	4.3
240	96	0.361	1.185	4.5	290	105.9	0.380	1.245	4.3
241	96	0.362	1.186	4.5	291	106.1	0.380	1.247	4.3
242	96	0.362	1.188	4.5	292	106.3	0.380	1.248	4.3
243	97	0.362	1.189	4.5	293	106.5	0.381	1.249	4.3
244	97	0.363	1.190	4.5	294	106.7	0.381	1.250	4.3
245	97	0.363	1.191	4.5	295	106.9	0.381	1.251	4.3
246	97	0.363	1.192	4.5	296	107.1	0.382	1.252	4.3
247	97	0.364	1.194	4.5	297	107.3	0.382	1.254	4.3
248	98	0.364	1.195	4.5	298	107.5	0.382	1.255	4.3
249	98	0.365	1.196	4.5	299	107.7	0.383	1.256	4.3
250	98	0.365	1.197	4.5	300	107.9	0.383	1.257	4.3

ERI 7/8-Inch Rigid Transmission Lines

Channel	Freq. (MHz)	Attn. (dB/100 feet)	Attn. (dB/100 meters)	Average Power (kw)	Channel	Freq. (MHz)	Attn. (dB/100 feet)	Attn. (dB/100 meters)	Average Power (kw)
TV Frequencies									
2	57	0.278	0.914	5.9	20	509	0.833	2.732	2.0
3	63	0.293	0.960	5.6	21	515	0.838	2.748	1.9
4	69	0.306	1.005	5.3	22	521	0.842	2.764	1.9
5	79	0.328	1.076	5.0	23	527	0.847	2.780	1.9
6	85	0.340	1.116	4.8	24	533	0.852	2.796	1.9
7	177	0.491	1.610	3.3	25	539	0.857	2.811	1.9
8	183	0.499	1.637	3.3	26	545	0.862	2.827	1.9
9	189	0.507	1.664	3.2	27	551	0.866	2.842	1.9
10	195	0.515	1.690	3.2	28	557	0.871	2.858	1.9
11	201	0.523	1.716	3.1	29	563	0.876	2.873	1.9
12	207	0.531	1.741	3.1	30	569	0.880	2.889	1.9
13	213	0.538	1.767	3.0	31	575	0.885	2.904	1.8
14	473	0.803	2.633	2.0	32	581	0.890	2.919	1.8
15	479	0.808	2.650	2.0	33	587	0.894	2.934	1.8
16	485	0.813	2.667	2.0	34	593	0.899	2.949	1.8
17	491	0.818	2.683	2.0	35	599	0.903	2.964	1.8
18	497	0.823	2.699	2.0	36	605	0.908	2.979	1.8
19	503	0.828	2.716	2.0					
TV Frequencies (Europe)									
2	480	.256	0.840	6.4	43E	650	0.941	3.088	1.7
2A	50	0.260	0.853	6.3	44E	658	0.947	3.107	1.7
3	55	0.274	0.899	5.9	45E	666	0.953	3.125	1.7
4	66	0.300	0.985	5.4	46E	674	0.958	3.144	1.7
5	175	0.488	1.602	3.3	47E	682	0.964	3.163	1.7
6	182	0.498	1.634	3.3	48E	690	0.970	3.181	1.7
7	189	0.507	1.665	3.2	49E	698	0.975	3.200	1.7
8	196	0.517	1.696	3.2	50E	706	0.981	3.218	1.7
9	203	0.526	1.726	3.1	51E	714	0.986	3.236	1.7
10	210	0.535	1.755	3.0	52E	722	0.992	3.254	1.6
11	217	0.544	1.784	3.0	53E	730	0.997	3.272	1.6
12	224	0.552	1.813	3.0	54E	738	1.003	3.290	1.6
21E	474	0.803	2.636	2.0	55E	746	1.008	3.308	1.6
22E	482	0.810	2.658	2.0	56E	754	1.014	3.326	1.6
23E	490	0.817	2.680	2.0	57E	762	1.019	3.343	1.6
24E	498	0.824	2.702	2.0	58E	770	1.024	3.361	1.6
25E	506	0.830	2.724	2.0	59E	778	1.030	3.378	1.6
26E	514	0.837	2.745	1.9	60E	786	1.035	3.396	1.6
27E	522	0.843	2.767	1.9	61E	794	1.040	3.413	1.6
28E	530	0.850	2.788	1.9	62E	802	1.045	3.430	1.6
29E	538	0.856	2.809	1.9	63E	810	1.051	3.447	1.6
30E	546	0.862	2.829	1.9	64E	818	1.056	3.464	1.5
31E	554	0.869	2.850	1.9	65E	826	1.061	3.481	1.5
32E	562	0.875	2.871	1.9	66E	834	1.066	3.498	1.5
33E	570	0.881	2.891	1.9	67E	842	1.071	3.515	1.5
34E	578	0.887	2.911	1.8	68E	850	1.076	3.531	1.5
35E	586	0.893	2.931	1.8	69E	858	1.081	3.548	1.5
36E	594	0.900	2.951	1.8					
37E	602	0.906	2.971	1.8					
38E	610	0.912	2.991	1.8					
39E	618	0.918	3.010	1.8					
40E	626	0.923	3.030	1.8					
41E	634	0.929	3.049	1.8					
42E	642	0.935	3.068	1.7					

ERI 1-5/8-Inch Rigid Transmission Lines

Channel	Freq. (MHz)	Attn. (dB/100 feet)	Attn. (dB/100 meters)	Average Power (kw)	Channel	Freq. (MHz)	Attn. (dB/100 feet)	Attn. (dB/100 meters)	Average Power (kw)
FM Frequencies									
201	88.1	0.177	0.582	15.7	251	98.1	0.187	0.615	14.9
202	88.3	0.178	0.583	15.7	252	98.3	0.188	0.615	14.9
203	88.5	0.178	0.584	15.7	253	98.5	0.188	0.616	14.8
204	88.7	0.178	0.584	15.6	254	98.7	0.188	0.616	14.8
205	88.9	0.178	0.585	15.6	255	98.9	0.188	0.617	14.8
206	89.1	0.178	0.586	15.6	256	99.1	0.188	0.618	14.8
207	89.3	0.179	0.586	15.6	257	99.3	0.188	0.618	14.8
208	89.5	0.179	0.587	15.6	258	99.5	0.189	0.619	14.8
209	89.7	0.179	0.588	15.6	259	99.7	0.189	0.620	14.8
210	89.9	0.179	0.588	15.5	260	99.9	0.189	0.620	14.7
211	90.1	0.179	0.589	15.5	261	100.1	0.189	0.621	14.7
212	90.3	0.180	0.590	15.5	262	100.3	0.189	0.621	14.7
213	90.5	0.180	0.590	15.5	263	100.5	0.190	0.622	14.7
214	90.7	0.180	0.591	15.5	264	100.7	0.190	0.623	14.7
215	90.9	0.180	0.592	15.5	265	100.9	0.190	0.623	14.7
216	91.1	0.180	0.592	15.4	266	101.1	0.190	0.624	14.7
217	91.3	0.181	0.593	15.4	267	101.3	0.190	0.625	14.6
218	91.5	0.181	0.594	15.4	268	101.5	0.191	0.625	14.6
219	91.7	0.181	0.594	15.4	269	101.7	0.191	0.626	14.6
220	91.9	0.181	0.595	15.4	270	101.9	0.191	0.626	14.6
221	92.1	0.181	0.595	15.4	271	102.1	0.191	0.627	14.6
222	92.3	0.182	0.596	15.3	272	102.3	0.191	0.628	14.6
223	92.5	0.182	0.597	15.3	273	102.5	0.191	0.628	14.6
224	92.7	0.182	0.597	15.3	274	102.7	0.192	0.629	14.5
225	92.9	0.182	0.598	15.3	275	102.9	0.192	0.629	14.5
226	93.1	0.182	0.599	15.3	276	103.1	0.192	0.630	14.5
227	93.3	0.183	0.599	15.3	277	103.3	0.192	0.631	14.5
228	93.5	0.183	0.600	15.2	278	103.5	0.192	0.631	14.5
229	93.7	0.183	0.601	15.2	279	103.7	0.193	0.632	14.5
230	93.9	0.183	0.601	15.2	280	103.9	0.193	0.633	14.5
231	94.1	0.183	0.602	15.2	281	104.1	0.193	0.633	14.4
232	94.3	0.184	0.603	15.2	282	104.3	0.193	0.634	14.4
233	94.5	0.184	0.603	15.2	283	104.5	0.193	0.634	14.4
234	94.7	0.184	0.604	15.1	284	104.7	0.194	0.635	14.4
235	94.9	0.184	0.604	15.1	285	104.9	0.194	0.636	14.4
236	95.1	0.184	0.605	15.1	286	105.1	0.194	0.636	14.4
237	95.3	0.185	0.606	15.1	287	105.3	0.194	0.637	14.4
238	95.5	0.185	0.606	15.1	288	105.5	0.194	0.637	14.3
239	95.7	0.185	0.607	15.1	289	105.7	0.194	0.638	14.3
240	95.9	0.185	0.608	15.0	290	105.9	0.195	0.639	14.3
241	96.1	0.185	0.608	15.0	291	106.1	0.195	0.639	14.3
242	96.3	0.186	0.609	15.0	292	106.3	0.195	0.640	14.3
243	96.5	0.186	0.610	15.0	293	106.5	0.195	0.640	14.3
244	96.7	0.186	0.610	15.0	294	106.7	0.195	0.641	14.3
245	96.9	0.186	0.611	15.0	295	106.9	0.196	0.642	14.2
246	97.1	0.186	0.611	15.0	296	107.1	0.196	0.642	14.2
247	97.3	0.187	0.612	14.9	297	107.3	0.196	0.643	14.2
248	97.5	0.187	0.613	14.9	298	107.5	0.196	0.643	14.2
249	97.7	0.187	0.613	14.9	299	107.7	0.196	0.644	14.2
250	97.9	0.187	0.614	14.9	300	107.9	0.196	0.645	14.2

ERI 1-5/8-Inch Rigid Transmission Lines

Channel	Freq. (MHz)	Attn. (dB/100 feet)	Attn. (dB/100 meters)	Average Power (kw)	Channel	Freq. (MHz)	Attn. (dB/100 feet)	Attn. (dB/100 meters)	Average Power (kw)
TV Frequencies									
2	57	0.143	0.468	19.5	20	509	0.428	1.405	6.5
3	63	0.150	0.492	18.6	21	515	0.431	1.413	6.5
4	69	0.157	0.515	17.7	22	521	0.433	1.421	6.4
5	79	0.168	0.551	16.6	23	527	0.436	1.430	6.4
6	85	0.174	0.572	16.0	24	533	0.438	1.438	6.4
7	177	0.252	0.826	11.1	25	539	0.441	1.446	6.3
8	183	0.256	0.840	10.9	26	545	0.443	1.454	6.3
9	189	0.260	0.854	10.7	27	551	0.446	1.462	6.3
10	195	0.264	0.867	10.5	28	557	0.448	1.470	6.2
11	201	0.268	0.881	10.4	29	563	0.450	1.478	6.2
12	207	0.272	0.894	10.2	30	569	0.453	1.486	6.2
13	213	0.276	0.907	10.1	31	575	0.455	1.494	6.1
14	473	0.413	1.354	6.8	32	581	0.458	1.502	6.1
15	479	0.415	1.363	6.7	33	587	0.460	1.509	6.1
16	485	0.418	1.371	6.7	34	593	0.462	1.517	6.0
17	491	0.421	1.380	6.6	35	599	0.465	1.525	6.0
18	497	0.423	1.388	6.6	36	605	0.467	1.533	6.0
19	503	0.426	1.397	6.5					
TV Frequencies (Europe)									
2	48.25	0.131	0.431	21.2	40E	626	0.475	1.559	5.9
2A	49.75	0.133	0.437	20.9	41E	634	0.478	1.569	5.8
3	55.25	0.140	0.461	19.8	42E	642	0.481	1.579	5.8
4	66.25	0.154	0.505	18.1	43E	650	0.484	1.589	5.8
5	175.25	0.251	0.822	11.1	44E	658	0.487	1.599	5.7
6	182.25	0.256	0.839	10.9	45E	666	0.490	1.609	5.7
7	189.25	0.260	0.855	10.7	46E	674	0.493	1.618	5.7
8	196.25	0.265	0.870	10.5	47E	682	0.496	1.628	5.6
9	203.25	0.270	0.886	10.3	48E	690	0.499	1.637	5.6
10	210.25	0.275	0.901	10.1	49E	698	0.502	1.647	5.6
11	217.25	0.279	0.916	10.0	50E	706	0.505	1.656	5.5
12	224.25	0.284	0.931	9.8	51E	714	0.508	1.666	5.5
21E	474	0.413	1.355	6.7	52E	722	0.511	1.675	5.5
22E	482	0.417	1.367	6.7	53E	730	0.513	1.685	5.4
23E	490	0.420	1.378	6.6	54E	738	0.516	1.694	5.4
24E	498	0.424	1.390	6.6	55E	746	0.519	1.703	5.4
25E	506	0.427	1.401	6.5	56E	754	0.522	1.712	5.3
26E	514	0.430	1.412	6.5	57E	762	0.525	1.721	5.3
27E	522	0.434	1.423	6.4	58E	770	0.527	1.730	5.3
28E	530	0.437	1.434	6.4	59E	778	0.530	1.740	5.3
29E	538	0.440	1.445	6.3	60E	786	0.533	1.749	5.2
30E	546	0.444	1.455	6.3	61E	794	0.536	1.757	5.2
31E	554	0.447	1.466	6.2	62E	802	0.538	1.766	5.2
32E	562	0.450	1.477	6.2	63E	810	0.541	1.775	5.2
33E	570	0.453	1.487	6.1	64E	818	0.544	1.784	5.1
34E	578	0.456	1.498	6.1	65E	826	0.546	1.793	5.1
35E	586	0.460	1.508	6.1	66E	834	0.549	1.802	5.1
36E	594	0.463	1.518	6.0	67E	842	0.552	1.810	5.1
37E	602	0.466	1.529	6.0	68E	850	0.554	1.819	5.0
38E	610	0.469	1.539	5.9	69E	858	0.557	1.827	5.0
39E	618	0.472	1.549	5.9					
40E	626	0.475	1.559	5.9					
41E	634	0.478	1.569	5.8					
42E	642	0.481	1.579	5.8					

ERI 3-1/8-Inch Rigid Transmission Lines

Channel	Freq. (MHz)	Attn. (dB/100 feet)	Attn. (dB/100 meters)	Average Power (kw)	Channel	Freq. (MHz)	Attn. (dB/100 feet)	Attn. (dB/100 meters)	Average Power (kw)
FM Frequencies									
201	88.1	0.090	0.295	53.2	251	98.1	0.095	0.311	50.4
202	88.3	0.090	0.295	53.1	252	98.3	0.095	0.312	50.3
203	88.5	0.090	0.296	53.0	253	98.5	0.095	0.312	50.3
204	88.7	0.090	0.296	53.0	254	98.7	0.095	0.312	50.2
205	88.9	0.090	0.296	52.9	255	98.9	0.095	0.313	50.2
206	89.1	0.090	0.297	52.9	256	99.1	0.095	0.313	50.1
207	89.3	0.090	0.297	52.8	257	99.3	0.095	0.313	50.1
208	89.5	0.091	0.297	52.7	258	99.5	0.096	0.314	50.0
209	89.7	0.091	0.298	52.7	259	99.7	0.096	0.314	49.9
210	89.9	0.091	0.298	52.6	260	99.9	0.096	0.314	49.9
211	90.1	0.091	0.298	52.6	261	100.1	0.096	0.315	49.8
212	90.3	0.091	0.299	52.5	262	100.3	0.096	0.315	49.8
213	90.5	0.091	0.299	52.5	263	100.5	0.096	0.315	49.7
214	90.7	0.091	0.299	52.4	264	100.7	0.096	0.315	49.7
215	90.9	0.091	0.300	52.3	265	100.9	0.096	0.316	49.6
216	91.1	0.091	0.300	52.3	266	101.1	0.096	0.316	49.6
217	91.3	0.092	0.300	52.2	267	101.3	0.096	0.316	49.5
218	91.5	0.092	0.301	52.2	268	101.5	0.097	0.317	49.5
219	91.7	0.092	0.301	52.1	269	101.7	0.097	0.317	49.5
220	91.9	0.092	0.301	52.0	270	101.9	0.097	0.317	49.4
221	92.1	0.092	0.302	52.0	271	102.1	0.097	0.318	49.4
222	92.3	0.092	0.302	51.9	272	102.3	0.097	0.318	49.3
223	92.5	0.092	0.302	51.9	273	102.5	0.097	0.318	49.3
224	92.7	0.092	0.303	51.8	274	102.7	0.097	0.319	49.2
225	92.9	0.092	0.303	51.8	275	102.9	0.097	0.319	49.2
226	93.1	0.092	0.303	51.7	276	103.1	0.097	0.319	49.1
227	93.3	0.093	0.304	51.7	277	103.3	0.097	0.320	49.1
228	93.5	0.093	0.304	51.6	278	103.5	0.097	0.320	49.0
229	93.7	0.093	0.304	51.5	279	103.7	0.098	0.320	49.0
230	93.9	0.093	0.305	51.5	280	103.9	0.098	0.320	48.9
231	94.1	0.093	0.305	51.4	281	104.1	0.098	0.321	48.9
232	94.3	0.093	0.305	51.4	282	104.3	0.098	0.321	48.8
233	94.5	0.093	0.305	51.3	283	104.5	0.098	0.321	48.8
234	94.7	0.093	0.306	51.3	284	104.7	0.098	0.322	48.7
235	94.9	0.093	0.306	51.2	285	104.9	0.098	0.322	48.7
236	95.1	0.093	0.306	51.2	286	105.1	0.098	0.322	48.6
237	95.3	0.094	0.307	51.1	287	105.3	0.098	0.323	48.6
238	95.5	0.094	0.307	51.0	288	105.5	0.098	0.323	48.5
239	95.7	0.094	0.307	51.0	289	105.7	0.099	0.323	48.5
240	95.9	0.094	0.308	50.9	290	105.9	0.099	0.324	48.4
241	96.1	0.094	0.308	50.9	291	106.1	0.099	0.324	48.4
242	96.3	0.094	0.308	50.8	292	106.3	0.099	0.324	48.4
243	96.5	0.094	0.309	50.8	293	106.5	0.099	0.325	48.3
244	96.7	0.094	0.309	50.7	294	106.7	0.099	0.325	48.3
245	96.9	0.094	0.309	50.7	295	106.9	0.099	0.325	48.2
246	97.1	0.094	0.310	50.6	296	107.1	0.099	0.325	48.2
247	97.3	0.094	0.310	50.6	297	107.3	0.099	0.326	48.1
248	97.5	0.095	0.310	50.5	298	107.5	0.099	0.326	48.1
249	97.7	0.095	0.311	50.5	299	107.7	0.099	0.326	48.0
250	97.9	0.095	0.311	50.4	300	107.9	0.100	0.327	48.0

ERI 3-1/8-Inch Rigid Transmission Lines

Channel	Freq. (MHz)	Attn. (dB/100 feet)	Attn. (dB/100 meters)	Average Power (kw)	Channel	Freq. (MHz)	Attn. (dB/100 feet)	Attn. (dB/100 meters)	Average Power (kw)
TV Frequencies									
2	57	0.072	0.237	66.2	20	509	0.219	0.719	21.8
3	63	0.076	0.249	63.0	21	515	0.220	0.723	21.7
4	69	0.079	0.261	60.1	22	521	0.222	0.727	21.6
5	79	0.085	0.279	56.2	23	527	0.223	0.731	21.4
6	85	0.088	0.290	54.1	24	533	0.224	0.736	21.3
7	177	0.128	0.420	37.4	25	539	0.226	0.740	21.2
8	183	0.130	0.427	36.7	26	545	0.227	0.744	21.1
9	189	0.132	0.434	36.1	27	551	0.228	0.748	21.0
10	195	0.134	0.441	35.6	28	557	0.229	0.752	20.8
11	201	0.136	0.448	35.0	29	563	0.231	0.757	20.7
12	207	0.138	0.454	34.5	30	569	0.232	0.761	20.6
13	213	0.141	0.461	34.0	31	575	0.233	0.765	20.5
14	473	0.211	0.692	22.7	32	581	0.234	0.769	20.4
15	479	0.212	0.697	22.5	33	587	0.236	0.773	20.3
16	485	0.214	0.701	22.4	34	593	0.237	0.777	20.2
17	491	0.215	0.705	22.2	35	599	0.238	0.781	20.1
18	497	0.216	0.710	22.1	36	605	0.239	0.785	20.0
19	503	0.218	0.714	22.0					
TV Frequencies (Europe)									
2	48.25	0.066	0.218	72.0	40E	626	0.243	0.799	19.6
2A	49.75	0.067	0.221	70.9	41E	634	0.245	0.804	19.5
3	55.25	0.071	0.233	67.3	42E	642	0.247	0.809	19.4
4	66.25	0.078	0.255	61.4	43E	650	0.248	0.814	19.3
5	175.25	0.127	0.418	37.5	44E	658	0.250	0.820	19.1
6	182.25	0.130	0.426	36.8	45E	666	0.251	0.825	19.0
7	189.25	0.132	0.434	36.1	46E	674	0.253	0.830	18.9
8	196.25	0.135	0.442	35.5	47E	682	0.254	0.835	18.8
9	203.25	0.137	0.450	34.8	48E	690	0.256	0.840	18.7
10	210.25	0.140	0.458	34.2	49E	698	0.257	0.845	18.6
11	217.25	0.142	0.466	33.7	50E	706	0.259	0.850	18.5
12	224.25	0.144	0.473	33.1	51E	714	0.260	0.855	18.3
21E	474	0.211	0.693	22.6	52E	722	0.262	0.860	18.2
22E	482	0.213	0.699	22.4	53E	730	0.263	0.864	18.1
23E	490	0.215	0.705	22.2	54E	738	0.265	0.869	18.0
24E	498	0.217	0.711	22.1	55E	746	0.266	0.874	17.9
25E	506	0.218	0.716	21.9	56E	754	0.268	0.879	17.8
26E	514	0.220	0.722	21.7	57E	762	0.269	0.884	17.7
27E	522	0.222	0.728	21.5	58E	770	0.271	0.888	17.6
28E	530	0.224	0.734	21.4	59E	778	0.272	0.893	17.6
29E	538	0.225	0.739	21.2	60E	786	0.274	0.898	17.5
30E	546	0.227	0.745	21.1	61E	794	0.275	0.903	17.4
31E	554	0.229	0.750	20.9	62E	802	0.277	0.907	17.3
32E	562	0.230	0.756	20.7	63E	810	0.278	0.912	17.2
33E	570	0.232	0.761	20.6	64E	818	0.279	0.917	17.1
34E	578	0.234	0.767	20.4	65E	826	0.281	0.921	17.0
35E	586	0.235	0.772	20.3	66E	834	0.282	0.926	16.9
36E	594	0.237	0.778	20.2	67E	842	0.284	0.930	16.9
37E	602	0.239	0.783	20.0	68E	850	0.285	0.935	16.8
38E	610	0.240	0.788	19.9	69E	858	0.286	0.939	16.7
39E	618	0.242	0.794	19.8					
40E	626	0.243	0.799	19.6					
41E	634	0.245	0.804	19.5					
42E	642	0.247	0.809	19.4					

ERI 4-1/16-Inch Rigid Transmission Lines

Channel	Freq. (MHz)	Attn. (dB/100 feet)	Attn. (dB/100 meters)	Average Power (kw)	Channel	Freq. (MHz)	Attn. (dB/100 feet)	Attn. (dB/100 meters)	Average Power (kw)
FM Frequencies									
201	88.1	0.070	0.228	83.3	251	98.1	0.074	0.241	78.9
202	88.3	0.070	0.229	83.2	252	98.3	0.074	0.241	78.8
203	88.5	0.070	0.229	83.1	253	98.5	0.074	0.242	78.7
204	88.7	0.070	0.229	83.0	254	98.7	0.074	0.242	78.7
205	88.9	0.070	0.229	82.9	255	98.9	0.074	0.242	78.6
206	89.1	0.070	0.230	82.8	256	99.1	0.074	0.242	78.5
207	89.3	0.070	0.230	82.7	257	99.3	0.074	0.243	78.4
208	89.5	0.070	0.230	82.6	258	99.5	0.074	0.243	78.3
209	89.7	0.070	0.231	82.5	259	99.7	0.074	0.243	78.3
210	89.9	0.070	0.231	82.5	260	99.9	0.074	0.243	78.2
211	90.1	0.070	0.231	82.4	261	100.1	0.074	0.244	78.1
212	90.3	0.070	0.231	82.3	262	100.3	0.074	0.244	78.0
213	90.5	0.071	0.232	82.2	263	100.5	0.074	0.244	77.9
214	90.7	0.071	0.232	82.1	264	100.7	0.074	0.244	77.9
215	90.9	0.071	0.232	82.0	265	100.9	0.075	0.245	77.8
216	91.1	0.071	0.232	81.9	266	101.1	0.075	0.245	77.7
217	91.3	0.071	0.233	81.8	267	101.3	0.075	0.245	77.6
218	91.5	0.071	0.233	81.7	268	101.5	0.075	0.245	77.6
219	91.7	0.071	0.233	81.6	269	101.7	0.075	0.246	77.5
220	91.9	0.071	0.233	81.5	270	101.9	0.075	0.246	77.4
221	92.1	0.071	0.234	81.5	271	102.1	0.075	0.246	77.3
222	92.3	0.071	0.234	81.4	272	102.3	0.075	0.246	77.2
223	92.5	0.071	0.234	81.3	273	102.5	0.075	0.247	77.2
224	92.7	0.071	0.234	81.2	274	102.7	0.075	0.247	77.1
225	92.9	0.072	0.235	81.1	275	102.9	0.075	0.247	77.0
226	93.1	0.072	0.235	81.0	276	103.1	0.075	0.247	76.9
227	93.3	0.072	0.235	80.9	277	103.3	0.075	0.248	76.9
228	93.5	0.072	0.235	80.8	278	103.5	0.076	0.248	76.8
229	93.7	0.072	0.236	80.7	279	103.7	0.076	0.248	76.7
230	93.9	0.072	0.236	80.7	280	103.9	0.076	0.248	76.6
231	94.1	0.072	0.236	80.6	281	104.1	0.076	0.249	76.6
232	94.3	0.072	0.236	80.5	282	104.3	0.076	0.249	76.5
233	94.5	0.072	0.237	80.4	283	104.5	0.076	0.249	76.4
234	94.7	0.072	0.237	80.3	284	104.7	0.076	0.249	76.3
235	94.9	0.072	0.237	80.2	285	104.9	0.076	0.249	76.3
236	95.1	0.072	0.237	80.1	286	105.1	0.076	0.250	76.2
237	95.3	0.072	0.238	80.1	287	105.3	0.076	0.250	76.1
238	95.5	0.073	0.238	80.0	288	105.5	0.076	0.250	76.1
239	95.7	0.073	0.238	79.9	289	105.7	0.076	0.250	76.0
240	95.9	0.073	0.238	79.8	290	105.9	0.076	0.251	75.9
241	96.1	0.073	0.239	79.7	291	106.1	0.076	0.251	75.8
242	96.3	0.073	0.239	79.6	292	106.3	0.077	0.251	75.8
243	96.5	0.073	0.239	79.6	293	106.5	0.077	0.251	75.7
244	96.7	0.073	0.239	79.5	294	106.7	0.077	0.252	75.6
245	96.9	0.073	0.240	79.4	295	106.9	0.077	0.252	75.5
246	97.1	0.073	0.240	79.3	296	107.1	0.077	0.252	75.5
247	97.3	0.073	0.240	79.2	297	107.3	0.077	0.252	75.4
248	97.5	0.073	0.240	79.1	298	107.5	0.077	0.253	75.3
249	97.7	0.073	0.241	79.1	299	107.7	0.077	0.253	75.3
250	97.9	0.073	0.241	79.0	300	107.9	0.077	0.253	75.2

ERI 4-1/16-Inch Rigid Transmission Lines

Channel	Freq. (MHz)	Attn. (dB/100 feet)	Attn. (dB/100 meters)	Average Power (kw)	Channel	Freq. (MHz)	Attn. (dB/100 feet)	Attn. (dB/100 meters)	Average Power (kw)
TV Frequencies									
2	57	0.056	0.183	103.8	20	509	0.170	0.557	34.2
3	63	0.059	0.193	98.7	21	515	0.171	0.560	34.0
4	69	0.062	0.202	94.2	22	521	0.172	0.564	33.8
5	79	0.066	0.216	88.0	23	527	0.173	0.567	33.6
6	85	0.068	0.224	84.8	24	533	0.174	0.570	33.4
7	177	0.099	0.325	58.5	25	539	0.175	0.573	33.2
8	183	0.101	0.331	57.5	26	545	0.176	0.577	33.0
9	189	0.102	0.336	56.6	27	551	0.177	0.580	32.8
10	195	0.104	0.342	55.7	28	557	0.178	0.583	32.6
11	201	0.106	0.347	54.9	29	563	0.179	0.586	32.5
12	207	0.107	0.352	54.1	30	569	0.180	0.590	32.3
13	213	0.109	0.357	53.3	31	575	0.181	0.593	32.1
14	473	0.163	0.536	35.5	32	581	0.182	0.596	31.9
15	479	0.165	0.540	35.3	33	587	0.183	0.599	31.8
16	485	0.166	0.543	35.0	34	593	0.184	0.602	31.6
17	491	0.167	0.547	34.8	35	599	0.184	0.605	31.4
18	497	0.168	0.550	34.6	36	605	0.185	0.608	31.3
19	503	0.169	0.553	34.4					
TV Frequencies (Europe)									
2	48.25	0.051	0.169	112.9	40E	626	0.189	0.619	30.7
2A	49.75	0.052	0.171	111.1	41E	634	0.190	0.623	30.5
3	55.25	0.055	0.181	105.4	42E	642	0.191	0.627	30.3
4	66.25	0.060	0.198	96.2	43E	650	0.192	0.631	30.1
5	175.25	0.099	0.323	58.8	44E	658	0.194	0.635	30.0
6	182.25	0.101	0.330	57.7	45E	666	0.195	0.639	29.8
7	189.25	0.103	0.336	56.6	46E	674	0.196	0.643	29.6
8	196.25	0.104	0.343	55.5	47E	682	0.197	0.647	29.4
9	203.25	0.106	0.349	54.6	48E	690	0.198	0.651	29.2
10	210.25	0.108	0.355	53.6	49E	698	0.200	0.655	29.1
11	217.25	0.110	0.361	52.7	50E	706	0.201	0.659	28.9
12	224.25	0.112	0.367	51.9	51E	714	0.202	0.662	28.7
21E	474	0.164	0.537	35.4	52E	722	0.203	0.666	28.6
22E	482	0.165	0.542	35.1	53E	730	0.204	0.670	28.4
23E	490	0.166	0.546	34.8	54E	738	0.205	0.674	28.2
24E	498	0.168	0.551	34.6	55E	746	0.207	0.678	28.1
25E	506	0.169	0.555	34.3	56E	754	0.208	0.681	27.9
26E	514	0.171	0.560	34.0	57E	762	0.209	0.685	27.8
27E	522	0.172	0.564	33.7	58E	770	0.210	0.689	27.6
28E	530	0.173	0.568	33.5	59E	778	0.211	0.692	27.5
29E	538	0.175	0.573	33.2	60E	786	0.212	0.696	27.3
30E	546	0.176	0.577	33.0	61E	794	0.213	0.700	27.2
31E	554	0.177	0.582	32.7	62E	802	0.214	0.703	27.1
32E	562	0.179	0.586	32.5	63E	810	0.215	0.707	26.9
33E	570	0.180	0.590	32.2	64E	818	0.217	0.710	26.8
34E	578	0.181	0.594	32.0	65E	826	0.218	0.714	26.6
35E	586	0.182	0.599	31.8	66E	834	0.219	0.718	26.5
36E	594	0.184	0.603	31.6	67E	842	0.220	0.721	26.4
37E	602	0.185	0.607	31.4	68E	850	0.221	0.725	26.3
38E	610	0.186	0.611	31.1	69E	858	0.222	0.728	26.1
39E	618	0.187	0.615	30.9					
40E	626	0.189	0.619	30.7					
41E	634	0.190	0.623	30.5					
42E	642	0.191	0.627	30.3					

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ERI 6-1/8-Inch, 50 Ohm, Rigid Transmission Line

Channel	Freq. (MHz)	Attn. (dB/100 feet)	Attn. (dB/100 meters)	Average Power (kw)	Channel	Freq. (MHz)	Attn. (dB/100 feet)	Attn. (dB/100 meters)	Average Power (kw)
FM Frequencies									
201	88.1	0.046	0.150	184.4	251	98.1	0.048	0.158	174.6
202	88.3	0.046	0.150	184.2	252	98.3	0.048	0.158	174.4
203	88.5	0.046	0.150	184.0	253	98.5	0.048	0.158	174.2
204	88.7	0.046	0.150	183.8	254	98.7	0.048	0.158	174.1
205	88.9	0.046	0.150	183.5	255	98.9	0.048	0.159	173.9
206	89.1	0.046	0.150	183.3	256	99.1	0.048	0.159	173.7
207	89.3	0.046	0.151	183.1	257	99.3	0.048	0.159	173.5
208	89.5	0.046	0.151	182.9	258	99.5	0.048	0.159	173.3
209	89.7	0.046	0.151	182.7	259	99.7	0.049	0.159	173.2
210	89.9	0.046	0.151	182.5	260	99.9	0.049	0.159	173.0
211	90.1	0.046	0.151	182.3	261	100.1	0.049	0.160	172.8
212	90.3	0.046	0.151	182.1	262	100.3	0.049	0.160	172.6
213	90.5	0.046	0.152	181.9	263	100.5	0.049	0.160	172.5
214	90.7	0.046	0.152	181.7	264	100.7	0.049	0.160	172.3
215	90.9	0.046	0.152	181.5	265	100.9	0.049	0.160	172.1
216	91.1	0.046	0.152	181.3	266	101.1	0.049	0.160	171.9
217	91.3	0.046	0.152	181.1	267	101.3	0.049	0.161	171.8
218	91.5	0.046	0.152	180.9	268	101.5	0.049	0.161	171.6
219	91.7	0.047	0.153	180.7	269	101.7	0.049	0.161	171.4
220	91.9	0.047	0.153	180.5	270	101.9	0.049	0.161	171.3
221	92.1	0.047	0.153	180.3	271	102.1	0.049	0.161	171.1
222	92.3	0.047	0.153	180.1	272	102.3	0.049	0.161	170.9
223	92.5	0.047	0.153	179.9	273	102.5	0.049	0.162	170.7
224	92.7	0.047	0.153	179.7	274	102.7	0.049	0.162	170.6
225	92.9	0.047	0.154	179.5	275	102.9	0.049	0.162	170.4
226	93.1	0.047	0.154	179.3	276	103.1	0.049	0.162	170.2
227	93.3	0.047	0.154	179.1	277	103.3	0.049	0.162	170.1
228	93.5	0.047	0.154	178.9	278	103.5	0.049	0.162	169.9
229	93.7	0.047	0.154	178.7	279	103.7	0.050	0.162	169.7
230	93.9	0.047	0.155	178.5	280	103.9	0.050	0.163	169.6
231	94.1	0.047	0.155	178.3	281	104.1	0.050	0.163	169.4
232	94.3	0.047	0.155	178.1	282	104.3	0.050	0.163	169.2
233	94.5	0.047	0.155	177.9	283	104.5	0.050	0.163	169.1
234	94.7	0.047	0.155	177.8	284	104.7	0.050	0.163	168.9
235	94.9	0.047	0.155	177.6	285	104.9	0.050	0.163	168.7
236	95.1	0.047	0.156	177.4	286	105.1	0.050	0.164	168.6
237	95.3	0.047	0.156	177.2	287	105.3	0.050	0.164	168.4
238	95.5	0.047	0.156	177.0	288	105.5	0.050	0.164	168.3
239	95.7	0.048	0.156	176.8	289	105.7	0.050	0.164	168.1
240	95.9	0.048	0.156	176.6	290	105.9	0.050	0.164	167.9
241	96.1	0.048	0.156	176.4	291	106.1	0.050	0.164	167.8
242	96.3	0.048	0.156	176.2	292	106.3	0.050	0.165	167.6
243	96.5	0.048	0.157	176.1	293	106.5	0.050	0.165	167.5
244	96.7	0.048	0.157	175.9	294	106.7	0.050	0.165	167.3
245	96.9	0.048	0.157	175.7	295	106.9	0.050	0.165	167.1
246	97.1	0.048	0.157	175.5	296	107.1	0.050	0.165	167.0
247	97.3	0.048	0.157	175.3	297	107.3	0.050	0.165	166.8
248	97.5	0.048	0.157	175.1	298	107.5	0.050	0.165	166.7
249	97.7	0.048	0.158	175.0	299	107.7	0.050	0.166	166.5
250	97.9	0.048	0.158	174.8	300	107.9	0.051	0.166	166.3

ERI 6-1/8-Inch 50 Ohm, Rigid Transmission Lines

Channel	Freq. (MHz)	Attn. (dB/100 feet)	Attn. (dB/100 meters)	Average Power (kw)	Channel	Freq. (MHz)	Attn. (dB/100 feet)	Attn. (dB/100 meters)	Average Power (kw)
TV Frequencies									
2	57	0.037	0.120	229.9	20	509	0.112	0.367	75.1
3	63	0.038	0.126	218.6	21	515	0.113	0.370	74.6
4	69	0.040	0.132	208.7	22	521	0.113	0.372	74.2
5	79	0.043	0.142	194.9	23	527	0.114	0.374	73.7
6	85	0.045	0.147	187.8	24	533	0.115	0.376	73.3
7	177	0.065	0.213	129.3	25	539	0.115	0.378	72.9
8	183	0.066	0.217	127.1	26	545	0.116	0.381	72.5
9	189	0.067	0.221	125.0	27	551	0.117	0.383	72.1
10	195	0.068	0.224	123.0	28	557	0.117	0.385	71.7
11	201	0.069	0.228	121.1	29	563	0.118	0.387	71.3
12	207	0.070	0.231	119.3	30	569	0.119	0.389	70.9
13	213	0.071	0.235	117.6	31	575	0.119	0.391	70.5
14	473	0.108	0.354	78.0	32	581	0.120	0.393	70.1
15	479	0.108	0.356	77.5	33	587	0.121	0.396	69.7
16	485	0.109	0.358	77.0	34	593	0.121	0.398	69.4
17	491	0.110	0.361	76.5	35	599	0.122	0.400	69.0
18	497	0.111	0.363	76.0	36	605	0.122	0.402	68.6
19	503	0.111	0.365	75.5					
TV Frequencies (Europe)									
2	48.25	0.034	0.110	250.2	40E	626	0.125	0.409	67.4
2A	49.75	0.034	0.112	246.3	41E	634	0.125	0.412	67.0
3	55.25	0.036	0.118	233.6	42E	642	0.126	0.414	66.6
4	66.25	0.039	0.129	213.1	43E	650	0.127	0.417	66.1
5	175.25	0.065	0.212	129.9	44E	658	0.128	0.420	65.7
6	182.25	0.066	0.217	127.3	45E	666	0.129	0.422	65.3
7	189.25	0.067	0.221	124.9	46E	674	0.130	0.425	64.9
8	196.25	0.069	0.225	122.6	47E	682	0.130	0.428	64.5
9	203.25	0.070	0.229	120.4	48E	690	0.131	0.430	64.1
10	210.25	0.071	0.233	118.4	49E	698	0.132	0.433	63.7
11	217.25	0.072	0.237	116.4	50E	706	0.133	0.435	63.3
12	224.25	0.073	0.241	114.5	51E	714	0.133	0.438	63.0
21E	474	0.108	0.354	77.9	52E	722	0.134	0.441	62.6
22E	482	0.109	0.357	77.2	53E	730	0.135	0.443	62.3
23E	490	0.110	0.360	76.6	54E	738	0.136	0.446	61.9
24E	498	0.111	0.363	75.9	55E	746	0.137	0.448	61.5
25E	506	0.112	0.366	75.3	56E	754	0.137	0.451	61.2
26E	514	0.113	0.369	74.7	57E	762	0.138	0.453	60.9
27E	522	0.113	0.372	74.1	58E	770	0.139	0.456	60.5
28E	530	0.114	0.375	73.5	59E	778	0.140	0.458	60.2
29E	538	0.115	0.378	73.0	60E	786	0.140	0.461	59.9
30E	546	0.116	0.381	72.4	61E	794	0.141	0.463	59.6
31E	554	0.117	0.384	71.9	62E	802	0.142	0.465	59.3
32E	562	0.118	0.387	71.3					
33E	570	0.119	0.390	70.8					
34E	578	0.120	0.392	70.3					
35E	586	0.120	0.395	69.8					
36E	594	0.121	0.398	69.3					
37E	602	0.122	0.401	68.8					
38E	610	0.123	0.404	68.4					
39E	618	0.124	0.406	67.9					
40E	626	0.125	0.409	67.4					
41E	634	0.125	0.412	67.0					
42E	642	0.126	0.414	66.6					

ERI 6-1/8-Inch, 75 Ohm, Rigid Transmission Line

Channel	Freq. (MHz)	Attn. (dB/100 feet)	Attn. (dB/100 meters)	Average Power (kw)	Channel	Freq. (MHz)	Attn. (dB/100 feet)	Attn. (dB/100 meters)	Average Power (kw)
FM Frequencies									
201	88.1	0.042	0.138	159.1	251	98.1	0.044	0.146	150.7
202	88.3	0.042	0.138	158.9	252	98.3	0.044	0.146	150.5
203	88.5	0.042	0.138	158.8	253	98.5	0.044	0.146	150.4
204	88.7	0.042	0.138	158.6	254	98.7	0.045	0.146	150.2
205	88.9	0.042	0.139	158.4	255	98.9	0.045	0.146	150.1
206	89.1	0.042	0.139	158.2	256	99.1	0.045	0.146	149.9
207	89.3	0.042	0.139	158.0	257	99.3	0.045	0.147	149.8
208	89.5	0.042	0.139	157.9	258	99.5	0.045	0.147	149.6
209	89.7	0.042	0.139	157.7	259	99.7	0.045	0.147	149.5
210	89.9	0.042	0.139	157.5	260	99.9	0.045	0.147	149.3
211	90.1	0.043	0.140	157.3	261	100.1	0.045	0.147	149.2
212	90.3	0.043	0.140	157.1	262	100.3	0.045	0.147	149.0
213	90.5	0.043	0.140	157.0	263	100.5	0.045	0.147	148.9
214	90.7	0.043	0.140	156.8	264	100.7	0.045	0.148	148.7
215	90.9	0.043	0.140	156.6	265	100.9	0.045	0.148	148.6
216	91.1	0.043	0.140	156.4	266	101.1	0.045	0.148	148.4
217	91.3	0.043	0.140	156.3	267	101.3	0.045	0.148	148.3
218	91.5	0.043	0.141	156.1	268	101.5	0.045	0.148	148.1
219	91.7	0.043	0.141	155.9	269	101.7	0.045	0.148	148.0
220	91.9	0.043	0.141	155.8	270	101.9	0.045	0.149	147.8
221	92.1	0.043	0.141	155.6	271	102.1	0.045	0.149	147.7
222	92.3	0.043	0.141	155.4	272	102.3	0.045	0.149	147.5
223	92.5	0.043	0.141	155.2	273	102.5	0.045	0.149	147.4
224	92.7	0.043	0.142	155.1	274	102.7	0.045	0.149	147.2
225	92.9	0.043	0.142	154.9	275	102.9	0.045	0.149	147.1
226	93.1	0.043	0.142	154.7	276	103.1	0.046	0.149	147.0
227	93.3	0.043	0.142	154.6	277	103.3	0.046	0.150	146.8
228	93.5	0.043	0.142	154.4	278	103.5	0.046	0.150	146.7
229	93.7	0.043	0.142	154.2	279	103.7	0.046	0.150	146.5
230	93.9	0.043	0.142	154.1	280	103.9	0.046	0.150	146.4
231	94.1	0.043	0.143	153.9	281	104.1	0.046	0.150	146.2
232	94.3	0.044	0.143	153.7	282	104.3	0.046	0.150	146.1
233	94.5	0.044	0.143	153.6	283	104.5	0.046	0.150	146.0
234	94.7	0.044	0.143	153.4	284	104.7	0.046	0.151	145.8
235	94.9	0.044	0.143	153.2	285	104.9	0.046	0.151	145.7
236	95.1	0.044	0.143	153.1	286	105.1	0.046	0.151	145.5
237	95.3	0.044	0.144	152.9	287	105.3	0.046	0.151	145.4
238	95.5	0.044	0.144	152.8	288	105.5	0.046	0.151	145.3
239	95.7	0.044	0.144	152.6	289	105.7	0.046	0.151	145.1
240	95.9	0.044	0.144	152.4	290	105.9	0.046	0.151	145.0
241	96.1	0.044	0.144	152.3	291	106.1	0.046	0.152	144.8
242	96.3	0.044	0.144	152.1	292	106.3	0.046	0.152	144.7
243	96.5	0.044	0.144	152.0	293	106.5	0.046	0.152	144.6
244	96.7	0.044	0.145	151.8	294	106.7	0.046	0.152	144.4
245	96.9	0.044	0.145	151.6	295	106.9	0.046	0.152	144.3
246	97.1	0.044	0.145	151.5	296	107.1	0.046	0.152	144.2
247	97.3	0.044	0.145	151.3	297	107.3	0.046	0.152	144.0
248	97.5	0.044	0.145	151.2	298	107.5	0.047	0.153	143.9
249	97.7	0.044	0.145	151.0	299	107.7	0.047	0.153	143.7
250	97.9	0.044	0.146	150.9	300	107.9	0.047	0.153	143.6

ERI 6-1/8-Inch, 75 Ohm, Rigid Transmission Lines

Channel	Freq. (MHz)	Attn. (dB/100 feet)	Attn. (dB/100 meters)	Average Power (kw)	Channel	Freq. (MHz)	Attn. (dB/100 feet)	Attn. (dB/100 meters)	Average Power (kw)
TV Frequencies									
2	57	0.034	0.111	198.2	20	509	0.103	0.337	65.2
3	63	0.036	0.116	188.5	21	515	0.103	0.339	64.8
4	69	0.037	0.122	180.0	22	521	0.104	0.341	64.4
5	79	0.040	0.131	168.1	23	527	0.105	0.343	64.0
6	85	0.041	0.136	162.0	24	533	0.105	0.345	63.7
7	177	0.060	0.196	111.7	25	539	0.106	0.347	63.3
8	183	0.061	0.200	109.9	26	545	0.106	0.349	62.9
9	189	0.062	0.203	108.1	27	551	0.107	0.351	62.6
10	195	0.063	0.206	106.4	28	557	0.108	0.353	62.2
11	201	0.064	0.210	104.7	29	563	0.108	0.355	61.9
12	207	0.065	0.213	103.2	30	569	0.109	0.357	61.6
13	213	0.066	0.216	101.7	31	575	0.109	0.359	61.2
14	473	0.099	0.324	67.7	32	581	0.110	0.360	60.9
15	479	0.100	0.326	67.2	33	587	0.110	0.362	60.6
16	485	0.100	0.329	66.8	34	593	0.111	0.364	60.3
17	491	0.101	0.331	66.4	35	599	0.112	0.366	60.0
18	497	0.101	0.333	66.0	36	605	0.112	0.368	59.6
19	503	0.102	0.335	65.6					
TV Frequencies (Europe)									
2	48.25	0.031	0.102	215.6	40E	626	0.114	0.375	58.6
2A	49.75	0.032	0.103	212.3	41E	634	0.115	0.377	58.2
3	55.25	0.033	0.109	201.4	42E	642	0.116	0.379	57.9
4	66.25	0.036	0.119	183.8	43E	650	0.116	0.382	57.5
5	175.25	0.060	0.195	112.3	44E	658	0.117	0.384	57.1
6	182.25	0.061	0.199	110.1	45E	666	0.118	0.387	56.8
7	189.25	0.062	0.203	108.0	46E	674	0.119	0.389	56.4
8	196.25	0.063	0.207	106.0	47E	682	0.119	0.391	56.1
9	203.25	0.064	0.211	104.2	48E	690	0.120	0.394	55.7
10	210.25	0.065	0.214	102.4	49E	698	0.121	0.396	55.4
11	217.25	0.066	0.218	100.7	50E	706	0.121	0.399	55.1
12	224.25	0.068	0.222	99.1	51E	714	0.122	0.401	54.8
21E	474	0.099	0.325	67.6	52E	722	0.123	0.403	54.5
22E	482	0.100	0.328	67.0	53E	730	0.124	0.405	54.1
23E	490	0.101	0.330	66.5	54E	738	0.124	0.408	53.8
24E	498	0.102	0.333	65.9	55E	746	0.125	0.410	53.5
25E	506	0.102	0.336	65.4	56E	754	0.126	0.412	53.3
26E	514	0.103	0.339	64.9	57E	762	0.126	0.415	53.0
27E	522	0.104	0.341	64.3	58E	770	0.127	0.417	52.7
28E	530	0.105	0.344	63.8	59E	778	0.128	0.419	52.4
29E	538	0.106	0.347	63.4	60E	786	0.128	0.421	52.1
30E	546	0.106	0.349	62.9	61E	794	0.129	0.423	51.8
31E	554	0.107	0.352	62.4	62E	802	0.130	0.426	51.6
32E	562	0.108	0.354	62.0	63E	810	0.130	0.428	51.3
33E	570	0.109	0.357	61.5	64E	818	0.131	0.430	51.1
34E	578	0.110	0.360	61.1	65E	826	0.132	0.432	50.8
35E	586	0.110	0.362	60.6					
36E	594	0.111	0.365	60.2					
37E	602	0.112	0.367	59.8					
38E	610	0.113	0.370	59.4					
39E	618	0.113	0.372	59.0					
40E	626	0.114	0.375	58.6					
41E	634	0.115	0.377	58.2					
42E	642	0.116	0.379	57.9					

ERI 7-3/16-Inch, 75 Ohm, Rigid Transmission Line

Channel	Freq. (MHz)	Attn. (dB/100 feet)	Attn. (dB/100 meters)	Average Power (kw)	Channel	Freq. (MHz)	Attn. (dB/100 feet)	Attn. (dB/100 meters)	Average Power (kw)
FM Frequencies									
201	88.1	0.035	0.116	226.8	251	98.1	0.037	0.122	214.8
202	88.3	0.035	0.116	226.5	252	98.3	0.037	0.123	214.5
203	88.5	0.035	0.116	226.3	253	98.5	0.037	0.123	214.3
204	88.7	0.035	0.116	226.0	254	98.7	0.037	0.123	214.1
205	88.9	0.035	0.116	225.7	255	98.9	0.037	0.123	213.9
206	89.1	0.036	0.117	225.5	256	99.1	0.037	0.123	213.7
207	89.3	0.036	0.117	225.2	257	99.3	0.038	0.123	213.4
208	89.5	0.036	0.117	225.0	258	99.5	0.038	0.123	213.2
209	89.7	0.036	0.117	224.7	259	99.7	0.038	0.123	213.0
210	89.9	0.036	0.117	224.5	260	99.9	0.038	0.124	212.8
211	90.1	0.036	0.117	224.2	261	100.1	0.038	0.124	212.6
212	90.3	0.036	0.117	224.0	262	100.3	0.038	0.124	212.4
213	90.5	0.036	0.117	223.7	263	100.5	0.038	0.124	212.1
214	90.7	0.036	0.118	223.5	264	100.7	0.038	0.124	211.9
215	90.9	0.036	0.118	223.2	265	100.9	0.038	0.124	211.7
216	91.1	0.036	0.118	223.0	266	101.1	0.038	0.124	211.5
217	91.3	0.036	0.118	222.7	267	101.3	0.038	0.124	211.3
218	91.5	0.036	0.118	222.5	268	101.5	0.038	0.125	211.1
219	91.7	0.036	0.118	222.2	269	101.7	0.038	0.125	210.9
220	91.9	0.036	0.118	222.0	270	101.9	0.038	0.125	210.7
221	92.1	0.036	0.119	221.7	271	102.1	0.038	0.125	210.4
222	92.3	0.036	0.119	221.5	272	102.3	0.038	0.125	210.2
223	92.5	0.036	0.119	221.2	273	102.5	0.038	0.125	210.0
224	92.7	0.036	0.119	221.0	274	102.7	0.038	0.125	209.8
225	92.9	0.036	0.119	220.8	275	102.9	0.038	0.125	209.6
226	93.1	0.036	0.119	220.5	276	103.1	0.038	0.126	209.4
227	93.3	0.036	0.119	220.3	277	103.3	0.038	0.126	209.2
228	93.5	0.036	0.119	220.0	278	103.5	0.038	0.126	209.0
229	93.7	0.036	0.120	219.8	279	103.7	0.038	0.126	208.8
230	93.9	0.036	0.120	219.6	280	103.9	0.038	0.126	208.6
231	94.1	0.037	0.120	219.3	281	104.1	0.038	0.126	208.4
232	94.3	0.037	0.120	219.1	282	104.3	0.038	0.126	208.2
233	94.5	0.037	0.120	218.9	283	104.5	0.039	0.126	208.0
234	94.7	0.037	0.120	218.6	284	104.7	0.039	0.127	207.8
235	94.9	0.037	0.120	218.4	285	104.9	0.039	0.127	207.6
236	95.1	0.037	0.120	218.2	286	105.1	0.039	0.127	207.4
237	95.3	0.037	0.121	217.9	287	105.3	0.039	0.127	207.2
238	95.5	0.037	0.121	217.7	288	105.5	0.039	0.127	207.0
239	95.7	0.037	0.121	217.5	289	105.7	0.039	0.127	206.8
240	95.9	0.037	0.121	217.2	290	105.9	0.039	0.127	206.6
241	96.1	0.037	0.121	217.0	291	106.1	0.039	0.127	206.4
242	96.3	0.037	0.121	216.8	292	106.3	0.039	0.127	206.2
243	96.5	0.037	0.121	216.6	293	106.5	0.039	0.128	206.0
244	96.7	0.037	0.122	216.3	294	106.7	0.039	0.128	205.8
245	96.9	0.037	0.122	216.1	295	106.9	0.039	0.128	205.6
246	97.1	0.037	0.122	215.9	296	107.1	0.039	0.128	205.4
247	97.3	0.037	0.122	215.6	297	107.3	0.039	0.128	205.2
248	97.5	0.037	0.122	215.4	298	107.5	0.039	0.128	205.0
249	97.7	0.037	0.122	215.2	299	107.7	0.039	0.128	204.8
250	97.9	0.037	0.122	215.0	300	107.9	0.039	0.128	204.6

ERI 7-3/16-Inch, 75 Ohm, Rigid Transmission Lines

Channel	Freq. (MHz)	Attn. (dB/100 feet)	Attn. (dB/100 meters)	Average Power (kw)	Channel	Freq. (MHz)	Attn. (dB/100 feet)	Attn. (dB/100 meters)	Average Power (kw)
TV Frequencies									
2	57	0.028	0.093	282.7	20	509	0.086	0.284	92.6
3	63	0.030	0.098	268.7	21	515	0.087	0.285	92.1
4	69	0.031	0.102	256.6	22	521	0.088	0.287	91.5
5	79	0.033	0.110	239.7	23	527	0.088	0.289	91.0
6	85	0.035	0.114	230.9	24	533	0.089	0.291	90.5
7	177	0.050	0.165	159.1	25	539	0.089	0.292	89.9
8	183	0.051	0.168	156.4	26	545	0.090	0.294	89.4
9	189	0.052	0.171	153.9	27	551	0.090	0.296	88.9
10	195	0.053	0.174	151.5	28	557	0.091	0.297	88.4
11	201	0.054	0.176	149.1	29	563	0.091	0.299	87.9
12	207	0.055	0.179	146.9	30	569	0.092	0.301	87.5
13	213	0.055	0.182	144.8	31	575	0.092	0.302	87.0
14	473	0.083	0.273	96.2	32	581	0.093	0.304	86.5
15	479	0.084	0.275	95.6	33	587	0.093	0.305	86.1
16	485	0.084	0.277	95.0	34	593	0.094	0.307	85.6
17	491	0.085	0.279	94.4	35	599	0.094	0.309	85.2
18	497	0.085	0.280	93.8	36	605	0.095	0.310	84.7
19	503	0.086	0.282	93.2					
TV Frequencies (Europe)									
2	48.25	0.026	0.085	307.5	40E	626	0.096	0.316	83.2
2A	49.75	0.026	0.087	302.8	41E	634	0.097	0.318	82.7
3	55.25	0.028	0.092	287.2	42E	642	0.098	0.320	82.2
4	66.25	0.031	0.100	262.0	43E	650	0.098	0.322	81.6
5	175.25	0.050	0.164	159.9	44E	658	0.099	0.324	81.1
6	182.25	0.051	0.168	156.8	45E	666	0.099	0.326	80.6
7	189.25	0.052	0.171	153.8	46E	674	0.100	0.328	80.1
8	196.25	0.053	0.174	151.0	47E	682	0.101	0.330	79.6
9	203.25	0.054	0.177	148.3	48E	690	0.101	0.332	79.2
10	210.25	0.055	0.180	145.8	49E	698	0.102	0.334	78.7
11	217.25	0.056	0.183	143.3	50E	706	0.102	0.336	78.2
12	224.25	0.057	0.186	141.0	51E	714	0.103	0.338	77.8
21E	474	0.083	0.274	96.1	52E	722	0.104	0.340	77.3
22E	482	0.084	0.276	95.3	53E	730	0.104	0.342	76.9
23E	490	0.085	0.278	94.5	54E	738	0.105	0.344	76.4
24E	498	0.086	0.281	93.7	55E	746	0.105	0.346	76.0
25E	506	0.086	0.283	92.9					
26E	514	0.087	0.285	92.2					
27E	522	0.088	0.287	91.4					
28E	530	0.088	0.290	90.7					
29E	538	0.089	0.292	90.0					
30E	546	0.090	0.294	89.3					
31E	554	0.090	0.296	88.7					
32E	562	0.091	0.299	88.0					
33E	570	0.092	0.301	87.4					
34E	578	0.092	0.303	86.7					
35E	586	0.093	0.305	86.1					
36E	594	0.094	0.307	85.5					
37E	602	0.094	0.309	84.9					
38E	610	0.095	0.312	84.4					
39E	618	0.096	0.314	83.8					
40E	626	0.096	0.316	83.2					
41E	634	0.097	0.318	82.7					
42E	642	0.098	0.320	82.2					

ERI 8-3/16-Inch, 75 Ohm, Rigid Transmission Line

Channel	Freq. (MHz)	Attn. (dB/100 feet)	Attn. (dB/100 meters)	Average Power (kw)	Channel	Freq. (MHz)	Attn. (dB/100 feet)	Attn. (dB/100 meters)	Average Power (kw)
FM Frequencies									
201	88.1	0.032	0.103	271.9	251	98.1	0.033	0.109	257.5
202	88.3	0.032	0.103	271.6	252	98.3	0.033	0.109	257.2
203	88.5	0.032	0.104	271.3	253	98.5	0.033	0.109	257.0
204	88.7	0.032	0.104	271.0	254	98.7	0.033	0.109	256.7
205	88.9	0.032	0.104	270.7	255	98.9	0.033	0.110	256.4
206	89.1	0.032	0.104	270.4	256	99.1	0.033	0.110	256.2
207	89.3	0.032	0.104	270.1	257	99.3	0.033	0.110	255.9
208	89.5	0.032	0.104	269.8	258	99.5	0.034	0.110	255.7
209	89.7	0.032	0.104	269.5	259	99.7	0.034	0.110	255.4
210	89.9	0.032	0.104	269.2	260	99.9	0.034	0.110	255.1
211	90.1	0.032	0.105	268.9	261	100.1	0.034	0.110	254.9
212	90.3	0.032	0.105	268.5	262	100.3	0.034	0.110	254.6
213	90.5	0.032	0.105	268.2	263	100.5	0.034	0.110	254.4
214	90.7	0.032	0.105	267.9	264	100.7	0.034	0.111	254.1
215	90.9	0.032	0.105	267.6	265	100.9	0.034	0.111	253.9
216	91.1	0.032	0.105	267.4	266	101.1	0.034	0.111	253.6
217	91.3	0.032	0.105	267.1	267	101.3	0.034	0.111	253.3
218	91.5	0.032	0.105	266.8	268	101.5	0.034	0.111	253.1
219	91.7	0.032	0.105	266.5	269	101.7	0.034	0.111	252.8
220	91.9	0.032	0.106	266.2	270	101.9	0.034	0.111	252.6
221	92.1	0.032	0.106	265.9	271	102.1	0.034	0.111	252.3
222	92.3	0.032	0.106	265.6	272	102.3	0.034	0.111	252.1
223	92.5	0.032	0.106	265.3	273	102.5	0.034	0.112	251.8
224	92.7	0.032	0.106	265.0	274	102.7	0.034	0.112	251.6
225	92.9	0.032	0.106	264.7	275	102.9	0.034	0.112	251.3
226	93.1	0.032	0.106	264.4	276	103.1	0.034	0.112	251.1
227	93.3	0.032	0.106	264.1	277	103.3	0.034	0.112	250.8
228	93.5	0.032	0.107	263.9	278	103.5	0.034	0.112	250.6
229	93.7	0.032	0.107	263.6	279	103.7	0.034	0.112	250.4
230	93.9	0.033	0.107	263.3	280	103.9	0.034	0.112	250.1
231	94.1	0.033	0.107	263.0	281	104.1	0.034	0.112	249.9
232	94.3	0.033	0.107	262.7	282	104.3	0.034	0.113	249.6
233	94.5	0.033	0.107	262.4	283	104.5	0.034	0.113	249.4
234	94.7	0.033	0.107	262.1	284	104.7	0.034	0.113	249.1
235	94.9	0.033	0.107	261.9	285	104.9	0.034	0.113	248.9
236	95.1	0.033	0.107	261.6	286	105.1	0.034	0.113	248.7
237	95.3	0.033	0.108	261.3	287	105.3	0.034	0.113	248.4
238	95.5	0.033	0.108	261.0	288	105.5	0.035	0.113	248.2
239	95.7	0.033	0.108	260.8	289	105.7	0.035	0.113	247.9
240	95.9	0.033	0.108	260.5	290	105.9	0.035	0.113	247.7
241	96.1	0.033	0.108	260.2	291	106.1	0.035	0.114	247.5
242	96.3	0.033	0.108	259.9	292	106.3	0.035	0.114	247.2
243	96.5	0.033	0.108	259.7	293	106.5	0.035	0.114	247.0
244	96.7	0.033	0.108	259.4	294	106.7	0.035	0.114	246.8
245	96.9	0.033	0.108	259.1	295	106.9	0.035	0.114	246.5
246	97.1	0.033	0.109	258.8	296	107.1	0.035	0.114	246.3
247	97.3	0.033	0.109	258.6	297	107.3	0.035	0.114	246.1
248	97.5	0.033	0.109	258.3	298	107.5	0.035	0.114	245.8
249	97.7	0.033	0.109	258.0	299	107.7	0.035	0.114	245.6
250	97.9	0.033	0.109	257.8	300	107.9	0.035	0.115	245.4

ERI 8-3/16-Inch, 75 Ohm, Rigid Transmission Lines

Channel	Freq. (MHz)	Attn. (dB/100 feet)	Attn. (dB/100 meters)	Average Power (kw)	Channel	Freq. (MHz)	Attn. (dB/100 feet)	Attn. (dB/100 meters)	Average Power (kw)
TV Frequencies									
2	57	0.025	0.083	339.0	20	509	0.077	0.253	111.0
3	63	0.027	0.087	322.2	21	515	0.078	0.255	110.4
4	69	0.028	0.091	307.7	22	521	0.078	0.256	109.7
5	79	0.030	0.098	287.4	23	527	0.079	0.258	109.1
6	85	0.031	0.101	276.9	24	533	0.079	0.259	108.4
7	177	0.045	0.147	190.8	25	539	0.079	0.261	107.8
8	183	0.046	0.150	187.6	26	545	0.080	0.262	107.2
9	189	0.046	0.152	184.5	27	551	0.080	0.264	106.6
10	195	0.047	0.155	181.6	28	557	0.081	0.265	106.0
11	201	0.048	0.157	178.8	29	563	0.081	0.267	105.4
12	207	0.049	0.160	176.1	30	569	0.082	0.268	104.8
13	213	0.049	0.162	173.6	31	575	0.082	0.270	104.3
14	473	0.074	0.244	115.3	32	581	0.083	0.271	103.7
15	479	0.075	0.245	114.6	33	587	0.083	0.272	103.2
16	485	0.075	0.247	113.8	34	593	0.083	0.274	102.6
17	491	0.076	0.248	113.1	35	599	0.084	0.275	102.1
18	497	0.076	0.250	112.4	36	605	0.084	0.277	101.6
19	503	0.077	0.252	111.7					
TV Frequencies (Europe)									
2	48.25	0.023	0.076	368.7	40E	626	0.086	0.282	99.8
2A	49.75	0.024	0.077	363.1	41E	634	0.086	0.284	99.1
3	55.25	0.025	0.082	344.3	42E	642	0.087	0.285	98.5
4	66.25	0.027	0.089	314.1	43E	650	0.088	0.287	97.9
5	175.25	0.045	0.147	191.7	44E	658	0.088	0.289	97.2
6	182.25	0.046	0.150	188.0	45E	666	0.089	0.291	96.6
7	189.25	0.046	0.152	184.4	46E	674	0.089	0.293	96.0
8	196.25	0.047	0.155	181.0	47E	682	0.090	0.294	95.5
9	203.25	0.048	0.158	177.8	48E	690	0.090	0.296	94.9
10	210.25	0.049	0.161	174.7	49E	698	0.091	0.298	94.3
11	217.25	0.050	0.164	171.8					
12	224.25	0.051	0.166	169.1					
21E	474	0.074	0.244	115.2					
22E	482	0.075	0.246	114.2					
23E	490	0.076	0.248	113.2					
24E	498	0.076	0.250	112.3					
25E	506	0.077	0.252	111.4					
26E	514	0.078	0.254	110.5					
27E	522	0.078	0.256	109.6					
28E	530	0.079	0.258	108.7					
29E	538	0.079	0.260	107.9					
30E	546	0.080	0.262	107.1					
31E	554	0.081	0.264	106.3					
32E	562	0.081	0.266	105.5					
33E	570	0.082	0.268	104.7					
34E	578	0.082	0.270	104.0					
35E	586	0.083	0.272	103.2					
36E	594	0.084	0.274	102.5					
37E	602	0.084	0.276	101.8					
38E	610	0.085	0.278	101.1					
39E	618	0.085	0.280	100.4					
40E	626	0.086	0.282	99.8					
41E	634	0.086	0.284	99.1					
42E	642	0.087	0.285	98.5					

Specification and Design Notes:
Standard conditions for rating rigid lines are as follows. Attenuation: VSWR 1:1.0, ambient temperature 20°C (68°), atmospheric pressure, dry air.[3]
Average Power: VSWR 1:1.0, ambient temperature 40°C (104°F), inner conductor temperature 100°C (212°F), atmospheric pressure, dry air and no solar loading. The safety factor on peak power ratings is 400% (safety factor of 2.0 on voltage) to allow for the possible effects of fine matchers, tuning slugs, etc. Also, the theoretical peak breakdown voltage is derated by 35% for production testing purposes, as done across the broadcast industry. Due to the difficulty of measuring the attenuation of large diameter rigid lines precisely, attenuation, (and consequently average power), ratings are calculated based on line geometry, copper losses and dielectric losses.

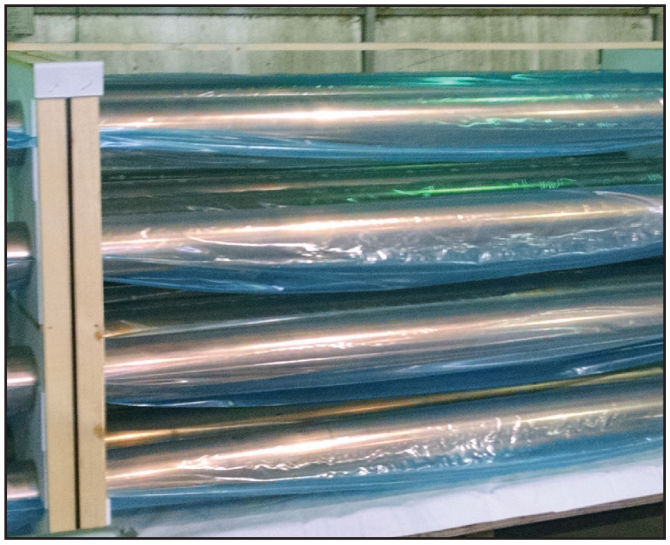
ERI rigid coaxial transmission lines are EIA compliant. To ensure high conductivity, they are made from ASTM B188 Alloy 102, Alloy 103 and Alloy 110 seamless copper tubes, which have an I.A.C.S rated conductivity at or above 99%[4]. Temper is Hard Drawn, H80, for line sizes ≤ 3-1/8 inch and is rated Hard, H75, for sizes > 3-1/8 inch. The coefficient of thermal expansion is 9.4 x 10^{-6} in/(in/°F) over 68°F – 212°F. Copper tube straightness is maintained at ≤ ½ inch per 20-foot length. This choice of copper material has been optimized in balancing the effects of both temperature and alloying elements on conductivity, as well as the need for strength, corrosion resistance and formability.

While typical RF broadcast transmission line systems are pressurized to 2-5 psig, ERI components are designed to handle 20 psig minimum. In RF applications, attenuation is affected by the nature of the signal to concentrate on the surface of the conductor due to skin effect, by some surface oxidation which is always present and also by small additional losses occurring at the flange interface. In order to ensure that attenuation ratings are conservative and agree closely with field-measured data, they include a derating factor on conductivity of 4 percentage points.

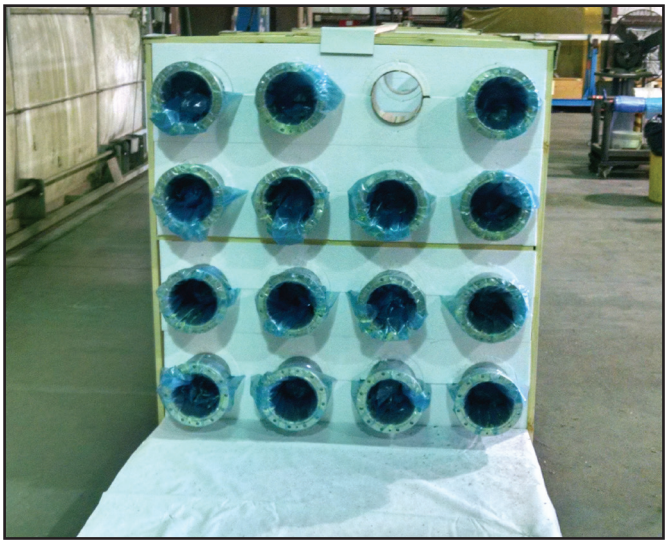
[3]One atmosphere absolute dry air pressure at sea level is 0 psig (gauge reading) or 14.7 psia (absolute); where the gauge pressure = absolute pressure – 14.7 psia).
[4]Conductivity of copper is expressed as a percentage of I.A.C.S (International Annealed Copper Standard) which is based upon annealed copper wire having a density of 8.89 g/cm^3, 1 meter long, weighing 1 gram, with a resistance of 0.15328 ohms, such that the percentage was assigned as 100 times the ratio of volume resistivity at 68°F (20°C).

Transmission Line Shipment Packaging

Heat Shrink Skid Tarps Provide Long Term Weather Protection



CORTEC Corrosion Inhibitor Impregnated Packing Sleeves



Styrofoam Stacking Cradles for Shipment and Storage

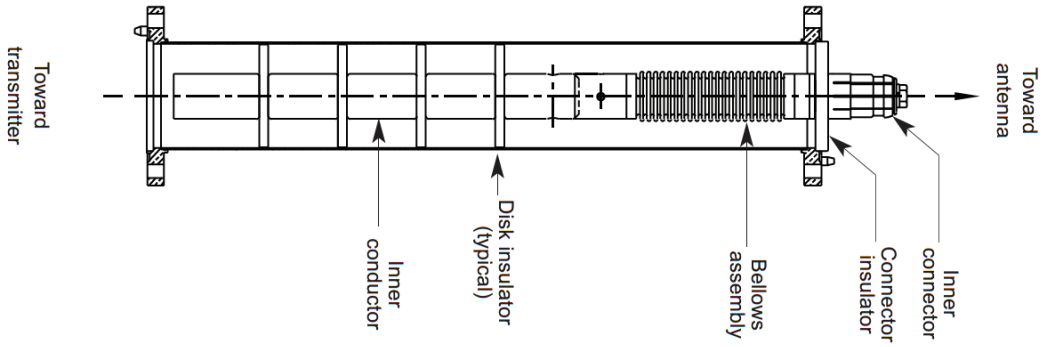
Rigid transmission line components are usually shipped to site and outdoor storage is often required. All transmission line systems shipped from ERI are suitably packaged for outdoor storage. This includes bagging the individual line sections in CORTEC bags that are impregnated with a corrosion inhibitor and stacking the line sections in Styrofoam cradles that are strapped to a shipping skid and then fully enclosed in a weatherproof heat shrink cover. This process has been used by ERI for several years and it has been demonstrated to be an excellent way to store rigid line components outdoors, for long periods, without tarnishing.

Rigid Line Sections

MACXLine® Rigid Line Sections

MACXLine® Standard Length Rigid Line Sections

MACXLine® standard length rigid line section come in standard section lengths of 20.00-foot (6.096-meter) detail "-1", 19.75-foot (6.020 meter) detail "-2", 19.50-foot (5.944 meter) detail "-3", 19.00-foot (5.791 meter) detail "-6"and 17.50-foot (5.342 meter) detail "-11". The detail "-D" line sections are for DUALine™ systems which use a specially engineered section length, that is the same for the entire system, to accommodate two (2) or three (3) television RF channels which are not able to use a standard line section length. The detail "W" line section are variable length line sections which are designed to provide a system which has a maximum VSWR of 1.1:1 or less for the entire UHF television band. Each line section includes the copper inner and outer conductor. The inner conductor includes the MACXLine fixed bullet/bellows expansion compensator. One flange hardware kit, with O ring is also included with each rigid line section.



MACXLine® Standard Rigid Line Sections Specifications

Part No.	Line Size	Impedance	Length		Section Weight	
MACX350A-1	3-1/8-inch	50 ohm	20.00-ft	(6.10-m)	56-lbm	(25.4-kg)
MACX350A-2	3-1/8-inch	50 ohm	19.75-ft	(6.02-m)	55-lbm	(24.9-kg)
MACX350A-3	3-1/8-inch	50 ohm	19.50-ft	(5.94-m)	54-lbm	(24.5-kg)
MACX350A-6	3-1/8-inch	50 ohm	19.00-ft	(5.79-m)	52-lbm	(23.6-kg)
MACX350A-11	3-1/8-inch	50 ohm	17.50-ft	(5.33-m)	49-lbm	(22.2-kg)
MACX350A-D	3-1/8-inch	50 ohm	Custom	--	TBD	
MACX350A-W	3-1/8-inch	50 ohm	Varies	--	Varies	
MACX450-1	4-1/16-inch	50 ohm	20.00-ft	(6.10-m)	89-lbm	(40.4-kg)
MACX450-2	4-1/16-inch	50 ohm	19.75-ft	(6.02-m)	88-lbm	(39.9-kg)
MACX450-3	4-1/16-inch	50 ohm	19.50-ft	(5.94-m)	87-lbm	(39.5-kg)
MACX450-6	4-1/16-inch	50 ohm	19.00-ft	(5.79-m)	85-lbm	(38.6-kg)
MACX450-11	4-1/16-inch	50 ohm	17.50-ft	(5.33-m)	80-lbm	(36.3-kg)
MACX450-D	4-1/16-inch	50 ohm	Custom	--	TBD	
MACX450-W	4-1/16-inch	50 ohm	Varies	--	Varies	
MACX650-1	6-1/8-inch	50 ohm	20.00-ft	(6.10-m)	146-lbm	(66.2-kg)
MACX650-2	6-1/8-inch	50 ohm	19.75-ft	(6.02-m)	144-lbm	(65.3-kg)
MACX650-3	6-1/8-inch	50 ohm	19.50-ft	(5.94-m)	142-lbm	(64.4-kg)
MACX650-6	6-1/8-inch	50 ohm	19.00-ft	(5.79-m)	140-lbm	(63.5-kg)
MACX650-11	6-1/8-inch	50 ohm	17.50-ft	(5.33-m)	129-lbm	(58.5-kg)
MACX650-D	6-1/8-inch	50 ohm	Custom	--	TBD	
MACX650-W	6-1/8-inch	50 ohm	Varies	--	Varies	
MACX675B-1	6-1/8-inch	75 ohm	20.00-ft	(6.10-m)	119-lbm	(53.9-kg)
MACX675B-2	6-1/8-inch	75 ohm	19.75-ft	(6.02-m)	117-lbm	(53.3-kg)
MACX675B-3	6-1/8-inch	75 ohm	19.50-ft	(5.94-m)	116-lbm	(52.8-kg)
MACX675B-D	6-1/8-inch	75 ohm	Custom	--	TBD	
MACX675B-W	6-1/8-inch	75 ohm	Varies	--	Varies	
MACX775-1	7-3/16-inch	75 ohm	20.00-ft	(6.10-m)	164-lbm	(74.5-kg)

MACXLine® Standard Rigid Line Sections Specifications

Part No.	Line Size	Impedance	Length		Section Weight	
MACX775-2	7-3/16-inch	75 ohm	19.75-ft	(6.02-m)	162-lbm	(73.5-kg)
MACX775-3	7-3/16-inch	75 ohm	19.50-ft	(5.94-m)	160-lbm	(72.6-kg)
MACX775-D	7-3/16-inch	75 ohm	Custom	--	TBD	
MACX775-W	7-3/16-inch	75 ohm	Varies	--	Varies	
MACX875B-1	8-3/16-inch	75 ohm	20.00-ft	(6.10-m)	194-lbm	(88.2-kg)
MACX875B-2	8-3/16-inch	75 ohm	19.75-ft	(6.02-m)	192-lbm	(87.1-kg)
MACX875B-3	8-3/16-inch	75 ohm	19.50-ft	(5.94-m)	190-lbm	(86.0-kg)
MACX875B-D	8-3/16-inch	75 ohm	Custom	--	TBD	
MACX875B-W	8-3/16-inch	75 ohm	Varies	--	Varies	

MACXLine® Variable Length Rigid Line Sections

Special length MACXLine rigid line sections are available in any length and are a fixed price offering with detail numbers for variable length line sections up to 60.00-inches (1524-mm), 60.00-inches to 120.00-inches (1524-mm to 3048-mm) and 120.00-inches to 240.00-inches (3048-mm to 6096-mm). Each line section includes the copper inner and outer conductor. The inner conductor includes the MACXLine fixed bullet/bellows expansion compensator in variable length line sections greater than 60.00-inches (1524 mm). Variable length rigid line sections less than 60-inches (1524 mm), where the bellows compensator is not required, include a standard copper inner conductor with a captivated inner connector. One flange hardware kit, with O ring, is also included with each variable length rigid line section.

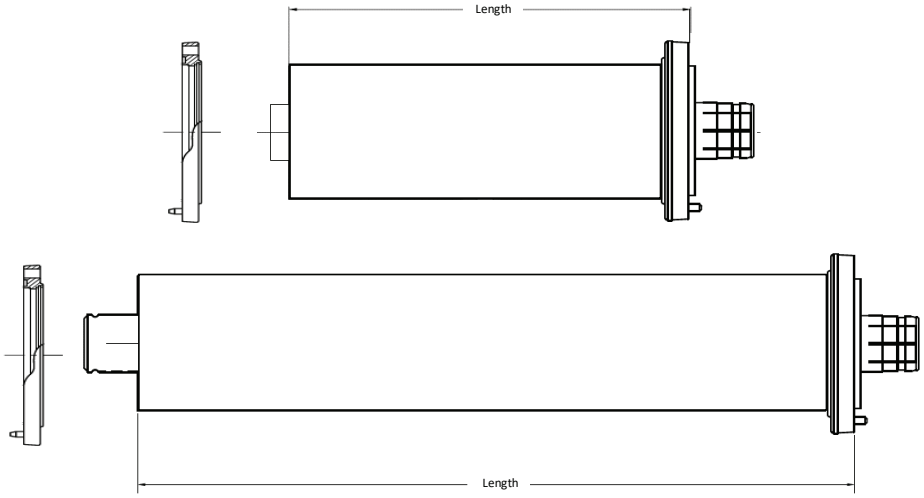
MACXLine® Variable Length Rigid Line Sections Specifications

Part No.	Line Size	Impedance	Length	
MACX350A-5	3-1/8-inch	50-ohm	0.00-in to 60.00-in	(0-mm to 1524-mm)
MACX350A-10	3-1/8-inch	50-ohm	60.00-in to 120.00-in	(1524-mm to 3048-mm)
MACX350A-20	3-1/8-inch	50-ohm	120.00-in to 240.00-in	(3048-mm to 6096-mm)
MACX450-5	4-1/16-inch	50-ohm	0.00-in to 60.00-in	(0-mm to 1524-mm)
MACX450-10	4-1/16-inch	50-ohm	60.00-in to 120.00-in	(1524-mm to 3048-mm)
MACX450-20	4-1/16-inch	50-ohm	120.00-in to 240.00-in	(3048-mm to 6096-mm)
MACX650-5	6-1/8-inch	50-ohm	0.00-in to 60.00-in	(0-mm to 1524-mm)
MACX650-10	6-1/8-inch	50-ohm	60.00-in to 120.00-in	(1524-mm to 3048-mm)
MACX650-20	6-1/8-inch	50-ohm	120.00-in to 240.00-in	(3048-mm to 6096-mm)
MACX675B-5	6-1/8-inch	75-ohm	0.00-in to 60.00-in	(0-mm to 1524-mm)
MACX675B-10	6-1/8-inch	75-ohm	60.00-in to 120.00-in	(1524-mm to 3048-mm)
MACX675B-20	6-1/8-inch	75-ohm	120.00-in to 240.00-in	(3048-mm to 6096-mm)
MACX775-5	7-3/16-inch	75-ohm	0.00-in to 60.00-in	(0-mm to 1524-mm)
MACX775-10	7-3/16-inch	75-ohm	60.00-in to 120.00-in	(1524-mm to 3048-mm)
MACX775-20	7-3/16-inch	75-ohm	120.00-in to 240.00-in	(3048-mm to 6096-mm)
MACX875B-5	8-3/16-inch	75-ohm	0.00-in to 60.00-in	(0-mm to 1524-mm)
MACX875B-10	8-3/16-inch	75-ohm	60.00-in to 120.00-in	(1524-mm to 3048-mm)
MACX875B-20	8-3/16-inch	75-ohm	120.00-in to 240.00-in	(3048-mm to 6096-mm)

MACXLine® Field Cut Rigid Line Sections

MACXLine Field Cut rigid line sections are available as an alternative to factory fabricated variable length line section. The detail -39 field cut MACXLine sections are for any length from 60.00-inches (1524-mm) to 240.00-inches (6096-mm). Each line section includes the copper inner and outer conductor. The inner conductor includes the MACXLine fixed bullet/bellows expansion compensator. This accommodates any cut length required while maintaining sufficient separation from the inner conductor support insulators.
The detail -41 field cut line section is for section lengths less than 60-inches (1524 mm), where the bellows compensator is not required, include a standard copper inner conductor with a captivated inner connector.

Both kits include a silver solder fixed field flange kit and one flange hardware kit, with O ring.



MACXLine® Field Cut Rigid Line Sections Specifications

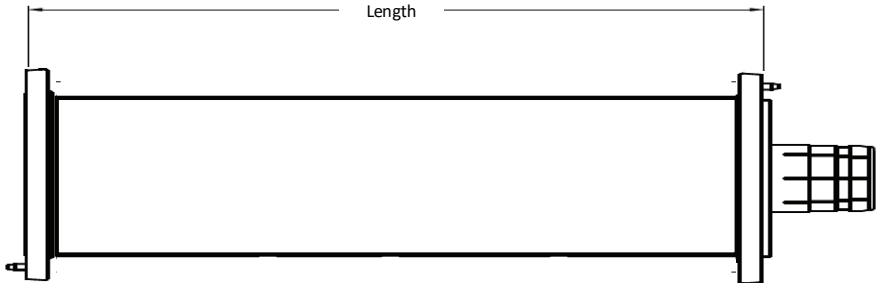
Part No.	Line Size	Impedance	Length	
MACX350A-39	3-1/8-inch	50-ohm	60.00-in to 240.00-in	(1524-mm to 6096-mm)
MACX350A-41	3-1/8-inch	50-ohm	0.00-in to 60.00-in	(0-mm to 1524-mm)
MACX450-39	4-1/16-inch	50-ohm	60.00-in to 240.00-in	(1524-mm to 6096-mm)
MACX450-41	4-1/16-inch	50-ohm	0.00-in to 60.00-in	(0-mm to 1524-mm)
MACX650-39	6-1/8-inch	50-ohm	60.00-in to 240.00-in	(1524-mm to 6096-mm)
MACX650-41	6-1/8-inch	50-ohm	0.00-in to 60.00-in	(0-mm to 1524-mm)
MACX675B-39	6-1/8-inch	75-ohm	60.00-in to 240.00-in	(1524-mm to 6096-mm)
MACX675B-41	6-1/8-inch	75-ohm	0.00-in to 60.00-in	(0-mm to 1524-mm)
MACX775-39	7-3/16-inch	75-ohm	60.00-in to 240.00-in	(1524-mm to 6096-mm)
MACX775-41	7-3/16-inch	75-ohm	0.00-in to 60.00-in	(0-mm to 1524-mm)
MACX875B-39	8-3/16-inch	75-ohm	60.00-in to 240.00-in	(1524-mm to 6096-mm)
MACX875B-41	8-3/16-inch	75-ohm	0.00-in to 60.00-in	(0-mm to 1524-mm)

StandardLine Rigid Line Sections

STDLine Standard Length Rigid Line Sections

ERI StandardLine rigid coaxial transmission line is available in sizes from 7/8-inch to 8-3/16-inch. All required system components and installation accessories can be purchased from ERI. These components are fabricated from the same high-quality materials as MACXLine, but they do not include a bellows section for differential expansion compensation. This product is recommended only for very short runs and for indoor application only. This product family also includes unflanged rigid transmission line components in sizes from 7/8-inch to 6-1/8-inch, 50-ohm, for indoor use.

STDLine standard length rigid line sections come in standard section lengths of 20.00-foot (6.096-meter), 19.75-foot (6.020 meter), 19.50-foot (5.944 meter), 19.00-foot (5.791 meter) and 17.50-foot (5.342 meter). Each line section includes the copper outer conductor, a standard copper inner conductor with a captivated inner connector. One flange hardware kit, with O ring, is also included with each rigid line section.



STDLine Standard Length Rigid Line Sections Specifications

Part No.	Line Size	Impedance	Length		Section Weight	
STD050-1	7/8-inch	50-ohm	20.00-ft	(6.10-m)	12-lbm	(5.4-kg)
STD050-10-120	7/8-inch	50-ohm	10.00-ft	(3.05-m)	7-lbm	(3.0-kg)
STD150-1	1-5/8-inch	50-ohm	20.00-ft	(6.10-m)	27-lbm	(12.2-kg)
STD150-17	1-5/8-inch	50-ohm	17.50-ft	(5.33-m)	24-lbm	(10.7-kg)
STD350-1	3-1/8-inch	50-ohm	20.00-ft	(6.10-m)	55-lbm	(24.9-kg)
STD350-2	3-1/8-inch	50-ohm	19.75-ft	(6.02-m)	55-lbm	(24.9-kg)
STD350-3	3-1/8-inch	50-ohm	19.50-ft	(5.94-m)	54-lbm	(24.5-kg)
STD350-6	3-1/8-inch	50-ohm	19.00-ft	(5.79-m)	53-lbm	(24.0-kg)
STD350-11	3-1/8-inch	50-ohm	17.50-ft	(5.33-m)	49-lbm	(22.2-kg)
STD450-1	4-1/16-inch	50-ohm	20.00-ft	(6.10-m)	86-lbm	(39.0-kg)
STD450-2	4-1/16-inch	50-ohm	19.75-ft	(6.02-m)	85-lbm	(38.6-kg)
STD450-3	4-1/16-inch	50-ohm	19.50-ft	(5.94-m)	84-lbm	(38.1-kg)
STD450-6	4-1/16-inch	50-ohm	19.00-ft	(5.79-m)	83-lbm	(37.6-kg)
STD450-11	4-1/16-inch	50-ohm	17.50-ft	(5.33-m)	76-lbm	(34.5-kg)
STD650B-1	6-1/8-inch	50-ohm	20.00-ft	(6.10-m)	144-lbm	(65.3-kg)
STD650B-2	6-1/8-inch	50-ohm	19.75-ft	(6.02-m)	142-lbm	(64.4-kg)
STD650B-3	6-1/8-inch	50-ohm	19.50-ft	(5.94-m)	140-lbm	(63.5-kg)
STD650B-6	6-1/8-inch	50-ohm	19.00-ft	(5.79-m)	138-lbm	(62.6-kg)
STD650B-11	6-1/8-inch	50-ohm	17.50-ft	(5.33-m)	127-lbm	(57.6-kg)
STD675B-1	6-1/8-inch	75-ohm	20.00-ft	(6.10-m)	144-lbm	(65.3-kg)
STD675B-2	6-1/8-inch	75-ohm	19.75-ft	(6.02-m)	142-lbm	(64.4-kg)
STD675B-3	6-1/8-inch	75-ohm	19.50-ft	(5.94-m)	140-lbm	(63.5-kg)
STD675B-6	6-1/8-inch	75-ohm	19.00-ft	(5.79-m)	138-lbm	(62.6-kg)
STD675B-11	6-1/8-inch	75-ohm	17.50-ft	(5.33-m)	127-lbm	(57.6-kg)
STD775-1	7-3/16-inch	75-ohm	20.00-ft	(6.10-m)	164-lbm	(74.5-kg)
STD775-2	7-3/16-inch	75-ohm	19.75-ft	(6.02-m)	162-lbm	(73.5-kg)
STD775-3	7-3/16-inch	75-ohm	19.50-ft	(5.94-m)	160-lbm	(72.6-kg)
STD875-1	8-3/16-inch	75-ohm	20.00-ft	(6.10-m)	194-lbm	(88.2-kg)
STD875-2	8-3/16-inch	75-ohm	19.75-ft	(6.02-m)	192-lbm	(87.1-kg)
STD875-3	8-3/16-inch	75-ohm	19.50-ft	(5.94-m)	190-lbm	(86.0-kg)

STDLine Variable Length Rigid Line Sections

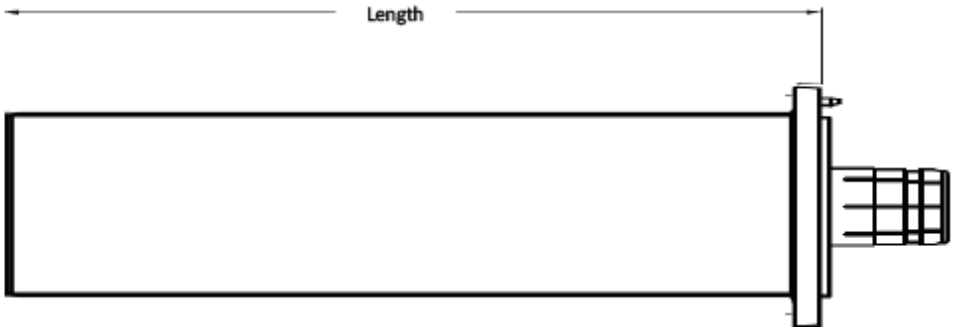
Special length STDLine rigid line sections are available in any length and are a fixed price offering with detail numbers for variable length line sections up to 60.00-inches (1524-mm), 60.00-inches to 120.00-inches (1524-mm to 3048-mm) and 120.00-inches to 240.00-inches (3048-mm to 6096-mm). Each line section includes the copper inner and outer conductor. One captivated inner connector and one flange hardware kit, with O ring, is also included with each variable length rigid line section.

STDLine Variable Length Rigid Line Sections Specifications

Part No.	Line Size	Impedance	Length	
STD050-5	7/8-inch	50 ohm	0.00-in to 60.00-in	(0-mm to 1524-mm)
STD150-5	1-5/8-inch	50 ohm	0.00-in to 60.00-in	(0-mm to 1524-mm)
STD150-10	1-5/8-inch	50 ohm	60.00-in to 120.00-in	(1524-mm to 3048-mm)
STD150-20	1-5/8-inch	50 ohm	120.00-in to 240.00-in	(3048-mm to 6096-mm)
STD350A-10	3-1/8-inch	50 ohm	60.00-in to 120.00-in	(1524-mm to 3048-mm)
STD350A-20	3-1/8-inch	50 ohm	120.00-in to 240.00-in	(3048-mm to 6096-mm)
STD450-10	4-1/16-inch	50 ohm	60.00-in to 120.00-in	(1524-mm to 3048-mm)
STD450-20	4-1/16-inch	50 ohm	120.00-in to 240.00-in	(3048-mm to 6096-mm)
STD650B-10	6-1/8-inch	50 ohm	60.00-in to 120.00-in	(1524-mm to 3048-mm)
STD650B-20	6-1/8-inch	50 ohm	120.00-in to 240.00-in	(3048-mm to 6096-mm)
STD675B-10	6-1/8-inch	75 ohm	60.00-in to 120.00-in	(1524-mm to 3048-mm)
STD675B-20	6-1/8-inch	75 ohm	120.00-in to 240.00-in	(3048-mm to 6096-mm)
STD775-10	7-3/16-inch	75 ohm	60.00-in to 120.00-in	(1524-mm to 3048-mm)
STD775-20	7-3/16-inch	75 ohm	120.00-in to 240.00-in	(3048-mm to 6096-mm)
STD875-10	8-3/16-inch	75 ohm	60.00-in to 120.00-in	(1524-mm to 3048-mm)
STD875-20	8-3/16-inch	75 ohm	120.00-in to 240.00-in	(3048-mm to 6096-mm)

STDLine Field Cut Rigid Line Sections

STDLine Field Cut rigid line sections are available as an alternative to factory fabricated variable length line section. The detail -39 field cut STDLine sections are for any length from 60.00-inches (1524-mm) to 240.00-inches (6096-mm). Each line section includes the copper inner and outer conductor. Each line section includes the copper inner and outer conductor. one captivated inner connector, silver solder fixed field flange kit and one flange hardware kit, with O ring, is also included with each variable length rigid line section. For field cut line sections of 60.00-inches (1524 mm) or less use MACXLine detail -41 field cut line sections.



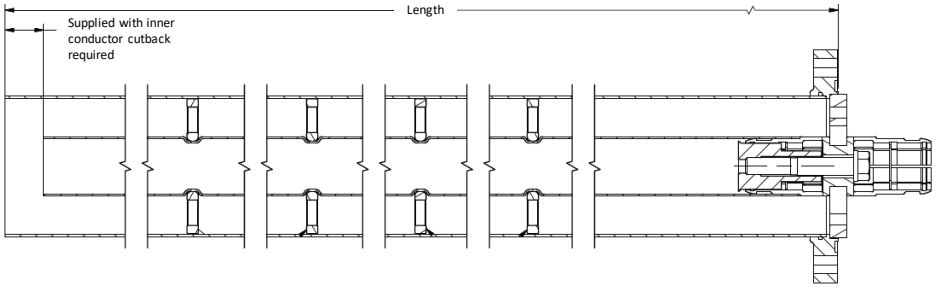
STDLine Field Cut Rigid Line Sections Specifications

Part No.	Line Size	Impedance	Length	
STD350-39	3-1/8-inch	50-ohm	60.00-in to 240.00-in	(1524-mm to 6096-mm)
STD450-39	4-1/16-inch	50-ohm	60.00-in to 240.00-in	(1524-mm to 6096-mm)
STD650B-39	6-1/8-inch	50-ohm	60.00-in to 240.00-in	(1524-mm to 6096-mm)
STD675B-39	6-1/8-inch	75-ohm	60.00-in to 240.00-in	(1524-mm to 6096-mm)
STD775-39	7-3/16-inch	75-ohm	60.00-in to 240.00-in	(1524-mm to 6096-mm)
STD875-39	8-3/16-inch	75-ohm	60.00-in to 240.00-in	(1524-mm to 6096-mm)

NOTE: Use MACX detail -41 for field cut sections up to 60-inches (1524-mm).

STDLine Variable Length Flanged One End Rigid Line Sections

Special length flanged one end, STDLine rigid line sections are available in any length and are a fixed price offering with detail numbers for variable length line sections up to 60.00-inches (1524-mm), 60.00-inches to 120.00-inches (1524-mm to 3048-mm) and 120.00-inches to 240.00-inches (3048-mm to 6096-mm). Each line section includes the copper inner and outer conductor. One captivated inner connector and one flange hardware kit, with O ring, is also included with each variable length rigid line section. Field flange kits, unflanged couplings or clamp on field flanges are not included and should be ordered separately, if required.

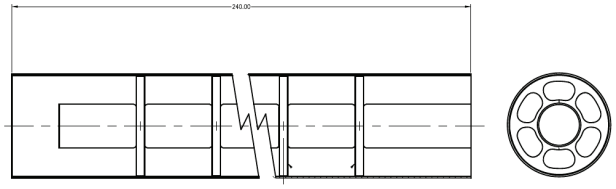


STDLine Variable Length Flanged One End Rigid Line Sections Specifications

Part No.	Line Size	Impedance	Length	
STD150-45-5	1-5/8-inch	50-ohm	0.00-in to 60.00-in	(0-mm to 1524-mm)
STD150-45-10	1-5/8-inch	50-ohm	60.00-in to 120.00-in	(1524-mm to 3048-mm)
STD150-45-20	1-5/8-inch	50-ohm	120.00-in to 240.00-in	(3048-mm to 6096-mm)
STD350-45-5	3-1/8-inch	50-ohm	0.00-in to 60.00-in	(0-mm to 1524-mm)
STD350-45-10	3-1/8-inch	50-ohm	60.00-in to 120.00-in	(1524-mm to 3048-mm)
STD350-45-20	3-1/8-inch	50-ohm	120.00-in to 240.00-in	(3048-mm to 6096-mm)
STD450-45-5	4-1/16-inch	50-ohm	0.00-in to 60.00-in	(0-mm to 1524-mm)
STD450-45-10	4-1/16-inch	50-ohm	60.00-in to 120.00-in	(1524-mm to 3048-mm)
STD450-45-20	4-1/16-inch	50-ohm	120.00-in to 240.00-in	(3048-mm to 6096-mm)
STD650B-45-5	6-1/8-inch	50-ohm	0.00-in to 60.00-in	(0-mm to 1524-mm)
STD650B-45-10	6-1/8-inch	50-ohm	60.00-in to 120.00-in	(1524-mm to 3048-mm)
STD650B-45-20	6-1/8-inch	50-ohm	120.00-in to 240.00-in	(3048-mm to 6096-mm)
STD675B-45-10	6-1/8-inch	75-ohm	60.00-in to 120.00-in	(1524-mm to 3048-mm)
STD675B-45-20	6-1/8-inch	75-ohm	120.00-in to 240.00-in	(3048-mm to 6096-mm)

STDLine Unflanged Rigid Line Sections

ERI StandardLine unflanged rigid coaxial transmission line is available in sizes from 7/8-inch to 6-1/8-inch. All required system components and installation accessories can be purchased from ERI. These components are fabricated from the same high-quality materials as MACXLine, but they do not include a bellows section for differential expansion compensation. The line sections are supplied in 20.00-foot (6096 mm) and include the inner and outer conductor fully assembled. Line sections are joined with unflanged couplings, which include the inner connector, or with clamp-on flanges, inner connectors and flange hardware kits that are purchased separately. This product cannot be pressurized and is recommended only for indoor application only.



STDLine Unflanged Standard Length Rigid Line Sections Specifications

Part No.	Line Size	Impedance	Length	
STD050-29-120	7/8-inch	50-ohm	10.00-ft (3.05-m)	6-lbm (2.6-kg)
STD050-31	7/8-inch	50-ohm	20.00-ft (6.10-m)	11-lbm (5.1-kg)
STD150-21	1-5/8-inch	50-ohm	20.00-ft (6.10-m)	25-lbm (11.3-kg)
STD350-31	3-1/8-inch	50-ohm	20.00-ft (6.10-m)	50-lbm (22.7-kg)
STD450-31	4-1/16-inch	50-ohm	20.00-ft (6.10-m)	80-lbm (36.3-kg)
STD650B-31	6-1/8-inch	50-ohm	20.00-ft (6.10-m)	140-lbm (63.5-kg)
STD675B-31	6-1/8-inch	75-ohm	20.00-ft (6.10-m)	130-lbm (59.0-kg)

STDLine Variable Length Unflanged Rigid Line Sections

Special length STDLine rigid line sections are available in any length and are a fixed price offering with detail numbers for variable length line sections up to 60.00-inches (1524-mm), 60.00-inches to 120.00-inches (1524-mm to 3048-mm) and 120.00-inches to 240.00-inches (3048-mm to 6096-mm). Each line section includes the copper inner and outer conductor fully assembled. Line sections are joined with unflanged couplings, which include the inner connector, or with clamp-on flanges, inner connectors and flange hardware kits that are purchased separately. This product cannot be pressurized and is recommended only for indoor application only.

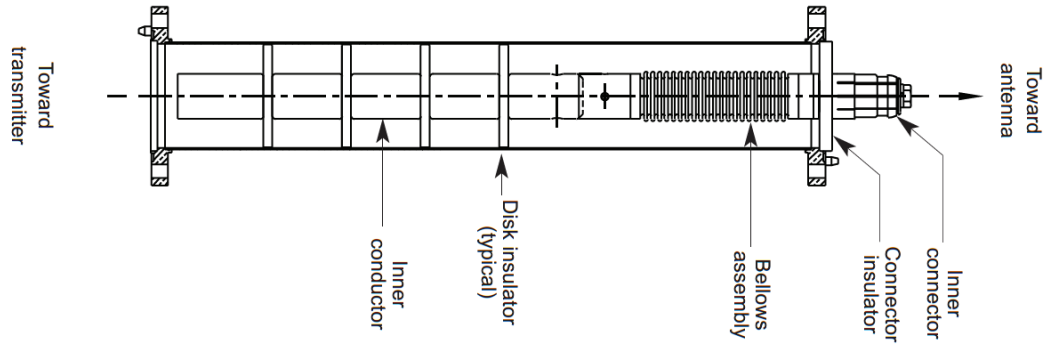
STDLine Unflanged Variable Length Rigid Line Sections Specifications

Part No.	Line Size	Impedance	Length	
STD150-29-5	1-5/8-inch	50-ohm	0.00-in to 60.00-in	(0-mm to 1524-mm)
STD150-29-10	1-5/8-inch	50-ohm	60.00-in to 120.00-in	(1524-mm to 3048-mm)
STD150-29-20	1-5/8-inch	50-ohm	120.00-in to 240.00-in	(3048-mm to 6096-mm)
STD350-29-5	3-1/8-inch	50-ohm	0.00-in to 60.00-in	(0-mm to 1524-mm)
STD350-29-10	3-1/8-inch	50-ohm	60.00-in to 120.00-in	(1524-mm to 3048-mm)
STD350-29-20	3-1/8-inch	50-ohm	120.00-in to 240.00-in	(3048-mm to 6096-mm)
STD450-29-5	4-1/16-inch	50-ohm	0.00-in to 60.00-in	(0-mm to 1524-mm)
STD450-29-10	4-1/16-inch	50-ohm	60.00-in to 120.00-in	(1524-mm to 3048-mm)
STD450-29-20	4-1/16-inch	50-ohm	120.00-in to 240.00-in	(3048-mm to 6096-mm)
STD650B-29-5	6-1/8-inch	50-ohm	0.00-in to 60.00-in	(0-mm to 1524-mm)
STD650B-29-10	6-1/8-inch	50-ohm	60.00-in to 120.00-in	(1524-mm to 3048-mm)
STD650B-29-20	6-1/8-inch	50-ohm	120.00-in to 240.00-in	(3048-mm to 6096-mm)

1329Line™ Rigid Line Sections

1329Line™ Standard Length Rigid Line Sections

1329Line™ standard length aluminum outer conductor rigid line sections come in standard section lengths of 20.00-foot (6.096-meter), 19.75-foot (6.020 meter), 19.50-foot (5.944 meter), 19.00-foot (5.791 meter) and 17.50-foot (5.342 meter). Each line section includes the copper inner and aluminum outer conductor. The inner conductor is the same as that used in MACXLine and it includes the same fixed bullet/bellows expansion compensator. One flange hardware kit, with O ring is also included with each rigid line section.



1329Line™ Standard Rigid Line Sections Specifications

Part No.	Line Size	Impedance	Length		Section Weight	
1329350-1	3-1/8-inch	50-ohm	20.00-ft	(6.10-m)	28-lbm	(12.7-kg)
1329350-2	3-1/8-inch	50-ohm	19.75-ft	(6.02-m)	28-lbm	(12.7-kg)
1329350-3	3-1/8-inch	50-ohm	19.50-ft	(5.94-m)	28-lbm	(12.7-kg)
1329350-6	3-1/8-inch	50-ohm	19.00-ft	(5.79-m)	28-lbm	(12.7-kg)
1329350-11	3-1/8-inch	50-ohm	17.50-ft	(5.33-m)	27-lbm	(12.2-kg)
1329450-1	4-1/16-inch	50-ohm	20.00-ft	(6.10-m)	38-lbm	(17.2-kg)
1329450-2	4-1/16-inch	50-ohm	19.75-ft	(6.02-m)	38-lbm	(17.0-kg)
1329450-3	4-1/16-inch	50-ohm	19.50-ft	(5.94-m)	37-lbm	(16.8-kg)
1329450-6	4-1/16-inch	50-ohm	19.00-ft	(5.79-m)	37-lbm	(16.8-kg)
1329450-11	4-1/16-inch	50-ohm	17.50-ft	(5.33-m)	33-lbm	(15.1-kg)
1329650-1	6-1/8-inch	50-ohm	20.00-ft	(6.10-m)	73-lbm	(33.1-kg)
1329650-2	6-1/8-inch	50-ohm	19.75-ft	(6.02-m)	72-lbm	(32.7-kg)
1329650-3	6-1/8-inch	50-ohm	19.50-ft	(5.94-m)	71-lbm	(32.3-kg)
1329650-6	6-1/8-inch	50-ohm	19.00-ft	(5.79-m)	70-lbm	(31.9-kg)
1329650-11	6-1/8-inch	50-ohm	17.50-ft	(5.33-m)	64-lbm	(29.0-kg)
1329675-1	6-1/8-inch	75-ohm	20.00-ft	(6.10-m)	69-lbm	(31.3-kg)
1329675-2	6-1/8-inch	75-ohm	19.75-ft	(6.02-m)	69-lbm	(31.1-kg)
1329675-3	6-1/8-inch	75-ohm	19.50-ft	(5.94-m)	68-lbm	(30.9-kg)
1329675-6	6-1/8-inch	75-ohm	19.00-ft	(5.79-m)	68-lbm	(30.6-kg)
1329675-11	6-1/8-inch	75-ohm	17.50-ft	(5.33-m)	62-lbm	(28.1-kg)

1329Line™ Variable Length Rigid Line Sections

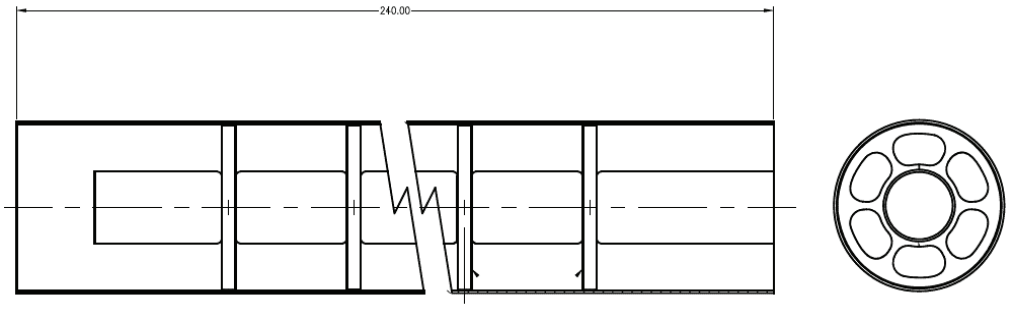
Special length 1329Line™ rigid line sections are available in any length and are a fixed price offering with detail numbers for variable length line sections up to 60.00-inches (1524-mm), 60.00-inches to 120.00-inches (1524-mm to 3048-mm) and 120.00-inches to 240.00-inches (3048-mm to 6096-mm). Each line section includes the copper inner and aluminum outer conductor. The inner conductor includes the same inner conductor as MACXLine with a fixed bullet/bellows expansion compensator in variable length line sections greater than 60.00-inches (1524 mm). Variable length rigid line sections less than 60-inches (1524 mm), where the bellows compensator is not required, include a standard copper inner conductor with a captivated inner connector. One flange hardware kit, with O ring, is also included with each variable length rigid line section.

1329Line™ Variable Length Rigid Line Sections Specifications

Part No.	Line Size	Impedance	Length	
1329350-5	3-1/8-inch	50-ohm	0.00-in to 60.00-in	(0-mm to 1524-mm)
1329350-10	3-1/8-inch	50-ohm	60.00-in to 120.00-in	(1524-mm to 3048-mm)
1329350-20	3-1/8-inch	50-ohm	120.00-in to 240.00-in	(3048-mm to 6096-mm)
1329450-5	4-1/16-inch	50-ohm	0.00-in to 60.00-in	(0-mm to 1524-mm)
1329450-10	4-1/16-inch	50-ohm	60.00-in to 120.00-in	(1524-mm to 3048-mm)
1329450-20	4-1/16-inch	50-ohm	120.00-in to 240.00-in	(3048-mm to 6096-mm)
1329650-5	6-1/8-inch	50-ohm	0.00-in to 60.00-in	(0-mm to 1524-mm)
1329650-10	6-1/8-inch	50-ohm	60.00-in to 120.00-in	(1524-mm to 3048-mm)
1329650-20	6-1/8-inch	50-ohm	120.00-in to 240.00-in	(3048-mm to 6096-mm)
1329675-5	6-1/8-inch	75-ohm	0.00-in to 60.00-in	(0-mm to 1524-mm)
1329675-10	6-1/8-inch	75-ohm	60.00-in to 120.00-in	(1524-mm to 3048-mm)
1329675-20	6-1/8-inch	75-ohm	120.00-in to 240.00-in	(3048-mm to 6096-mm)

1329Line™ Unflanged Rigid Line Sections

ERI 1329Line™ unflanged rigid coaxial transmission line is available in sizes from 1-5/8-inch to 6-1/8-inch. All required system components and installation accessories can be purchased from ERI. The inner conductors are the same high-quality materials as MACXLine, but they do not include a bellows section for differential expansion compensation. The line sections are supplied in 20.00-foot (6096 mm) and include the inner and outer conductor fully assembled. Line sections are joined with unflanged couplings, which include the inner connector, or with clamp-on flanges, inner connectors and flange hardware kits that are purchased separately. This product cannot be pressurized and is recommended only for indoor application only.



1329Line™ Unflanged Standard Length Rigid Line Sections Specifications

Part No.	Line Size	Impedance	Length		Section Weight	
1329150-31	1-5/8-inch	50-ohm	20.00-ft	(6.10-m)	11-lbm	(4.8-kg)
1329350-31	3-1/8-inch	50-ohm	20.00-ft	(6.10-m)	23-lbm	(10.3-kg)
1329450-31	4-1/16-inch	50-ohm	20.00-ft	(6.10-m)	32-lbm	(14.7-kg)
1329650-31	6-1/8-inch	50-ohm	20.00-ft	(6.10-m)	66-lbm	(30.0-kg)

1329Line™ Variable Length Unflanged Rigid Line Sections

Special length 1329Line rigid line sections are available in any length and are a fixed price offering with detail numbers for variable length line sections up to 60.00-inches (1524-mm), 60.00-inches to 120.00-inches (1524-mm to 3048-mm) and 120.00-inches to 240.00-inches (3048-mm to 6096-mm). Each line section includes the copper inner and aluminum outer conductor fully assembled. Line sections are joined with unflanged couplings, which include the inner connector, or with clamp-on flanges, inner connectors and flange hardware kits that are purchased separately. This product cannot be pressurized and is recommended only for indoor application only.

1329Line™ Unflanged Variable Length Rigid Line Sections Specifications

Part No.	Line Size	Impedance	Length	
1329150-29-5	1-5/8-inch	50-ohm	0.00-in to 60.00-in	(0-mm to 1524-mm)
1329150-29-10	1-5/8-inch	50-ohm	60.00-in to 120.00-in	(1524-mm to 3048-mm)
1329150-29-20	1-5/8-inch	50-ohm	120.00-in to 240.00-in	(3048-mm to 6096-mm)
1329350-29-5	3-1/8-inch	50-ohm	0.00-in to 60.00-in	(0-mm to 1524-mm)
1329350-29-10	3-1/8-inch	50-ohm	60.00-in to 120.00-in	(1524-mm to 3048-mm)
1329350-29-20	3-1/8-inch	50-ohm	120.00-in to 240.00-in	(3048-mm to 6096-mm)
1329450-29-5	4-1/16-inch	50-ohm	0.00-in to 60.00-in	(0-mm to 1524-mm)
1329450-29-10	4-1/16-inch	50-ohm	60.00-in to 120.00-in	(1524-mm to 3048-mm)
1329450-29-20	4-1/16-inch	50-ohm	120.00-in to 240.00-in	(3048-mm to 6096-mm)
1329650-29-5	6-1/8-inch	50-ohm	0.00-in to 60.00-in	(0-mm to 1524-mm)
1329650-29-10	6-1/8-inch	50-ohm	60.00-in to 120.00-in	(1524-mm to 3048-mm)
1329650-29-20	6-1/8-inch	50-ohm	120.00-in to 240.00-in	(3048-mm to 6096-mm)

Inners Only™ Line Sections

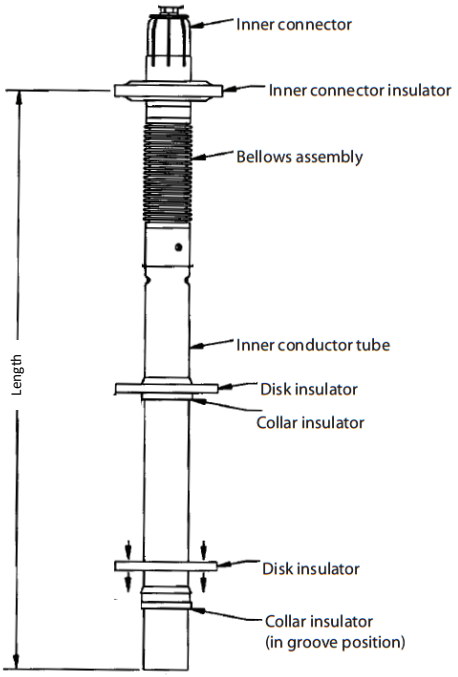
MACXLine® Inners Only™ Line Sections

MACXLine® Inners Only™ Standard Length Line Sections

MACXLine® Inners Only™ standard length replacement inner conductor line sections come in standard section lengths of 20.00-foot (6.096-meter), 19.75-foot (6.020 meter), 19.50-foot (5.944 meter), 19.00-foot (5.791 meter) and 17.50-foot (5.342 meter). Each line section includes the copper inner conductor with MACXLine fixed bullet/bellows expansion compensator. One flange hardware kit, with O ring is also included with each replacement inner conductor line section.

MACXLine® Inners Only™ Inner Conductor Standard Lengths Specifications

Part No.	Line Size	Impedance	Length	
MACX350A-25-240	3-1/8-inch	50-ohm	20.00-ft	(6.10-m)
MACX350A-25-237	3-1/8-inch	50-ohm	19.75-ft	(6.02-m)
MACX350A-25-234	3-1/8-inch	50-ohm	19.50-ft	(5.94-m)
MACX350A-25-228	3-1/8-inch	50-ohm	19.00-ft	(5.79-m)
MACX350A-25-210	3-1/8-inch	50-ohm	17.50-ft	(5.33-m)
MACX450-25-240	4-1/16-inch	50-ohm	20.00-ft	(6.10-m)
MACX450-25-237	4-1/16-inch	50-ohm	19.75-ft	(6.02-m)
MACX450-25-234	4-1/16-inch	50-ohm	19.50-ft	(5.94-m)
MACX450-25-228	4-1/16-inch	50-ohm	19.00-ft	(5.79-m)
MACX450-25-210	4-1/16-inch	50-ohm	17.50-ft	(5.33-m)
MACX650-25-240	6-1/8-inch	50-ohm	20.00-ft	(6.10-m)
MACX650-25-237	6-1/8-inch	50-ohm	19.75-ft	(6.02-m)
MACX650-25-234	6-1/8-inch	50-ohm	19.50-ft	(5.94-m)
MACX650-25-228	6-1/8-inch	50-ohm	19.00-ft	(5.79-m)
MACX650-25-210	6-1/8-inch	50-ohm	17.50-ft	(5.33-m)
MACX675B-25-240	6-1/8-inch	75-ohm	20.00-ft	(6.10-m)
MACX675B-25-237	6-1/8-inch	75-ohm	19.75-ft	(6.02-m)
MACX675B-25-234	6-1/8-inch	75-ohm	19.50-ft	(5.94-m)
MACX675B-25-228	6-1/8-inch	75-ohm	19.00-ft	(5.79-m)
MACX675B-25-210	6-1/8-inch	75-ohm	17.50-ft	(5.33-m)
MACX775-25-240	7-3/16-inch	75-ohm	20.00-ft	(6.10-m)
MACX775-25-237	7-3/16-inch	75-ohm	19.75-ft	(6.02-m)
MACX775-25-234	7-3/16-inch	75-ohm	19.50-ft	(5.94-m)
MACX875-25-240	8-3/16-inch	75-ohm	20.00-ft	(6.10-m)
MACX875-25-237	8-3/16-inch	75-ohm	19.75-ft	(6.02-m)
MACX875-25-234	8-3/16-inch	75-ohm	19.50-ft	(5.94-m)



MACXLine® Inners Only™ Field Cut Line Sections

MACXLine Inners Only™ Field Cut replacement inner conductor line sections are available as an alternative to factory fabricated variable length line sections. The detail -26 field cut MACXLine sections are for any length from 60.00-inches (1524-mm) to 240.00-inches (6096-mm).

Each replacement inner conductor line section includes the copper inner conductor. The replacement inner conductor includes the MACXLine fixed bullet/bellows expansion compensator. This accommodates any cut length required while maintaining sufficient separation from the inner conductor support insulators.

The detail -24 field cut replacement inner conductor line section is for section lengths less than 60-inches (1524 mm), where the bellows compensator is not required, include a standard copper inner conductor with a captivated inner connector. Both kits include one flange hardware kit, with O ring.

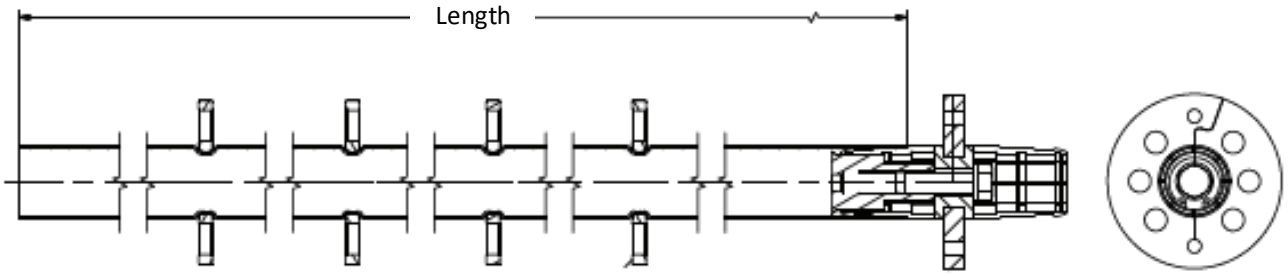
MACXLine® Inners Only™ Inner Conductors Field Cuts Specifications

Part No.	Line Size	Impedance	Length	
MACX350A-24	3-1/8-inch	50-ohm	0.00-in to 60.00-in	(0-mm to 1524-mm)
MACX350A-26	3-1/8-inch	50-ohm	60.00-in to 240.00-in	(1524-mm to 3048-mm)
MACX450-24	4-1/16-inch	50-ohm	0.00-in to 60.00-in	(0-mm to 1524-mm)
MACX450-26	4-1/16-inch	50-ohm	60.00-in to 240.00-in	(1524-mm to 3048-mm)
MACX650-24	6-1/8-inch	50-ohm	0.00-in to 60.00-in	(0-mm to 1524-mm)
MACX650-26	6-1/8-inch	50-ohm	60.00-in to 240.00-in	(1524-mm to 3048-mm)
MACX675B-24	6-1/8-inch	75-ohm	0.00-in to 60.00-in	(0-mm to 1524-mm)
MACX675B-26	6-1/8-inch	75-ohm	60.00-in to 240.00-in	(1524-mm to 3048-mm)
MACX775-24	7-3/16-inch	75-ohm	0.00-in to 60.00-in	(0-mm to 1524-mm)
MACX775-26	7-3/16-inch	75-ohm	60.00-in to 240.00-in	(1524-mm to 3048-mm)
MACX875-24	8-3/16-inch	75-ohm	0.00-in to 60.00-in	(0-mm to 1524-mm)
MACX875-26	8-3/16-inch	75-ohm	60.00-in to 240.00-in	(1524-mm to 3048-mm)

StandardLine Inners Only™ Line Sections

STDLine Inners Only™ Standard Length Line Sections

STDLine Inners Only™ standard length replacement inner conductor line sections available in sizes from 3-1/8-inch to 6-1/8-inch and come in standard section lengths of 20.00-foot (6.096-meter), 19.75-foot (6.020 meter), 19.50-foot (5.944 meter), 19.00-foot (5.791 meter) and 17.50-foot (5.342 meter). Each line section includes the copper inner conductor with a captivated inner connector. One flange hardware kit, with O ring is also included with each replacement inner conductor line section. These components are fabricated from the same high-quality materials as MACXLine, but they do not include a bellows section for differential expansion compensation. This product is recommended only for very short runs and for indoor application only.



StandardLine Inners Only™ Inner Conductors Standard Lengths Specifications

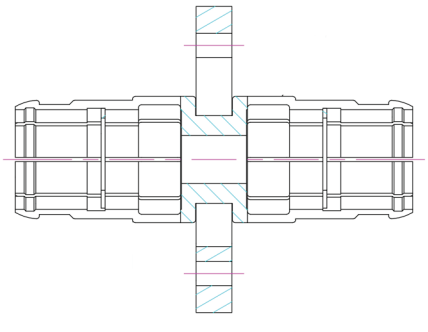
Part No.	Line Size	Impedance	Length	
STD350-25-240	3-1/8-inch	50-ohm	20.00-ft	(6.10-m)
STD350-25-237	3-1/8-inch	50-ohm	19.75-ft	(6.02-m)
STD350-25-234	3-1/8-inch	50-ohm	19.50-ft	(5.94-m)
STD350-25-228	3-1/8-inch	50-ohm	19.00-ft	(5.79-m)
STD350-25-210	3-1/8-inch	50-ohm	17.50-ft	(5.33-m)
STD450-25-240	4-1/16-inch	50-ohm	20.00-ft	(6.10-m)
STD450-25-237	4-1/16-inch	50-ohm	19.75-ft	(6.02-m)
STD450-25-234	4-1/16-inch	50-ohm	19.50-ft	(5.94-m)
STD450-25-228	4-1/16-inch	50-ohm	19.00-ft	(5.79-m)
STD450-25-210	4-1/16-inch	50-ohm	17.50-ft	(5.33-m)
STD650B-25-240	6-1/8-inch	50-ohm	20.00-ft	(6.10-m)
STD650B-25-237	6-1/8-inch	50-ohm	19.75-ft	(6.02-m)
STD650B-25-234	6-1/8-inch	50-ohm	19.50-ft	(5.94-m)
STD650B-25-228	6-1/8-inch	50-ohm	19.00-ft	(5.79-m)
STD650B-25-210	6-1/8-inch	50-ohm	17.50-ft	(5.33-m)
STD675B-25-240	6-1/8-inch	75-ohm	20.00-ft	(6.10-m)
STD675B-25-237	6-1/8-inch	75-ohm	19.75-ft	(6.02-m)
STD675B-25-234	6-1/8-inch	75-ohm	19.50-ft	(5.94-m)
STD675B-25-228	6-1/8-inch	75-ohm	19.00-ft	(5.79-m)
STD675B-25-210	6-1/8-inch	75-ohm	17.50-ft	(5.33-m)

Rigid Line Components

Inner Connectors

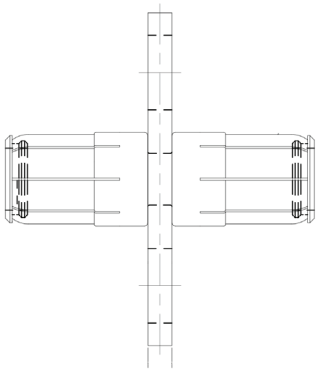
Standard Inner Connectors

Standard inner connectors are used in most field applications they should not be used if the inner connector is to support a line section inner conductor when being hoisted during installation.

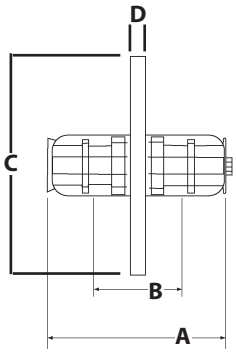


SECTION A-A
SCALE 1 : 1

ACX050-20, ACX150-20 and ACX350-20



ACX450-20, ACX650-20 and ACX675-20



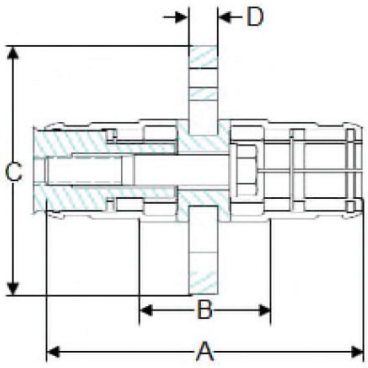
ACX775-20 and ACX875-20

Standard Inner Connectors Specifications

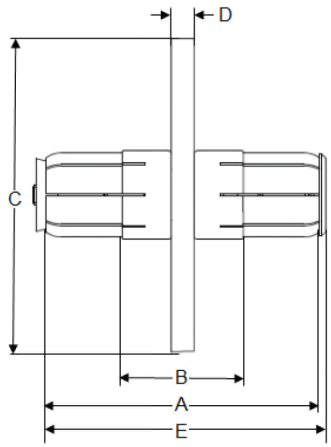
Part No.	Size	Impedance	Dim A	Dim B	Dim C	Dim D	Dim E
ACX050-20	7/8-inch	50-ohm	1.937-in (49-mm)	0.929-in (24-mm)	0.810-in (21-mm)	0.181-in (5-mm)	
ACX150-20	1-5/8-inch	50-ohm	2.300-in (58-mm)	1.174-in (30-mm)	1.643-in (42-mm)	0.250-in (6-mm)	Not Applicable
ACX350-20	3-1/8-inch	50-ohm	4.133-in (105-mm)	1.697-in (43-mm)	3.187-in (81-mm)	0.375-in (10-mm)	
ACX450-20	4-1/16-inch	50-ohm	5.400-in (137-mm)	2.400-in (61-mm)	4.095-in (104-mm)	0.375-in (10-mm)	5.640-in (143-mm)
ACX650-20	6-1/8-inch	50-ohm	5.500-in (140-mm)	2.438-in (62-mm)	6.060-in (154-mm)	0.437-in (11-mm)	5.740-in (146-mm)
ACX675-20	6-1/8-inch	75-ohm	5.400-in (137-mm)	2.398-in (61-mm)	6.060-in (154-mm)	0.437-in (11-mm)	5.640-in (143-mm)
ACX775-20	7-3/16-inch	75-ohm	6.000-in (152-mm)	2.620-in (67-mm)	7.240-in (184-mm)	0.500-in (13-mm)	0.390-in (10-mm)
ACX875-20	8-3/16-inch	75-ohm	5.510-in (140-mm)	3.120-in (79-mm)	8.480-in (215-mm)	0.620-in (16-mm)	0.390-in (10-mm)

Captivated Inner Connectors

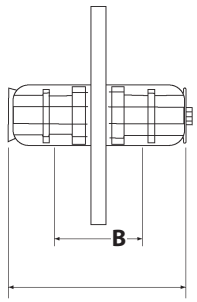
Captivated inner connectors include a locking mechanism which holds the connector in place until the locking hardware is released. These are used in standard transmission line sections to hold the inner conductor in place when being hoisted during installation or in directional couplers and other applications were maintaining precise positioning of the inner conductor is required.



ACX350-20



ACX450-19, ACX650-19 and ACX675-19



ACX775-19 and ACX875-19

Captivated Inner Connectors Specifications

Part No.	Size	Impedance	Dim A	Dim B	Dim C	Dim D	Dim E
ACX350-19	3-1/8-inch	50-ohm	4.133-in (105-mm)	1.697-in (43-mm)	3.187-in (81-mm)	0.375-in (10-mm)	Not Applicable
ACX450-19	4-1/16-inch	50-ohm	5.400-in (137-mm)	2.400-in (61-mm)	4.095-in (104-mm)	0.375-in (10-mm)	5.520-in (140-mm)
ACX650-19	6-1/8-inch	50-ohm	5.500-in (140-mm)	2.438-in (62-mm)	6.060-in (154-mm)	0.437-in (11-mm)	5.620-in (143-mm)
ACX675-19	6-1/8-inch	75-ohm	5.400-in (137-mm)	2.398-in (61-mm)	6.060-in (154-mm)	0.437-in (11-mm)	5.520-in (140-mm)
ACX775-19	7-3/16-inch	75-ohm	6.000-in (152-mm)	2.620-in (67-mm)	7.240-in (184-mm)	0.500-in (13-mm)	0.549-in (14-mm)
ACX875-19	8-3/16-inch	75-ohm	5.510-in (140-mm)	3.120-in (79-mm)	8.480-in (215-mm)	0.620-in (16-mm)	0.549-in (14-mm)

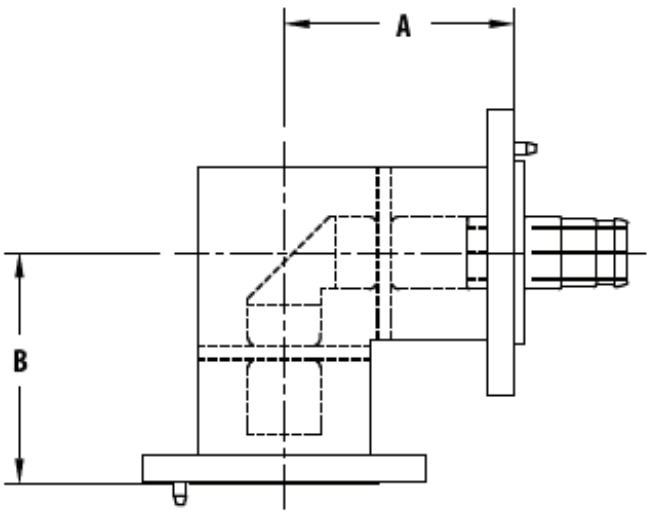
Miter Elbows

90-Degree Flanged Elbows

90-degree flanged miter elbows have supported inner conductors and swivel flanges. Each elbow includes one inner connector, O-ring, silicone grease and one flange hardware kit. They are pressure tight and suitable for indoor and outdoor applications. "-2" detail elbows include an outer conductor reinforcement gusset. "*" indicates an elbow that must be tuned to channel. "-W" detail 7-3/16-inch and 8-3/16-inch elbows are double mitered broadband designs. All other elbow sizes are broadband and do not require tuning to channel.

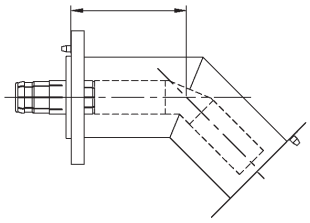
90-Degree Flanged Elbow Specifications

Part No.	Line Size	Impedance	Outer	Leg A		Leg B		Weight	
ACX050-10SE	7/8-inch	50-ohm	Copper	2.437-in	(62-mm)	3.078-in	(78-mm)	1.4-lbm	(0.6-kg)
ACX150-10SE	1-5/8-inch	50-ohm	Copper	2.890-in	(73-mm)	2.890-in	(73-mm)	3.5-lbm	(1.6-kg)
1329150-10SE	1-5/8-inch	50-ohm	Aluminum	2.895-in	(74-mm)	2.895-in	(74-mm)	1.4-lbm	(0.6-kg)
ACX350-10SE	3-1/8-inch	50-ohm	Copper	4.189-in	(106-mm)	4.189-in	(106-mm)	4.2-lbm	(1.9-kg)
1329350-10SE	3-1/8-inch	50-ohm	Aluminum	4.189-in	(106-mm)	4.189-in	(106-mm)	3.6-lbm	(1.7-kg)
ACX350-10SE-2	3-1/8-inch	50-ohm	Copper	4.189-in	(106-mm)	4.189-in	(106-mm)	3.8-lbm	(1.7-kg)
ACX350-10SU-5	3-1/8-inch	50-ohm	Copper	17.179-in	(436-mm)	4.189-in	(106-mm)	10.0-lbm	(4.5-kg)
ACX350-10SU-9	3-1/8-inch	50-ohm	Copper	9.000-in	(229-mm)	6.000-in	(152-mm)	7.0-lbm	(3.2-kg)
ACX450-10SE	4-1/16-inch	50-ohm	Copper	6.000-in	(152-mm)	6.000-in	(152-mm)	8.4-lbm	(3.8-kg)
1329450-10SE	4-1/16-inch	50-ohm	Aluminum	6.000-in	(152-mm)	6.000-in	(152-mm)	8.2-lbm	(3.7-kg)
ACX450-10SU	4-1/16-inch	50-ohm	Copper	12.000-in	(305-mm)	6.000-in	(152-mm)	10.5-lbm	(4.8-kg)
ACX450-10SU-5	4-1/16-inch	50-ohm	Copper	8.000-in	(203-mm)	6.000-in	(152-mm)	9.8-lbm	(4.4-kg)
ACX450-10SU-6	4-1/16-inch	50-ohm	Copper	9.000-in	(229-mm)	6.000-in	(152-mm)	9.5-lbm	(4.3-kg)
ACX650B-10SE	6-1/8-inch	50-ohm	Copper	5.500-in	(140-mm)	5.500-in	(140-mm)	18.7-lbm	(8.5-kg)
1329650-10SE	6-1/8-inch	50-ohm	Aluminum	5.500-in	(140-mm)	5.500-in	(140-mm)	15.0-lbm	(6.8-kg)
ACX650B-10SE-2	6-1/8-inch	50-ohm	Copper	5.500-in	(140-mm)	5.500-in	(140-mm)	18.7-lbm	(8.5-kg)
ACX650B-10SU	6-1/8-inch	50-ohm	Copper	14.000-in	(356-mm)	7.000-in	(178-mm)	22.0-lbm	(10.0-kg)
ACX675B-10SE	6-1/8-inch	75-ohm	Copper	5.500-in	(140-mm)	5.500-in	(140-mm)	17.2-lbm	(7.8-kg)
CE629	6-1/8-inch	75-ohm	Aluminum	9.000-in	(229-mm)	9.000-in	(229-mm)	14.0-lbm	(6.4-kg)
ACX675B-10SU	6-1/8-inch	75-ohm	Copper	14.000-in	(356-mm)	7.000-in	(178-mm)	21.5-lbm	(9.8-kg)
CE629U	6-1/8-inch	75-ohm	Aluminum	14.000-in	(356-mm)	7.000-in	(178-mm)	20.0-lbm	(9.1-kg)
ACX775-10SE-*	7-3/16-inch	75-ohm	Copper	12.000-in	(305-mm)	12.000-in	(305-mm)	50.0-lbm	(22.7-kg)
ACX775-10SE-W	7-3/16-inch	75-ohm	Copper	12.000-in	(305-mm)	12.000-in	(305-mm)	55.0-lbm	(24.9-kg)
ACX875B-10ASE-*	8-3/16-inch	75-ohm	Brass	12.000-in	(305-mm)	12.000-in	(305-mm)	60.0-lbm	(27.2-kg)
ACX875B-10SE-W	8-3/16-inch	75-ohm	Brass	12.000-in	(305-mm)	12.000-in	(305-mm)	65.0-lbm	(29.5-kg)



45-Degree Flanged Elbows

45-degree flanged miter elbows have supported inner conductors and swivel flanges. Each elbow includes one inner connector, O-ring, silicone grease and one flange hardware kit. They are pressure tight and suitable for indoor and outdoor applications. "*" indicates an elbow that must be tuned to channel. All other elbow sizes are broadband and do not require tuning to channel.

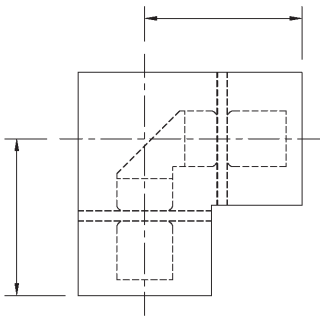


45-Degree Flanged Elbow Specifications

Part No.	Line Size	Impedance	Outer	Leg A		Leg B		Weight	
ACX350-9SE	3-1/8-inch	50-ohm	Copper	4.500-in	(114-mm)	4.500-in	(114-mm)	4.5-lbm	(2.0-kg)
ACX450-9SE	4-1/16-inch	50-ohm	Copper	6.000-in	(152-mm)	6.000-in	(152-mm)	6.5-lbm	(3.0-kg)
ACX775-9SE-*	7-3/16-inch	75-ohm	Copper	9.000-in	(229-mm)	9.000-in	(229-mm)	41.3-lbm	(18.7-kg)
ACX775-9SU-*	7-3/16-inch	75-ohm	Copper	13.503-in	(343-mm)	9.000-in	(343-mm)	58.3-lbm	(26.4-kg)

90-Degree Unflanged Elbows

90-degree unflanged miter elbows have supported inner conductors. Elbows are joined to other components with unflanged couplings, which include the inner connector, or with clamp-on flanges, inner connectors and flange hardware kits that are purchased separately. This product cannot be pressurized and is recommended only for indoor application only. All elbow sizes listed are broadband and do not require tuning to channel.

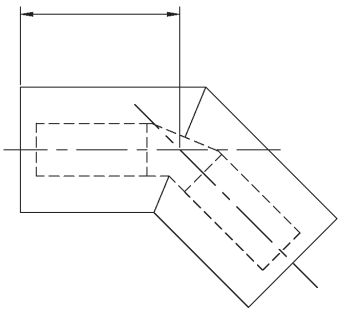


90-Degree Unflanged Elbow Specifications

Part No.	Line Size	Impedance	Outer	Leg A		Leg B		Weight
ACX050-10SE-3	7/8-inch	50-ohm	Copper	2.905-in	(74-mm)	2.265-in	(58-mm)	0.4-lbm (0.2-kg)
ACX150-10SE-3	1-5/8-inch	50-ohm	Copper	2.690-in	(68-mm)	2.690-in	(68-mm)	0.7-lbm (0.3-kg)
1329150-10SE-3	1-5/8-inch	50-ohm	Aluminum	2.690-in	(68-mm)	2.690-in	(68-mm)	0.4-lbm (0.2-kg)
ACX350-10SE-3	3-1/8-inch	50-ohm	Copper	4.000-in	(102-mm)	4.000-in	(102-mm)	1.8-lbm (0.8-kg)
1329350-10SE-3	3-1/8-inch	50-ohm	Aluminum	4.000-in	(102-mm)	4.000-in	(102-mm)	1.3-lbm (0.6-kg)
ACX450-9SE-3	4-1/16-inch	50-ohm	Copper	5.750-in	(146-mm)	5.750-in	(146-mm)	3.8-lbm (1.7-kg)
1329450-10SE-3	4-1/16-inch	50-ohm	Aluminum	5.750-in	(146-mm)	5.750-in	(146-mm)	3.8-lbm (1.7-kg)
ACX650B-10SE-3	6-1/8-inch	50-ohm	Copper	5.469-in	(139-mm)	5.469-in	(139-mm)	8.4-lbm (3.8-kg)
1329650-10SE-3	6-1/8-inch	50-ohm	Aluminum	5.470-in	(139-mm)	5.470-in	(139-mm)	6.4-lbm (2.9-kg)

45-Degree Unflanged Elbows

45-degree unflanged miter elbows have supported inner conductors. Elbows are joined to other components with unflanged couplings, which include the inner connector, or with clamp-on flanges, inner connectors and flange hardware kits that are purchased separately. This product cannot be pressurized and is recommended only for indoor application. All elbow sizes listed are broadband and do not require tuning to channel.

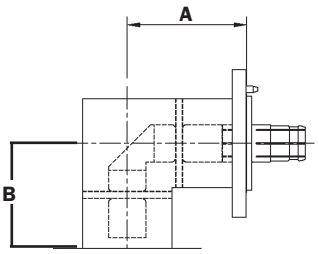


45-Degree Unflanged Elbow Specifications

Part No.	Line Size	Impedance	Outer	Leg A		Leg B		Weight
ACX350-9SE-3	3-1/8-inch	50-ohm	Copper	4.312-in	(110-mm)	4.312-in	(110-mm)	2.1-lbm (1.0-kg)
1329350-9SE-3	3-1/8-inch	50-ohm	Aluminum	4.312-in	(110-mm)	4.312-in	(110-mm)	1.4-lbm (0.6-kg)
ACX450-9SE-3	4-1/16-inch	50-ohm	Copper	5.500-in	(140-mm)	5.500-in	(140-mm)	5.5-lbm (2.5-kg)

90-Degree Flanged/Unflanged Elbows

90-degree unflanged/flanged miter elbows have supported inner conductors and have a swivel flange on one leg and are unflanged, female on the other leg. The elbows include one inner connector, O-ring, silicone grease and one flange hardware kit. The unflanged leg is joined to other components with an unflanged coupling, which includes the inner connector, or with clamp-on flanges, inner connectors and flange hardware kits that are purchased separately. This product cannot be pressurized and is recommended only for indoor application. All elbow sizes listed are broadband and do not require tuning to channel.

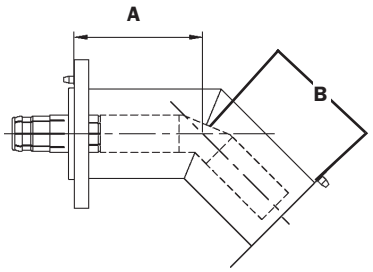


90-Degree Flanged/Unflanged Elbow Specifications

Part No.	Line Size	Impedance	Outer	Leg A		Leg B		Weight	
ACX350-10SE-4	3-1/8-inch	50-ohm	Copper	4.188-in	(106-mm)	4.000-in	(102-mm)	3.8-lbm	(1.7-kg)
1329350-10SE-4	3-1/8-inch	50-ohm	Aluminum	4.188-in	(106-mm)	4.000-in	(102-mm)	3.2-lbm	(1.5-kg)
ACX650B-10SE-4	6-1/8-inch	50-ohm	Copper	5.500-in	(140-mm)	5.469-in	(139-mm)	14.8-lbm	(6.7-kg)

45-Degree Flanged/Unflanged Elbows

45-degree unflanged/flanged miter elbows have supported inner conductors and have a swivel flange on one leg and are unflanged, female on the other leg. The elbows include one inner connector, O-ring, silicone grease and one flange hardware kit. The unflanged leg is joined to other components with an unflanged coupling, which includes the inner connector, or with clamp-on flanges, inner connectors and flange hardware kits that are purchased separately. This product cannot be pressurized and is recommended only for indoor application.

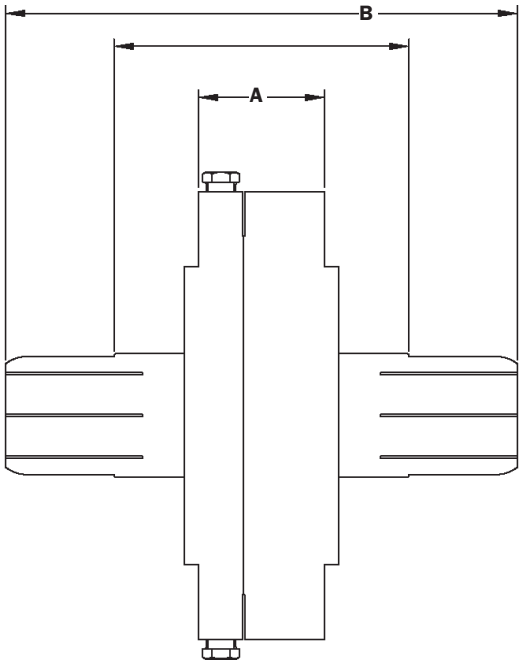


45-Degree Flanged/Unflanged Elbow Specifications

Part No.	Line Size	Impedance	Outer	Leg A		Leg B		Weight	
ACX350-9SE-4	3-1/8-inch	50-ohm	Copper	4.500-in	(114-mm)	4.312-in	(110-mm)	4.1-lbm	(1.9-kg)

Gas Barriers

Gas barrier, both sides have at least one pressure port, except the RLA150-16 which has a single pressure port. The assembly has fixed male inner connectors both ends. Includes flange hardware kit.



Gas Barrier Specifications

Part No.	Line Size	Impedance	Outer	Dim A		Dim B		No. of Ports	Weight	
RLA050-16	7/8-inch	50-ohm	Copper/Brass	1.125-in	(29-mm)	3.06-in	(78-mm)	2	1.0-lbm	(0.5-kg)
RLA150-16	1-5/8-inch	50-ohm	Copper/Brass	1.375-in	(35-mm)	3.70-in	(94-mm)	1	3.7-lbm	(1.7-kg)
RLA350-16	3-1/8-inch	50-ohm	Copper/Brass	1.000-in	(25-mm)	5.16-in	(131-mm)	2	4.8-lbm	(2.2-kg)
CG301	3-1/8-inch	50-ohm	Aluminum	1.000-in	(25-mm)	5.187-in	(132-mm)	2	4.1-lbm	(1.9-kg)
RLA450-16	4-1/16-inch	50-ohm	Copper/Brass	1.740-in	(44-mm)	7.08-in	(180-mm)	4	10.0-lbm	(4.5-kg)
CG401	4-1/16-inch	50-ohm	Aluminum	1.740-in	(44-mm)	6.187-in	(157-mm)	4	6.7-lbm	(3.0-kg)
RLA650-16	6-1/8-inch	50-ohm	Copper/Brass	1.630-in	(41-mm)	8.120-in	(206-mm)	4	17.8-lbm	(8.1-kg)
CG601	6-1/8-inch	50-ohm	Aluminum	1.630-in	(41-mm)	8.120-in	(206-mm)	4	11.2-lbm	(5.1-kg)
RLA675-16	6-1/8-inch	75-ohm	Copper/Brass	1.630-in	(41-mm)	7.06-in	(179-mm)	4	17.7-lbm	(8.0-kg)
CG602	6-1/8-inch	75-ohm	Aluminum	1.630-in	(41-mm)	8.120-in	(206-mm)	4	11.0-lbm	(5.0-kg)
RLA775-16	7-3/16-inch	75-ohm	Copper/Brass	1.630-in	(41-mm)	7.75-in	(197-mm)	4	19.0-lbm	(8.6-kg)
RLA875-16	8-3/16-inch	75-ohm	Copper/Brass	1.630-in	(41-mm)	8.17-in	(208-mm)	4	20.0-lbm	(9.1-kg)

Field Flanges and Unflanged Couplings

Swivel Field Flange Kits

Silver solder swivel flange, includes silver solder, flux, sliding ring and fixed ring. Order flange hardware kit and inner connector separately.

Fixed Field Flange Kits

Silver solder fixed field flange, includes silver solder and flux. Order flange hardware kit and inner connector separately.

Soft Solder Field Flange Kits

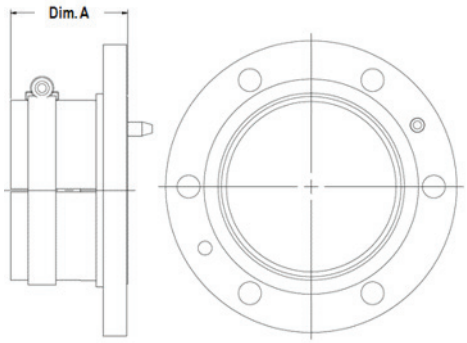
Soft solder fixed field flange for interior runs, includes soft solder and sleeve with fixed flange. Order flange hardware kit and inner connector separately.

Field Flange Specifications		Swivel Field Flange, Silver Solder		Fixed Field Flange, Silver Solder		Fixed Field Flange, Soft Solder	
Line Size	Outer	Part Number	Weight	Part Number	Weight	Part Number	Weight
7/8-inch	Brass	RLA000-27	0.9-lbm (0.4-kg)	RLA000-28	0.7-lbm (0.3-kg)	RLA000-37	0.9-lbm (0.4-kg)*
1-5/8-inch	Brass	RLA100-27	0.9-lbm (0.4-kg)	RLA100-28	0.9-lbm (0.4-kg)	RLA100-37	0.9-lbm (0.4-kg)*
3-1/8-inch	Brass	RLA300-27	2.0-lbm (0.9-kg)	RLA300-28	1.9-lbm (0.9-kg)	RLA300-37	2.1-lbm (0.9-kg)*
4-1/16-inch	Brass	RLA400-27	2.5-lbm (1.1-kg)	RLA400-28	2.5-lbm (1.1-kg)	RLA400-37	3.0-lbm (1.4-kg)*
6-1/8-inch	Brass	RLA600B-27	3.8-lbm (1.7-kg)	RLA600B-28	3.8-lbm (1.7-kg)	RLA600B-37	5.4-lbm (2.4-kg)*
7-3/16-inch	Brass	RLA700-27	5.5-lbm (2.5-kg)	RLA700-28	5.3-lbm (2.4-kg)	RLA700-37	6.0-lbm (2.7-kg)*
8-3/16-inch	Brass	RLA800B-27	6.9-lbm (3.1-kg)	RLA800B-28	6.9-lbm (3.1-kg)	RLA800B-37	20.0-lbm (9.1-kg)*

*All components are brass

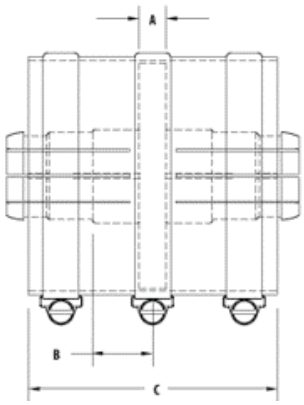
Clamp-On Flanges

Flange adapter, clamp type. Available for both copper and aluminum outer conductor transmission line. Includes hose clamp. Order flange hardware kit and inner connector separately.



Clamp-On Flange Adapter Specifications

Part No.	Line Size	Outer	Dim A		Weight	
RLA000-38	7/8-inch	Copper/Brass	1.376-in	(35-mm)	0.4-lbm	(0.2-kg)
RLA100-38	1-5/8-inch	Copper/Brass	1.437-in	(36-mm)	0.9-lbm	(0.4-kg)
1329100-38	1-5/8-inch	Aluminum	1.437-in	(36-mm)	0.3-lbm	(0.1-kg)
RLA300-38	3-1/8-inch	Copper/Brass	1.645-in	(42-mm)	2.1-lbm	(0.9-kg)
CA301	3-1/8-inch	Aluminum	2.094-in	(53-mm)	0.8-lbm	(0.4-kg)
RLA400-38	4-1/16-inch	Copper/Brass	2.375-in	(60-mm)	3.0-lbm	(1.3-kg)
1329400-38	4-1/16-inch	Aluminum	2.219-in	(56-mm)	0.9-lbm	(0.4-kg)
RLA600B-38	6-1/8-inch	Copper/Brass	2.687-in	(68-mm)	4.0-lbm	(1.8-kg)
1329600-38	6-1/8-inch	Aluminum	2.875-in	(73-mm)	1.4-lbm	(0.6-kg)



Unflanged Couplings

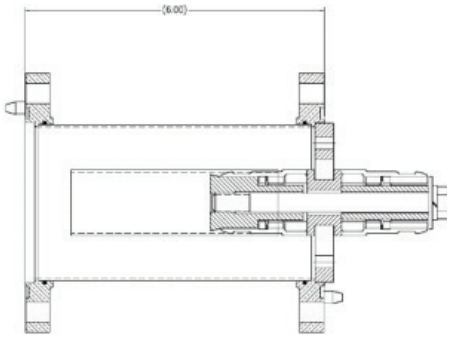
Unpressurized coupling, connects unflanged line and fittings. Includes supported inner connector and sleeve outer connector with clamps. Available for both copper and aluminum outer conductor transmission line.

Unflanged Coupling Specifications

Part No.	Line Size	Impedance	Outer	Dim A		Dim B		Dim C		Weight		# of Clamps
RLA050-39	7/8-inch	50 ohm	Copper/Brass	0.062-in	(2-mm)	0.465-in	(12-mm)	1.500-in	(38-mm)	0.3-lbm	(0.1-kg)	2
RLA150-39A	1-5/8-inch	50 ohm	Copper/Brass	0.250-in	(6-mm)	0.507-in	(13-mm)	2.500-in	(64-mm)	0.4-lbm	(0.2-kg)	3
1329150-39A	1-5/8-inch	50 ohm	Aluminum	0.250-in	(6-mm)	0.507-in	(13-mm)	2.500-in	(64-mm)	0.4-lbm	(0.2-kg)	3
RLA350-39A	3-1/8-inch	50 ohm	Copper/Brass	0.375-in	(10-mm)	0.849-in	(22-mm)	3.500-in	(89-mm)	1.4-lbm	(0.7-kg)	3
1329350-39A	3-1/8-inch	50 ohm	Aluminum	0.375-in	(10-mm)	0.849-in	(22-mm)	3.500-in	(89-mm)	1.8-lbm	(0.8-kg)	3
RLA450-39A	4-1/16-inch	50 ohm	Copper/Brass	0.369-in	(9-mm)	1.200-in	(30-mm)	4.000-in	(102-mm)	3.1-lbm	(1.4-kg)	3
1329450-39A	4-1/16-inch	50 ohm	Aluminum	0.369-in	(9-mm)	1.200-in	(30-mm)	4.000-in	(102-mm)	2.1-lbm	(1.0-kg)	3
RLA650-39	6-1/8-inch	50 ohm	Copper/Brass	0.063-in	(2-mm)	1.218-in	(31-mm)	5.000-in	(127-mm)	4.1-lbm	(1.9-kg)	4
1329650-39	6-1/8-inch	50 ohm	Aluminum	0.063-in	(2-mm)	1.218-in	(31-mm)	5.000-in	(127-mm)	3.0-lbm	(1.4-kg)	4

1329Line™ Galvanic Barriers

A galvanic barrier is required to interface 1329Line™ aluminum outer conductor transmission line when interfacing outdoors to brass/ copper transmission line, connectors, or antenna inputs. The galvanic barriers have fixed flanges and each include one captive inner connector and one flange hardware kit, with O ring gasket. This item can be pressurized. They have a 6-inch flange to flange length.

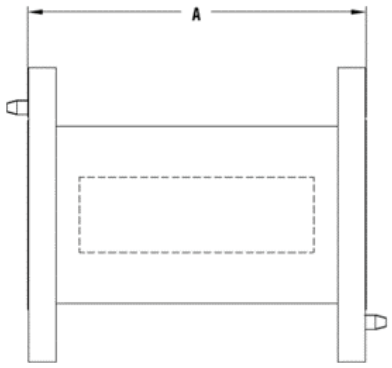


1329Line Galvanic Barrier Specifications

Part No.	Line Size	Impedance	Length		Weight	
STD350-52NP	3-1/8-inch	50-ohms	6.00-in	(152-mm)	7-lbm	(3.3-kg)
STD450-52NP	4-1/16-inch	50-ohms	6.00-in	(152-mm)	8-lbm	(3.7-kg)
STD650-52NP	6-1/8-inch	50-ohms	6.00-in	(152-mm)	13-lbm	(5.7-kg)
STD675-52NP	6-1/8-inch	75-ohms	6.00-in	(152-mm)	11-lbm	(4.9-kg)

Male-to-Male Adapters

A male-to-male adapter is used to connector two fixed male connectors together they include a copper inner and outer conductor and one flange hardware kit, with O ring gasket, no inner connector is included. This item can be pressurized.



Male-to-Male Adapter Specifications

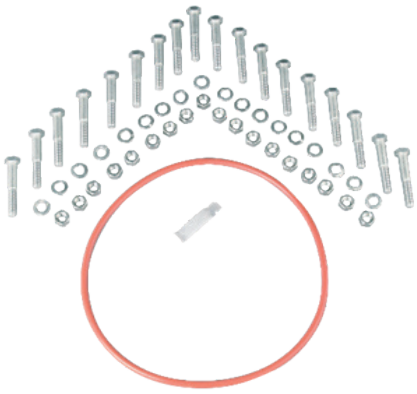
Part No.	Line Size	Impedance	Length		Weight	
STD050-52	7/8-inch	50-ohms	6.00-in	(152-mm)	2-lbm	(0.7-kg)
STD150-52	1-5/8-inch	50-ohms	6.00-in	(152-mm)	3-lbm	(1.4-kg)
STD350-52	3-1/8-inch	50-ohms	6.00-in	(152-mm)	6-lbm	(2.7-kg)
STD450-52	4-1/16-inch	50-ohms	6.00-in	(152-mm)	8-lbm	(3.6-kg)
STD650-52	6-1/8-inch	50-ohms	6.00-in	(152-mm)	11-lbm	(5.0-kg)
STD675-52	6-1/8-inch	75-ohms	6.00-in	(152-mm)	10-lbm	(4.5-kg)
STD775-52	7/3-16-inch	75-ohms	8.00-in	(203-mm)	12-lbm	(5.4-kg)
STD875-52	8-3/16-inch	75-ohms	8.00-in	(203-mm)	13-lbm	(5.9-kg)

Flange Hardware Kits and Replacement O-Rings

Hardware kits include one (1) O-ring, silicone lubricant, nuts, bolts and lock washers for one flange joint connection. Replacement O-Rings include the O-Ring and Silicon Lubricant.

Flange Hardware Kit Specifications

Part No.	Line Size	# of Bolts	Bolt Size	Weight	
RLA000-21	7/8-inch	3	1/4-20	0.2-lbm	(0.1-kg)
RLA100-21	1-5/8-inch	4	5/16 in	0.3-lbm	(0.1-kg)
RLA300-21	3-1/8-inch	6	3/8 in	0.5-lbm	(0.2-kg)
RLA400-21	4-1/16-inch	8	3/8 in	0.8-lbm	(0.4-kg)
RLA600-21	6-1/8-inch	12	3/8 in	1.1-lbm	(0.5-kg)
RLA700-21	7-3/16-inch	14	3/8 in	1.4-lbm	(0.6-kg)
RLA800-21	8-3/16-inch	18	3/8 in	1.9-lbm	(0.9-kg)



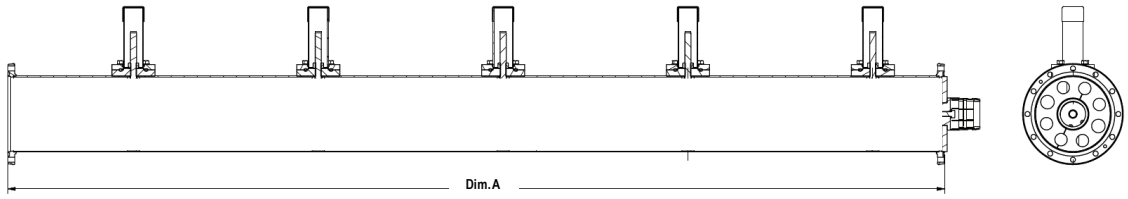
Replacement O-Ring Specifications

Part No.	Line Size	Inside Diameter		Thickness	
RLA000-51	7/8-inch	1.046-in	(27-mm)	0.139-in	(4-mm)
RLA100-51	1-5/8-inch	1.875-in	(48-mm)	0.188-in	(5-mm)
RLA300-51	3-1/8-inch	3.350-in	(85-mm)	0.210-in	(5-mm)
RLA400-51	4-1/16-inch	4.350-in	(110-mm)	0.210-in	(5-mm)
RLA600-51	6-1/8-inch	6.250-in	(159-mm)	0.250-in	(6-mm)
RLA700-51	7-3/16-inch	7.475-in	(190-mm)	0.275-in	(7-mm)
RLA800-51	8-3/16-inch	9.000-in	(229-mm)	0.250-in	(6-mm)

Coaxial Fine Matchers

FM Fine Matchers

Coaxial fine matcher, flanged both ends for the FM broadcast band (88 to 108 MHz). Includes one captive inner connector, O ring and one flange hardware kit. Five (5) tuners. Can be pressurized for outside use. 76-inches flange to flange. Tuners including locking nuts and pressure tight caps. Does not include mounting brackets or hardware. These are available from ERI at additional cost. Maximum matching capability 1.23.

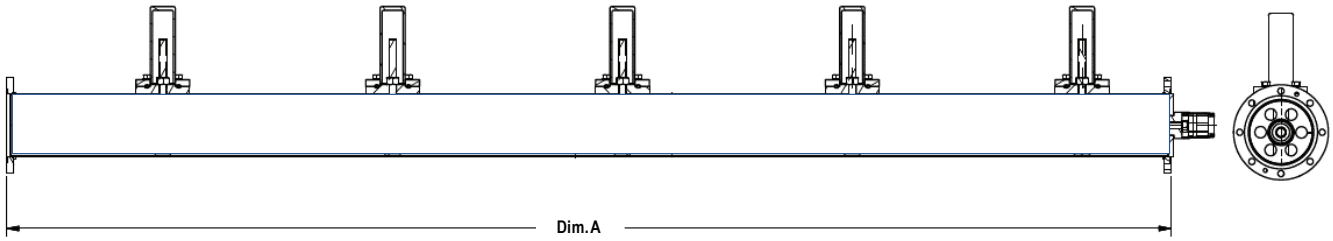


FM Fine Matcher Specifications

Part No.	Line Size	Impedance	Outer	Tuners	Dim A		Weight	
STD350-FTF	3-1/8-inch	50-ohm	Copper/Brass	Five (5)	76.000-in	(1930-mm)	38-lbm	(17.3-kg)
STD350-FTF-AL	3-1/8-inch	50-ohm	Aluminum	Five (5)	76.000-in	(1930-mm)	18-lbm	(8.2-kg)
STD450-FTF	4-1/16-inch	50-ohm	Copper/Brass	Five (5)	76.000-in	(1930-mm)	47-lbm	(21.5-kg)
STD450-FTF-AL	4-1/16-inch	50-ohm	Aluminum	Five (5)	76.000-in	(1930-mm)	23-lbm	(10.2-kg)
STD650-FTF	6-1/8-inch	50-ohm	Copper/Brass	Five (5)	76.000-in	(1930-mm)	66-lbm	(29.9-kg)
STD650-FTF-AL	6-1/8-inch	50-ohm	Aluminum	Five (5)	76.000-in	(1930-mm)	32-lbm	(14.5-kg)

High Band VHF Fine Matchers

Coaxial fine matcher, flanged both ends for the high band VHF television broadcast band (174 to 216 MHz). Includes one captive inner connector, O ring and one flange hardware kit. Five (5) tuners. Can be pressurized for outside use. 48-inches flange to flange. Tuners including locking nuts and pressure tight caps. Does not include mounting brackets or hardware. These are available from ERI at additional cost.

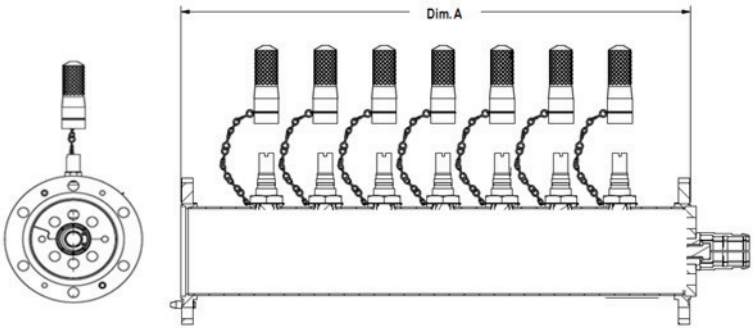


High Band VHF Fine Matcher Specifications

Part No.	Line Size	Impedance	Outer	Tuners	Dim A		Weight	
STD350-FTV	3-1/8-inch	50-ohm	Copper/Brass	Five (5)	48.000-in	(1219-mm)	34-lbm	(15.3-kg)
STD350-FTV-AL	3-1/8-inch	50-ohm	Aluminum	Five (5)	48.000-in	(1219-mm)	16-lbm	(7.3-kg)
STD450-FTV	4-1/16-inch	50-ohm	Copper/Brass	Five (5)	48.000-in	(1219-mm)	40-lbm	(18.1-kg)
STD450-FTV-AL	4-1/16-inch	50-ohm	Aluminum	Five (5)	48.000-in	(1219-mm)	19-lbm	(8.5-kg)
STD650-FTV	6-1/8-inch	50-ohm	Copper/Brass	Five (5)	48.000-in	(1219-mm)	53-lbm	(24.0-kg)
STD650-FTV-AL	6-1/8-inch	50-ohm	Aluminum Five	Five (5)	48.000-in	(1219-mm)	26-lbm	(11.9-kg)

UHF Fine Matchers

Coaxial fine matcher, flanged both ends for the UHF television broadcast band (470 to 800 MHz). Includes one captivated inner connector and one flange hardware kit. 7 tuners. 18-inches flange to flange. Tuners including locking nuts and pressure tight caps. Does not include mounting brackets or hardware. These are available from ERI at additional cost.



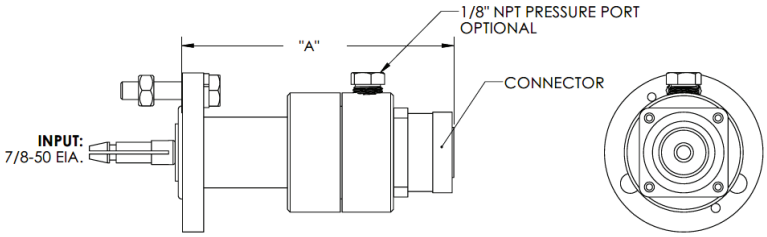
UHF Fine Matcher Specifications

Part No.	Line Size	Impedance	Outer	Tuners	Dim A		Weight	
STD350A-FT	3-1/8-inch	50-ohm	Copper/Brass	Seven (7)	18.000-in	(457-mm)	11-lbm	(5.1-kg)
STD350A-FT-AL	3-1/8-inch	50-ohm	Aluminum	Seven (7)	18.000-in	(457-mm)	7-lbm	(3.1-kg)
STD450A-FT	4-1/16-inch	50-ohm	Copper/Brass	Seven (7)	18.000-in	(457-mm)	11-lbm	(5.2-kg)
STD450-FT-AL	4-1/16-inch	50-ohm	Aluminum	Seven (7)	18.000-in	(457-mm)	8-lbm	(3.6-kg)
STD650B-FT	6-1/8-inch	50-ohm	Copper/Brass	Seven (7)	18.000-in	(457-mm)	25-lbm	(11.3-kg)
STD650-FT-AL	6-1/8-inch	50-ohm	Aluminum	Seven (7)	18.000-in	(457-mm)	14-lbm	(6.6-kg)
STD675B-FT	6-1/8-inch	75-ohm	Copper/Brass	Seven (7)	18.000-in	(457-mm)	24-lbm	(10.9-kg)
STD675-FT-AL	6-1/8-inch	75-ohm	Aluminum	Seven (7)	18.000-in	(457-mm)	13-lbm	(5.9-kg)
STD775-FT	7-3/16-inch	75-ohm	Copper/Brass	Seven (7)	18.000-in	(457-mm)	37-lbm	(16.8-kg)
STD875B-FT	8-3/16-inch	75-ohm	Copper/Brass	Seven (7)	18.000-in	(457-mm)	48-lbm	(21.8-kg)

Coaxial Reducers

7/8-inch Reducers

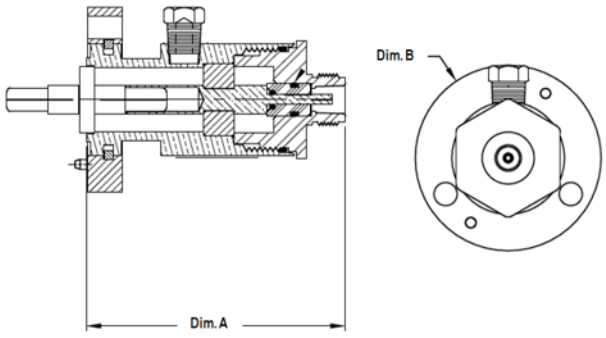
CR105 7/8-inch to 7-16-DIN and Type N Reducers
Step reducer from 7/8-inch EIA flange to 7-16 DIN and Type N. 7/8-inch fixed flange, copper/brass construction, gas tight and with or without 1/8-inch NPT gas inlet fitting. Includes removable 7/8-inch inner connector and one flange hardware kit, with O ring. Mixing copper/brass and aluminum components, outdoors, without galvanic protection is not recommended.



CR105 Reducer Specifications

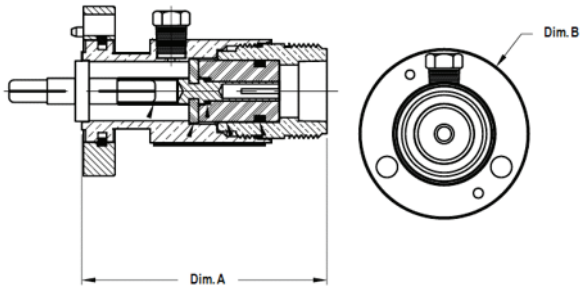
Part No.	Outer Material	Gas Port	Connector "B"	DIM. A		Weight	
CR105-BR-716F-00	Copper-Brass	No	7-16 DIN, female	3.860-in	(98-mm)	2.0-lbm	(0.9-kg)
CR105-BR-716F-PT	Copper-Brass	Yes	7-16 DIN, female	3.860-in	(98-mm)	2.0-lbm	(0.9-kg)
CR105-BR-716M-00	Copper-Brass	No	7-16 DIN, male	4.210-in	(107-mm)	2.0-lbm	(0.9-kg)
CR105-BR-716M-PT	Copper-Brass	Yes	7-16 DIN, male	4.210-in	(107-mm)	2.0-lbm	(0.9-kg)
CR105-BR-NFEM-00	Copper-Brass	No	Type N, female	4.480-in	(114-mm)	2.0-lbm	(0.9-kg)
CR105-BR-NFEM-PT	Copper-Brass	Yes	Type N, female	4.480-in	(114-mm)	2.0-lbm	(0.9-kg)

RLA050-NF 7/8-inch to Type N Reducer
Step reducer from 7/8-inch EIA flange to Type N, female. 7/8-inch fixed flange copper/brass construction, gas tight, with 1/8-inch NPT gas inlet port. Includes removable 7/8-inch inner connector and one flange hardware kit, with O ring.



Dim. "A"	3.140-in	(80-mm)
Dim. "B"	2.250-in	(57-mm)
Weight	1.2-lbm	(0.5-kg)

RLA050-LC 7/8-inch to Type LC Reducer
Step reducer from 7/8-inch EIA flange to Type LC, female. 7/8-inch fixed flange copper/brass construction, gas tight, with 1/8-inch NPT gas inlet port. Includes removable 7/8-inch inner connector and one flange hardware kit, with O ring.

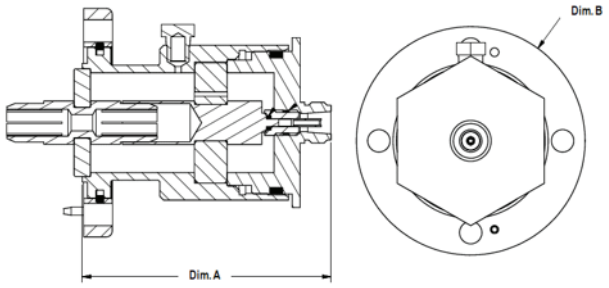


Dim. "A"	3.250-in	(83-mm)
Dim. "B"	2.250-in	(57-mm)
Weight	1.3-lbm	(0.6-kg)

1-5/8-inch Reducers

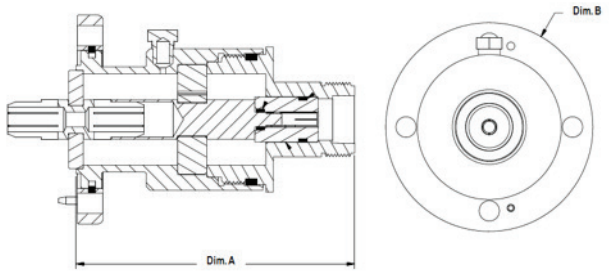
RLA150-NF 1-5/8-inch to Type N Reducer
Step reducer from 1-5/8-inch EIA flange to Type N, female. 1-5/8-inch fixed flange copper/brass construction, gas tight, with 1/8-inch NPT gas inlet port. Includes removable 1-5/8-inch inner connector and one flange hardware kit, with O ring.

Dim. "A"	3.809-in	(97-mm)
Dim. "B"	3.500-in	(89-mm)
Weight	3.4-lbm	(1.5-kg)

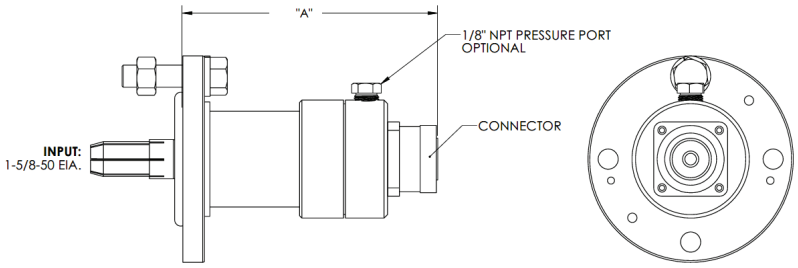


RLA150-LC 1-5/8-inch to Type LC Reducer
Step reducer from 1-5/8-inch EIA flange to Type LC, female. 1-5/8-inch fixed flange copper/brass construction, gas tight, with 1/8-inch NPT gas inlet port. Includes removable 1-5/8-inch inner connector and one flange hardware kit, with O ring.

Dim. "A"	4.717-in	(120-mm)
Dim. "B"	3.500-in	(89-mm)
Weight	3.4-lbm	(1.5-kg)



CR216 1-5/8-inch to 7-16 DIN and Type N Reducers



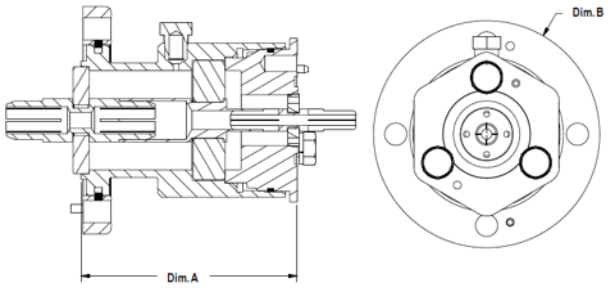
Step reducer from 1-5/8-inch EIA flange to 7-16 DIN and Type N. 1-5/8-inch fixed flange, copper/brass construction. Models available with or without 1/8-inch NPT gas inlet fitting. Includes removable 1-5/8-inch inner connector and one flange hardware kit, with O ring. Mixing copper/brass and aluminum components, outdoors, without galvanic protection is not recommended.

CR216 Reducer Specifications

Part No.	Outer Material	Gas Port	Connector "B"	DIM. A		Weight	
CR216-BR-716F-00	Copper-Brass	No	7-16 DIN, female	4.290-in	(109-mm)	2.0-lbm	(0.9-kg)
CR216-BR-716F-PT	Copper-Brass	Yes	7-16 DIN, female	4.290-in	(109-mm)	2.0-lbm	(0.9-kg)
CR216-BR-716M-00	Copper-Brass	No	7-16 DIN, male	4.640-in	(118-mm)	2.0-lbm	(0.9-kg)
CR216-BR-716M-PT	Copper-Brass	Yes	7-16 DIN, male	4.640-in	(118-mm)	2.0-lbm	(0.9-kg)
CR216-BR-NFEM-00	Copper-Brass	No	Type N, female	4.910-in	(125-mm)	2.0-lbm	(0.9-kg)
CR216-BR-NFEM-PT	Copper-Brass	Yes	Type N, female	4.910-in	(125-mm)	2.0-lbm	(0.9-kg)

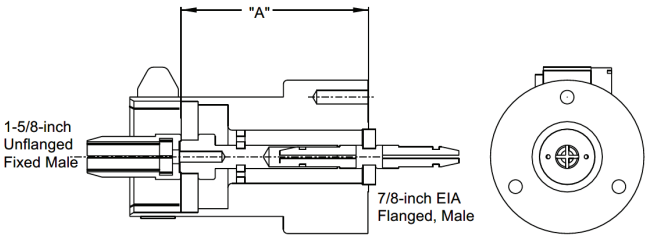
RLA150-050 1-5/8-inch to 7/8-inch Reducer
Step reducer from 1-5/8-inch EIA flange to 7/8-inch EIA fixed flange. 1-5/8-inch fixed flange copper/brass construction, gas tight, with 1/8-inch NPT gas inlet port. Includes removable 7/8-inch and 1-5/8-inch inner connector and one flange hardware kit, with O ring.

Dim. "A"	3.341-in	(85-mm)
Dim. "B"	3.500-in	(89-mm)
Weight	5.0-lbm	(2.3-kg)



CR214 1-5/8-inch to 7/8-inch Reducer
Step reducer from 1-5/8-inch unflanged, fixed male, to 1-5/8-inch EIA Flange. 7/8-inch EIA fixed flange, male (removable), aluminum outer conductor, not gas tight. Includes removable 7/8-inch and 1-5/8-inch inner connector and one flange hardware kit.

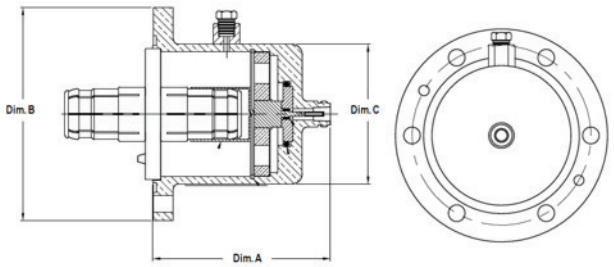
Dim. "A"	2.750-in	(70-mm)
Weight	3.0-lbm	(1.4-kg)



3-1/8-inch Reducers

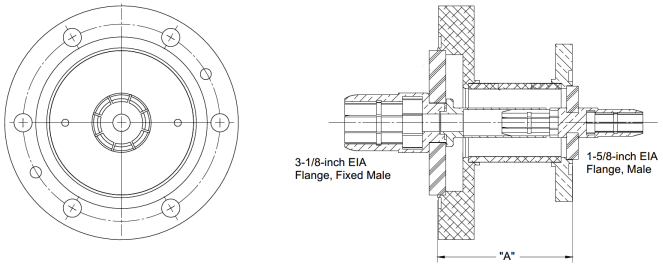
RLA350-NF 3-1/8-inch to Type N Reducers
Step reducer from 3-1/8-inch EIA flange to Type N, female. 3-1/8-inch fixed flange available with copper/brass construction (RLA350-NF) or with an aluminum outer conductor (RLA350-NF-AL), gas tight, with a 1/8-inch NPT gas inlet port. Includes removable 3-1/8-inch inner connector and one flange hardware kit, with O ring.

Part No.	RLA350-NF	RLA350-NF-AL
Outer Material	Copper/Brass	Aluminum
Dim. "A"	4.338-in	(110-mm)
Dim. "B"	5.187-in	(132-mm)
Dim. "C"	3.402-in	(86-mm)
Weight	5.6-lbm (2.5-kg)	2.5-lbm (1.1-kg)



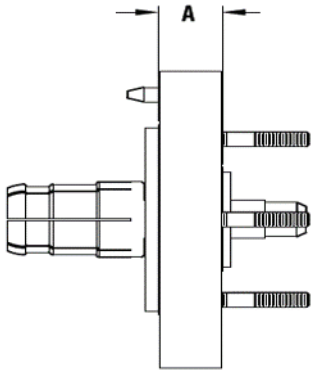
CR312 3-1/8-inch to 1-5/8-inch Reducer
Step reducer from 3-1/8-inch EIA flange to 1-5/8-inch EIA Flange. Fixed flanges aluminum outer conductor construction, gas tight. Includes removable 1-5/8-inch and fixed 3-1/8-inch inner connectors. Flange hardware is not included, order, separately. Mixing copper/brass and aluminum components, outdoors, without galvanic protection is not recommended.

Dim. "A"	0.867-in	(22-mm)
Weight	7.0-lbm	(3.2-kg)



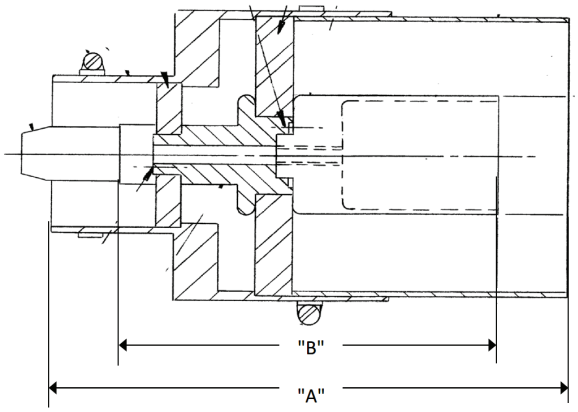
RLA350-150 3-1/8-inch to 1-5/8-inch Reducer
Plate reducer, 50-ohm, 3-1/8-inch EIA flange to 1-5/8-inch EIA flange includes two inner connectors. 1-5/8-inch inner connector is removable and mates with captivated 1-5/8-inch inner connectors. Includes 3-1/8-inch and 1-5/8-inch O rings, 3-1/8-inch hardware kit and studs for 1-5/8-inch flange connection. When a 1-5/8 inch 50-ohm Gas Barrier needs to be connected to this adapter, first remove all four 5/16-18 threaded studs from adapter. Secure with four5/16-18UNC-2A cap screws which are 2-inches long (not included) and four 5/16-inch lock washers (included).

Dim. "A"	0.867-in	(22-mm)
Weight	7.0-lbm	(3.2-kg)



CR304 3-1/8 to 1-5/8-inch NF Reducer
Step reducer from 3-1/8-inch unflanged, female, to 1-5/8-inch unflanged, fixed male. Aluminum outer conductor construction, unpressurized. Indoor use only. Includes removable 1-5/8-inch and fixed 3-1/8-inch inner connectors. Flange hardware is not included, order separately.

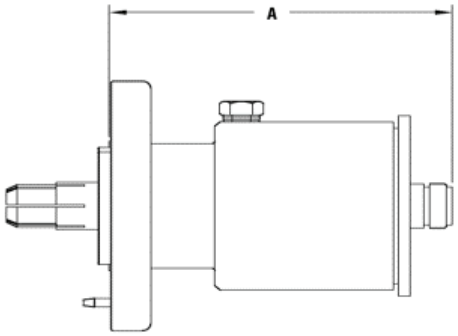
Dim. "A"	5.220-in	(133-mm)
Dim. "B"	4.120-in	(105-mm)
Weight	3.0-lbm	(1.4-kg)



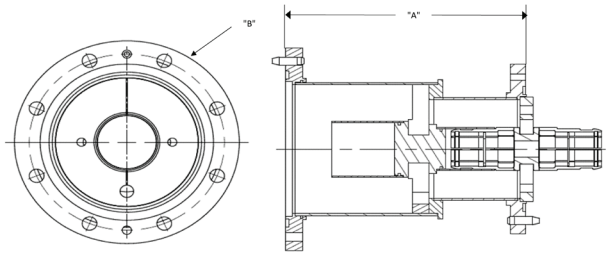
4-1/16-inch Reducers

RLA450-N 4-1/16-inch to Type N Reducer
Step reducer from 4-1/16-inch flange to Type N, female. 4-1/16-inch fixed flange with copper/brass construction, gas tight. Includes removable 4-1/16-inch inner connector and one flange hardware kit, with O ring.

Dim. "A"	4.813-in	(122-mm
Weight	8.5-lbm	(3.9-kg)



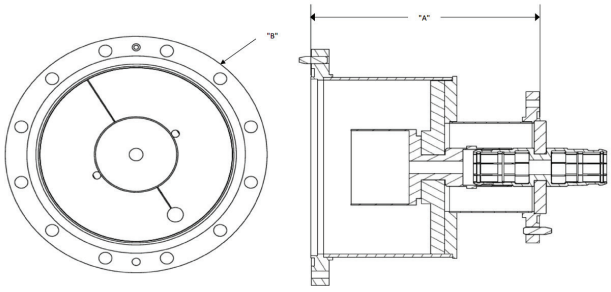
RLA450-350 / 1329450-350 Reducers
Step reducer from 4-1/16-inch flange to 3-1/8-inch EIA flange. Fixed flanges available with copper/brass construction (RLA450-350) or with an aluminum outer conductor (1329450-350), gas tight. Includes removable 3-1/8-inch inner connector and one 3-1/8-inch flange hardware kit, with O ring. Mixing copper/brass and aluminum components, outdoors, without galvanic protection is not recommended.



Part No.	RLA450-350	1329450-350
Outer Material	Copper/Brass	Aluminum
Dim. "A"	6.625-in	(168-mm)
Dim. "B"	6.188-in	(157-mm)
Weight	8.2-lbm (3.7-kg)	3.8-lbm (1.7-kg)

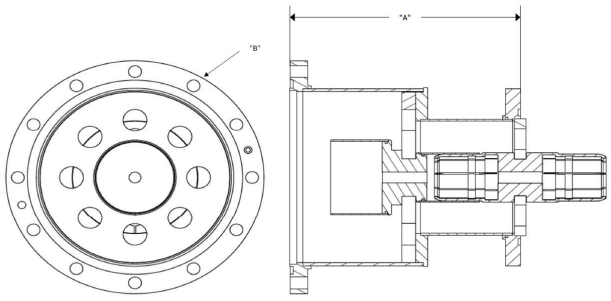
6-1/8-inch Reducers

RLA650B-350 / 1329650-350 Reducers
Step reducer from 6-1/8-inch, 50-ohm, EIA flange to 3-1/8-inch EIA flange. Fixed flanges available with copper/brass construction (RLA650B-350) or with an aluminum outer conductor (1329650-350), gas tight. Includes removable 3-1/8-inch inner connector and one 3-1/8-inch flange hardware kit, with O ring.



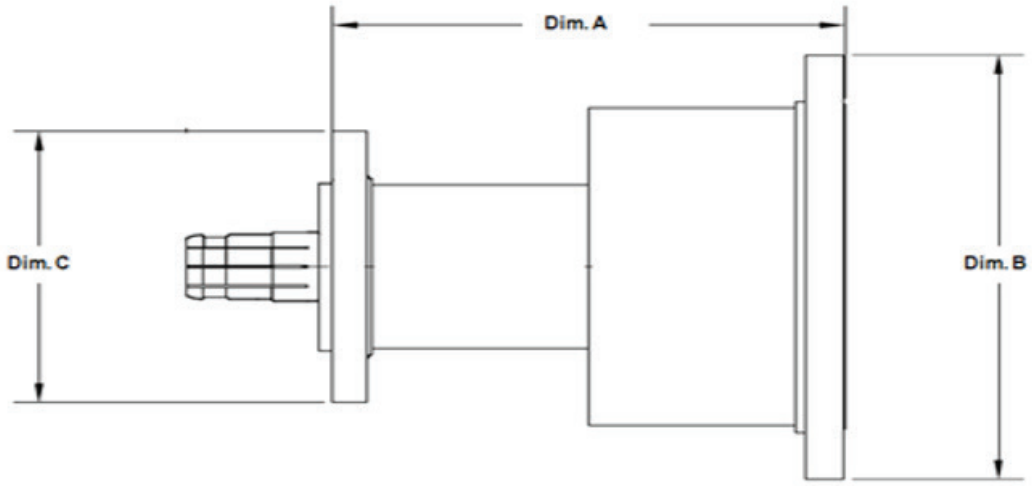
Part No.	RLA650B-350	1329650-350
Outer Material	Copper/Brass	Aluminum
Dim. "A"	7.125-in	(181-mm)
Dim. "B"	8.120-in	(206-mm)
Weight	8.2-lbm (3.7-kg)	6.5-lbm (2.9-kg)

RLA650-450 / 1329650-450 Reducers
Step reducer from 6-1/8-inch, 50-ohm, EIA flange to 4-1/16-inch flange. Fixed flanges available with copper/brass construction (RLA650-450) or with an aluminum outer conductor (1329650-450), gas tight. Includes removable 4-1/16-inch inner connector and one 4-1/16-inch flange hardware kit, with O ring.



Part No.	RLA650-450	1329650-450
Outer Material	Copper/Brass	Aluminum
Dim. "A"	7.260-in	(184-mm)
Dim. "B"	8.120-in	(206-mm)
Weight	8.2-lbm (3.7-kg)	6.4-lbm (2.9-kg)

7-3/16-inch and 8-3/16-inch Reducers



RLA775-675 Reducer			RLA875-675 Reducer			RLA875-775 Reducer		
Step reducer from 7-3/16-inch, 75-ohm, flange to 6-1/8-inch, 75-ohm, flange. Fixed flanges available with copper/brass construction, gas tight. Includes removable 6-1/8-inch-inch, 75-ohm, inner connector and one 6-1/8-inch flange hardware kit, with O ring.			Step reducer from 8-3/16-inch, 75-ohm, flange to 6-1/8-inch, 75-ohm, flange. Fixed flanges available with copper/brass construction, gas tight. Includes removable 6-1/8-inch-inch, 75-ohm, inner connector and one 6-1/8-inch flange hardware kit, with O ring.			Step reducer from 8-3/16-inch, 75-ohm, flange to 7-3/16-inch, 75-ohm, flange. Fixed flanges available with copper/brass construction, gas tight. Includes removable 7-3/16-inch-inch, 75-ohm, inner connector and one 7-3/16-inch flange hardware kit, with O ring.		
Dim. "A"	9.625-in	(244-mm)	**Dim. "A"**	12.000-in	(305-mm)	**Dim. "A"**	12.000-in	(305-mm)
Dim. "B"	9.500-in	(241-mm)	**Dim. "B"**	11.000-in	(279-mm)	**Dim. "B"**	11.000-in	(279-mm)
Dim. "C"	8.120-in	(206-mm)	**Dim. "C"**	8.120-in	(206-mm)	**Dim. "C"**	9.500-in	(241-mm)
Weight	18.0-lbm	(8.2-kg)	**Weight**	20.0-lbm	(9.5-kg)	**Weight**	21.0-lbm	(9.1-kg)

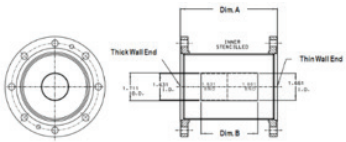
Coaxial Adapter

Thin Wall to Thick Wall Inner Conductor Adapters

Coaxial Thick Wall to Thin Wall Adapters

Coaxial 4-1/16-inch, 6-1/8-inch, 75-ohm and 7-3/16-inch, 75 ohm, standard ("thick") wall to thin wall inner conductor adapters. 6-inches flange to flange. Outer conductor with fixed flanges. Gas tight. Does not include inner connectors, order separately. Includes one flange hardware kit with O ring.

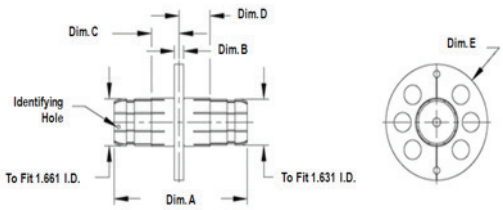
Part No.	CA405	CA605	CA706
Line Size	4-1/16-inch	6-1/8-inch	7-3/16-inch
Impedance	50-ohm	75-ohm	75-ohm
Outer Material	Copper/Brass	Copper/Brass	Copper/Brass
Dim. "A"	6.000-in (152-mm)	6.000-in (152-mm)	8.000-in (203-mm)
Dim. "B"	3.500-in (89-mm)	3.500-in (89-mm)	5.252-in (133-mm)
Weight	8.0-lbm (3.6-kg)	12.0-lbm (5.4-kg)	14.2-lbm (6.5-kg)



Coaxial Thick Wall to Thin Wall Inner Connector Adapters

Coaxial 4-1/16-inch, 6-1/8-inch, 75-ohm and 7-3/16-inch, 75 ohm, standard ("thick") wall to thin wall inner conductor adapters. 6-inches flange to flange. Outer conductor with fixed flanges. Gas tight. Does not include inner connectors, order separately. Includes one flange hardware kit with O ring.

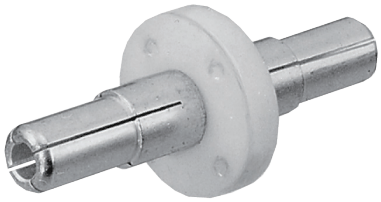
Part No.	CC0054	CC0067
Line Size	4-1/16-inch	6-1/8-inch
Impedance	50-ohm	75-ohm
Dim. A	5.375-in (137-mm)	5.469-in (139-mm)
Dim. B	0.375-in (10-mm)	0.438-in (11-mm)
Dim. C	1.120-in (28-mm)	1.180-in (30-mm)
Dim. D	1.250-in (32-mm)	1.219-in (31-mm)
Dim. E	4.100-in (104-mm)	6.072-in (154-mm)



Adapter Inner Connectors 50-ohm to 51.5-ohm

Inner conductor adapter for interfacing 50-ohm to 51.5-ohm rigid transmission line.

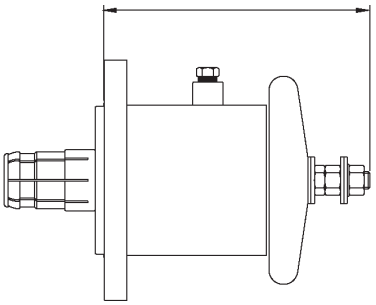
Part No.	Line Size	Description	Weight
RLA050-51.5	7/8-inch	Connects 7/8-inch, 50-ohm, to 7/8-inch, 51.5 ohm	0.1-lbm (0.05-kg)
RLA150-51.5	1-5/8-inch	Connects 1-5/8-inch, 50-ohm, to 1-5/8-inch, 51.5 ohm	0.2-lbm (0.1-kg)
RLA350-51.5	3-1/8-inch	Connects 3-1/8-inch, 50-ohm, to 3-1/8-inch, 51.5 ohm	1.0-lbm (0.5-kg)



End Terminals

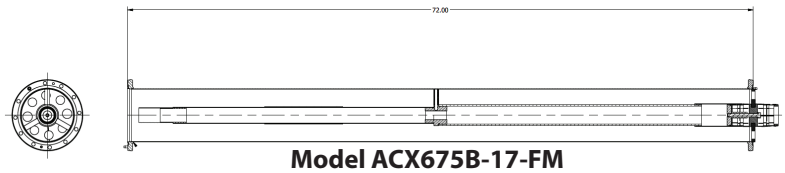
End terminal for strap connection, 50-ohm, gas tight with pressure port. Includes removable inner connector and one flange hardware kit with O ring.

Part No.	Line Size	Gas Port	DIM. "A"	Weight
RLA150-80	1-5/8-inch	Yes	3.750-in (95-mm)	2.3-lbm (1.0-kg)
RLA350-80	3-1/8-inch	Yes	4.800-in (122-mm)	6.3-lbm (2.9-kg)
RLA650-80	6-1/8-inch	Yes	4.900-in (124-mm)	12.0-lbm (5.4-kg)

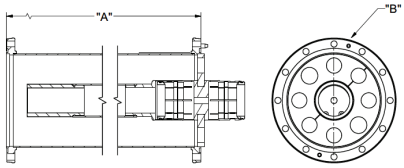


6-1/8-inch 50 to 75-ohm Impedance Transformers

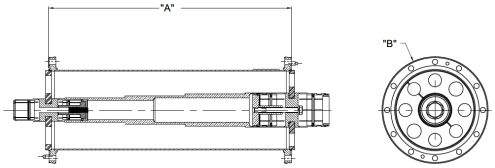
Connects 6-1/8-inch, 50-ohm, to 6-1/8-inch, 75-ohm transmission lines. Models are available for all television channels and the FM broadcast band.



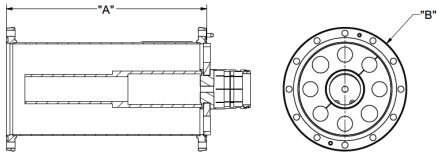
Model ACX675B-17-FM



Model ACX675B-17- (Channels 2 to 13)



Model ACX675B-17-W (Chanels 14 to 36)



Model ACX675B-17- (Channels 2 to 13)

50 to 75-ohm Impedance Transformer Specifications

Part No.	US RF Channel	Dim. "A"		Dim. "B"		Weight	
FM Band (88 to 108 MHz)							
ACX675B-FM	FM	72.00-in	(1829-mm)	8.166-in	(207-mm)	53-lbm	(23.8-kg)
FM 50 to 75-ohm impedance transformers include one (1) 6-1/8-inch, 50-ohm, captive inner connector and one (1) 6-1/8-inch flange hardware kit with O ring. 75-ohm connection is 6-1/8-inch, 75-ohm, EIA flanged, female. Return loss is -40 dB or better.							
Low Band VHF Television							
ACX675B-17-2	2	56.28-in	(1430-mm)	8.166-in	(207-mm)	45-lbm	(20.4-kg)
ACX675B-17-3	3	51.35-in	(1304-mm)	8.166-in	(207-mm)	42-lbm	(19.1-kg)
ACX675B-17-4	4	47.28-in	(1201-mm)	8.166-in	(207-mm)	40-lbm	(18.1-kg)
ACX675B-17-5	5	43.86-in	(1114-mm)	8.166-in	(207-mm)	38-lbm	(17.2-kg)
ACX675B-17-6	6	40.95-in	(1040-mm)	8.166-in	(207-mm)	36-lbm	(16.3-kg)
High Band VHF Television							
ACX675B-17-7	7	21.19-in	(538-mm)	8.166-in	(207-mm)	25-lbm	(11.3-kg)
ACX675B-17-8	8	20.64-in	(524-mm)	8.166-in	(207-mm)	25-lbm	(11.3-kg)
ACX675B-17-9	9	20.13-in	(511-mm)	8.166-in	(207-mm)	25-lbm	(11.3-kg)
ACX675B-17-10	10	19.65-in	(499-mm)	8.166-in	(207-mm)	25-lbm	(11.3-kg)
ACX675B-17-11	11	19.20-in	(488-mm)	8.166-in	(207-mm)	25-lbm	(11.3-kg)
ACX675B-17-12	12	18.77-in	(477-mm)	8.166-in	(207-mm)	25-lbm	(11.3-kg)
ACX675B-17-13	13	18.37-in	(467-mm)	8.166-in	(207-mm)	25-lbm	(11.3-kg)
VHF television 50 to 75-ohm impedance transformers include one (1) 6-1/8-inch, 50-ohm, removal inner connector and one (1) 6-1/8-inch flange hardware kit with O ring. 75-ohm connection is 6-1/8-inch, 75-ohm, EIA flanged, female. Return loss is - 40 dB or better.							
UHF Television							
ACX675B-17-*	14 to 26	13.22-in	(336-mm)	8.166-in	(207-mm)	22-lbm	(10.0-kg)
ACX675B-17-**	27 to 36	11.65-in	(296-mm)	8.166-in	(207-mm)	20-lbm	(9.1-kg)
UHF television 50 to 75-ohm impedance transformers include one (1) 6-1/8-inch, 50-ohm, fixed inner connector and one (1) 6-1/8-inch flange hardware kit with O ring. 75-ohm connection is 6-1/8-inch, 75-ohm, EIA flanged, female. Return loss is -40 dB or better. * RF Channel 14 to 26 ** RF Channel 27 to 36							
Wideband UHF Television							
ACX675B-17-W	14 to 36	18.73-in	(476-mm)	8.166-in	(207-mm)	26-lbm	(11.8-kg)
Wideband UHF television 50 to 75-ohm impedance transformers include one (1) 6-1/8-inch, 50-ohm, captive inner connector, one (1) captive 6-1/8-inch 75-ohm inner connector and one (1) 6-1/8-inch flange hardware kit with O ring. 75-ohm connection is 6-1/8-inch, 75-ohm, EIA flanged, male. Return loss is -35 dB or better at UHF channels.							

Hangers and Support Accessories

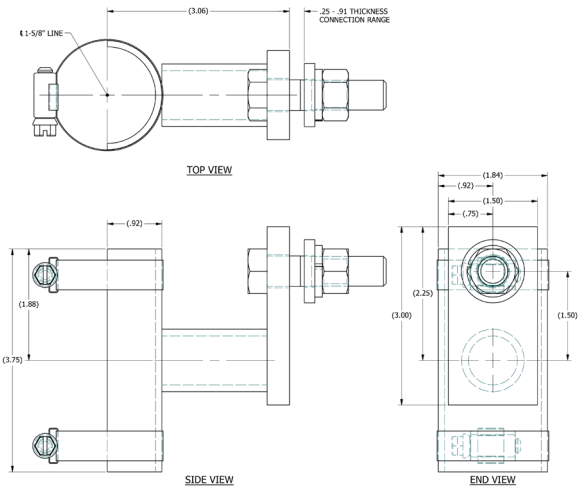
Rigid Line Vertical Hangers

Vertical Fixed Hangers

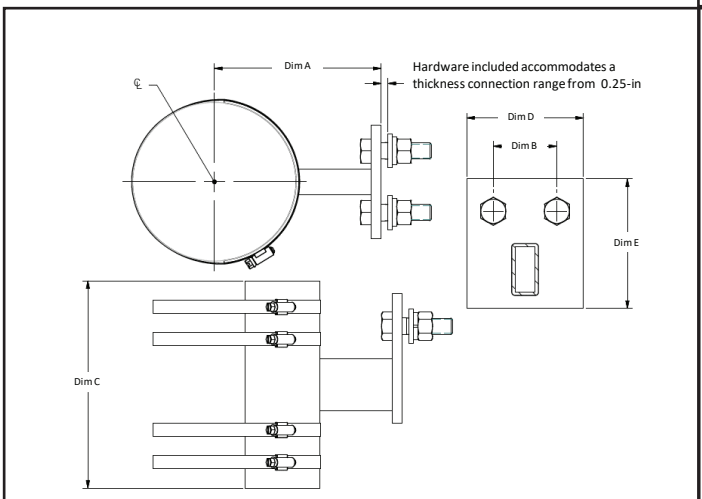
Rigid Line Fixed Hangers support the weight of the transmission line vertical run. Use two (2) at the tower top for up to 500-feet of vertical line. Add one additional fixed hanger at the tower top for each additional 500-feet of vertical run length.

All ERI rigid transmission line vertical fixed hangers are made with stainless steel.

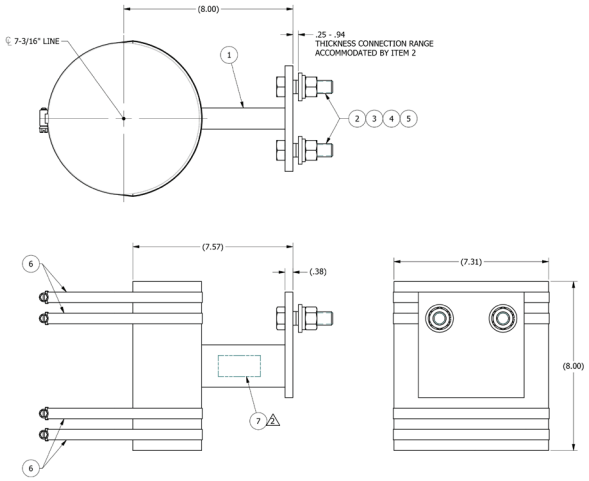
Mounting hardware included: 1/2-inch diameter hardware requires mounting to 9/16-inch diameter holes. 5/8-inch diameter hardware requires 11/16-inch diameter mounting holes. The RLA600-13-2 includes slotted mounting holes to accommodate 2-3/8-inch to 2-1/2-inch mounting hole spacing.



RLA100-13-2



RLA300-13-2, RLA400-13-2 and RLA600-13-2



RLA700-13-2 and RLA800-13-2

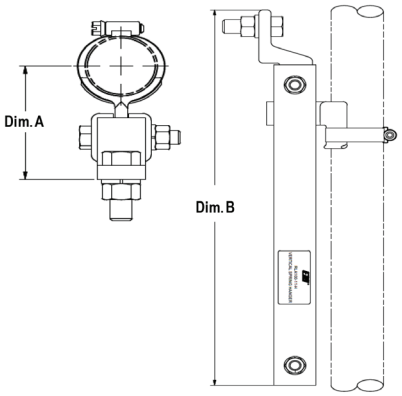
Vertical Fixed Hanger Specifications

Part No.	Line Size	Dim A	Dim B	Dim C	Dim D	Dim E	Weight	Attached Hardware
RLA100-13-2	1-5/8-inch	3.063-in (78-mm)	1.500-in (38-mm)	3.750-in (95-mm)	1.840-in (47-mm)	3.000-in (76-mm)	1.2-lbm (0.6-kg)	1/2-inch
RLA300-13-2	3-1/8-inch	4.125-in (105-mm)	2.250-in (57-mm)	8.000-in (203-mm)	4.250-in (108-mm)	5.000-in (127-mm)	4.8-lbm (2.2-kg)	1/2-inch
RLA400-13-2	4-1/16-inch	5.310-in (135-mm)	2.380-in (60-mm)	8.000-in (203-mm)	4.380-in (111-mm)	5.000-in (127-mm)	5.7-lbm (2.6-kg)	5/8-inch
RLA600-13-2	6-1/8-inch	6.250-in (159-mm)	2.375 - 2.500-in (60 - 64-mm)	8.000-in (203-mm)	4.380-in (111-mm)	5.000-in (127-mm)	6.2-lbm (2.8-kg)	5/8-inch
RLA700-13-2	7-3/16-inch	8.000-in (203-mm)	3.000-in (76-mm)	8.000-in (203-mm)	5.000-in (127-mm)	5.000-in (127-mm)	7.5-lbm (3.4-kg)	5/8-inch
RLA800-13-2	8-3/16-inch	8.000-in (203-mm)	3.000-in (76-mm)	8.000-in (203-mm)	5.000-in (127-mm)	5.000-in (127-mm)	7.8-lbm (3.5-kg)	5/8-inch

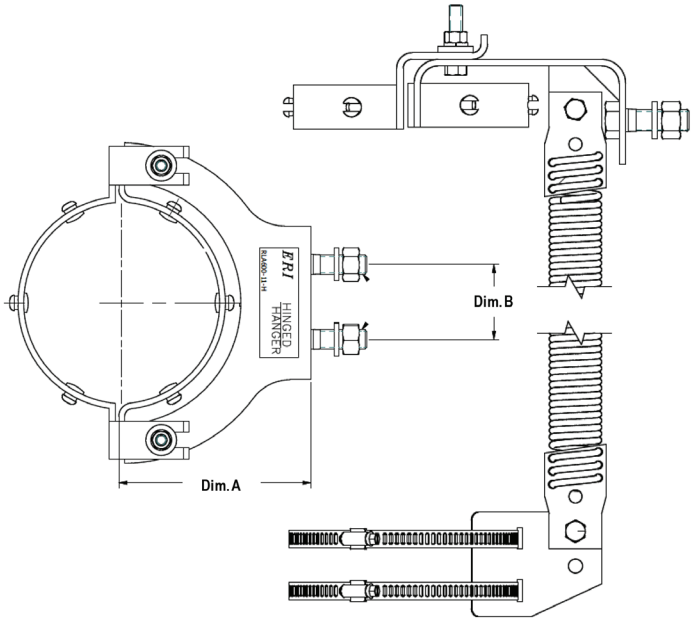
Vertical Spring Hangers

For ERI's 1-5/8-inch rigid line the vertical run supports the accommodate the differential expansion between the rigid line and the tower is provided by heavy duty RLA100-11-H vertical spring hangers spaced at 50-foot intervals below the two fixed hangers at the top of the run. For vertical runs that are less than 50-feet use one RLA100-11-H at the bottom of the vertical run. At 10-foot intervals between the spring hangers sliding hangers are used (see Part Number 14378 on next page). For vertical runs longer than 500-feet of 1-5/8-inch rigid line special hangers are required, contact ERI for more information.

For all other rigid coaxial line sizes ERI's offers its unique Hinged Vertical Spring Hanger, they support the transmission line vertical run while preventing lateral motion and accommodating differential expansion and contraction. For 3-1/8-inch and 4-1/16-inch rigid line one hanger and one vertical sliding ring is used on each line section. Transmission line systems of 6-1/8-inch, 7-3/16-inch and 8-3/16-inch rigid use two vertical spring hangers per line section for support. All vertical spring hangers and vertical sliding ring hangers are hinged to open from left or right side to save installation labor. Each hanger includes mounting hardware shown in the table below.



RLA100-11H



RLA300-11-H, RAL400-11-H, RLA600-11-H, RLA700-11-H

Vertical Spring Hanger Specifications

Part No.	Line Size	Dim A	Dim B	Dim C	Weight	Attached Hardware
RLA100-11-H	1-5/8-inch	3.063-in (78-mm)	14.060-in (357-mm)	0.130 - 0.700-in (3 - 18-mm)	3.2-lbm (1.5-kg)	1/2-inch
RLA300A-11-H	3-1/8-inch	4.125-in (105-mm)	2.250-in (57-mm)	0.130 - 0.690-in (3 - 18-mm)	6.4-lbm (2.9-kg)	1/2-inch
RLA400-11-H	4-1/16-inch	5.310-in (135-mm)	2.380-in (60-mm)	0.250 - 1.000-in (6 - 25-mm)	6.9-lbm (3.1-kg)	5/8-inch
RLA600-11-H	6-1/8-inch	6.250-in (159-mm)	2.375 - 2.500-in (60 - 64-mm)	0.250 - 1.000-in (6 - 25-mm)	9.3-lbm (4.2-kg)	5/8-inch
RLA700-11-H	7-3/16-inch	8.000-in (203-mm)	3.000-in (76-mm)	0.250 - 1.000-in (6 - 25-mm)	13.0-lbm (5.9-kg)	5/8-inch
RLA800-11-H	8-3/16-inch	8.000-in (203-mm)	3.000-in (76-mm)	0.250 - 1.000-in (6 - 25-mm)	13.7-lbm (6.2-kg)	5/8-inch

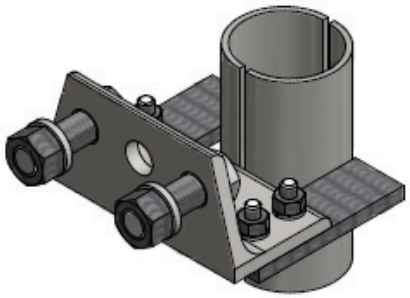
Vertical Sliding Hangers

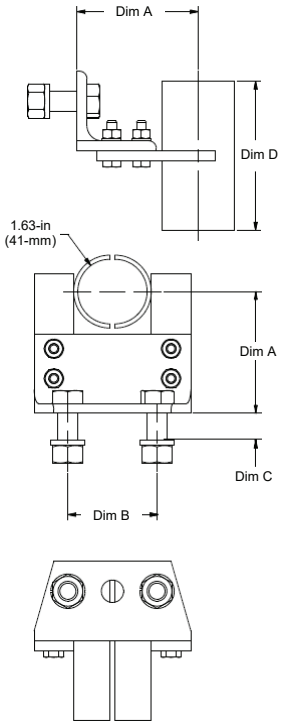
Smaller sizes of ERI rigid transmission line, including 1-5/8-inch, 3-1/18-inch and 4-1/16-inch use a combination of vertical spring hangers and vertical sliding rings to support their vertical runs.

For 1-5/8-inch rigid transmission line Part Number 14378-2 Vertical Sliding Hangers are installed at 10-foot (3-meter) intervals between the vertical fixed hangers and the vertical spring hangers. The hanger includes three 9/16-inch attachment holes and 1/2-inch hardware for up to two attachment points.

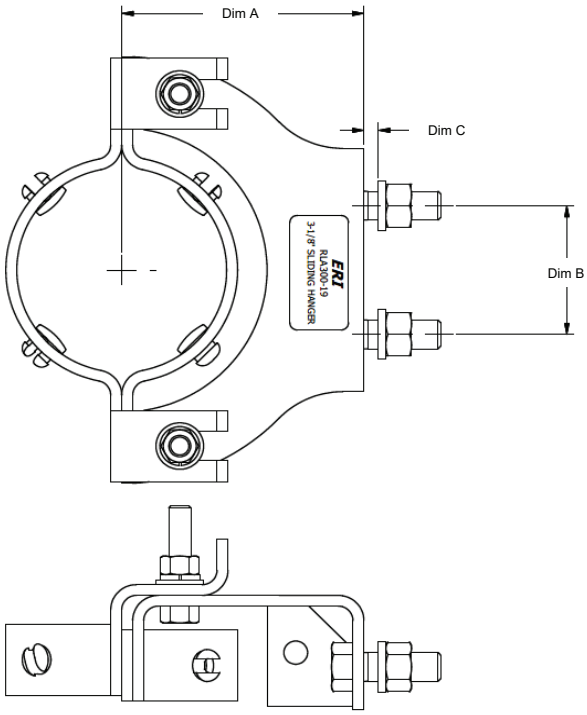
For 3-1/8-inch and 4-1/16-inch rigid transmission lines the vertical sliding hangers should be used at 10-foot intervals along the vertical run between vertical spring hangers. ERI's vertical sliding hangers use the same hinged closure used in ERI's vertical spring hangers. These hangers are hinged to open from the left or right side to save installation labor and time.

These sliding hangers prevents lateral motion and accommodate differential expansion and contraction. Each hanger includes mounting hardware shown in the table below.





14378-2 1-5/8-inch Vertical Sliding Hanger



RLA300-19 and RLA400-19 Vertical Sliding Hanger

Vertical Sliding Hanger Specifications

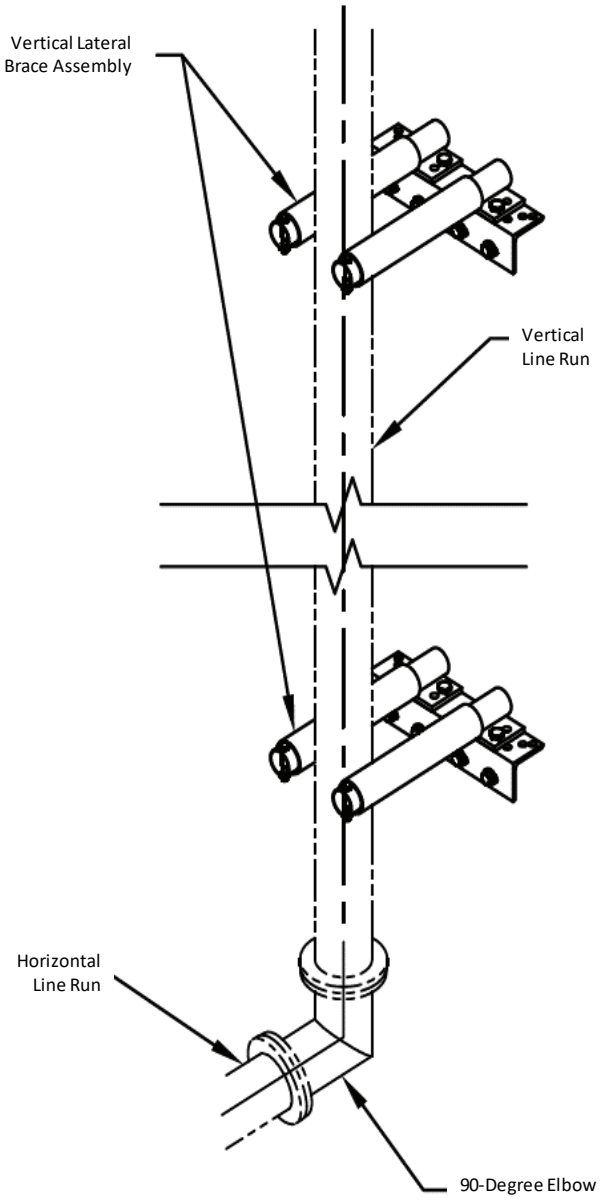
Part No.	Line Size	Dim A	Dim B	Dim C	Dim D	Weight	Attached Hardware
14378-2	1-5/8-inch	3.063-in (78-mm)	2.250-in (57-mm)	0.130 - 0.690-in (3 - 18-mm)	3.750-in (95-mm)	3.0-lbm (1.4-kg)	1/2-inch
RLA300-19	3-1/8-inch	4.125-in (105-mm)	2.250-in (57-mm)	0.130 - 0.690-in (3 - 18-mm)		2.7-lbm (1.2-kg)	1/2-inch
RLA400-19	4-1/16-inch	5.310-in (135-mm)	2.380-in (60-mm)	0.250 - 1.000-in (6 - 25-mm)		3.2-lbm (1.5-kg)	5/8-inch

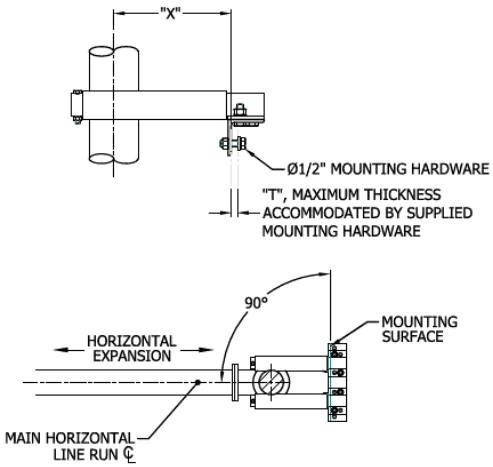
Minimum Distance to the Lowest Vertical Spring Hanger or Vertical Sliding Hanger

Horizontal Run Length	Copper Outer Conductor Rigid Line		Aluminum Outer Conductor Rigid Line	
Up to 100-feet (30.5-meters)	16.0-feet	(4.9-meters)	24.0-feet	(7.3-meters)
101-feet to 200-feet (30.6-meters to 61.0-meters)	32.0-feet	(9.8-meters)	48.0-feet	(14.6-meters)

Vertical Lateral Braces

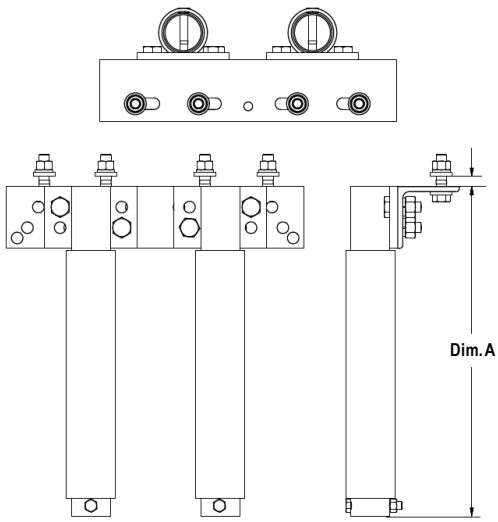
The Vertical Lateral Brace is an innovative unique product manufactured by ERI. These braces are used at the base of vertical run to prevent lateral motion and are universal with adjustments to accommodate all rigid transmission line sizes from 3-1/8-inch through 8-3/16-inch. Use two (2) vertical lateral guides equally spaced between the lowest vertical spring or sliding hanger and elbow at the base of the vertical run. Includes 1/2-inch mounting hardware.





Line Size	Dim X	
3-1/8-inch	4.130-in	(105-mm)
4-1/16-inch	5.310-in	(135-mm)
6-1/8-inch	6.250-in	(159-mm)
7-3/16-inch	8.000-in	(203-mm)
8-3/16-inch	8.000-in	(203-mm)

The line settings above are for horizontal transmission line runs up to 200-feet (61-meters).



Vertical Lateral Brace Specifications

Part No.	Dim A	Dim B	Dim C	Dim D	Weight	Attached Hardware
RLA000-01VLB	13.000-in (330-mm)	0.060 - 0.750-in (2 - 19-mm)	5.510-in (140-mm)	14.500-in (368-mm)	11.2-lbm (5.1-kg)	1/2-inch

Rigid Line Horizontal Hangers

ERI provides a unique Horizontal Hanger System which uses components that are compatible with all rigid transmission line sizes from 3-1/8-inch through 8-3/16-inch. The system uses a Universal Horizontal Hanger Bracket and interchangeable Hanger Springs, Fixed Hanger Rods and a Universal Horizontal Lateral Brace. The system is engineered to allow many different support configurations and is particularly useful when adding new transmission lines to towers with multiple existing transmission line already installed under the transmission line bridge.

Minimum Horizontal Run Length

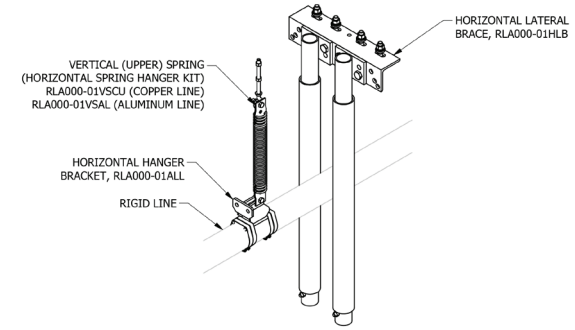
The entire length of the Minimum Horizontal Run length should be supported be horizontal spring hanger to accommodate differential expansion, beyond that length fixed hangers may be used. The Minimum Horizontal Run length should be the greater of 20-feet (6.1-meters) or:

Line Size	Copper Outer Conductor Rigid Line	Aluminum Outer Conductor Rigid Line
3-1/8-inch and 4-1/16-inch	4% of Vertical Run Height	7% of Vertical Run Height
6-1/8-inch	6% of Vertical Run Height	10% of Vertical Run Height
7-3/16-inch and 8-3/16-inch	6% of Vertical Run Height	---

Universal Horizontal Hanger System

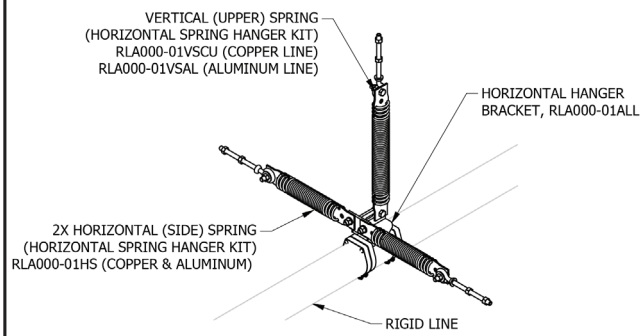
The ERI horizontal transmission line support system is made up of four (4) components that can be used to accommodate many different installation configurations. This system is particularly useful when adding new transmission line to an already crowded structure and in systems that use more than one transmission line to feed dual input FM and television master antennas. The components include the Universal Horizontal Hanger Bracket is compatible with all rigid transmission line sizes from 3-1/8-inch through 8-3/16-inch. It includes a stainless steel bracket and stainless steel hose clamps for all these transmission line sizes. The brackets accept a variety of accessory supports including Horizontal Vertical Support Springs, Horizontal Side Springs, Horizontal Fixed Supports. The separate Horizontal Lateral Brace assembly provides support to prevent lateral motion of the transmission line when the Universal Horizontal Hanger Bracket is used in single point mounting configurations.

Single Point Horizontal Spring Hanger



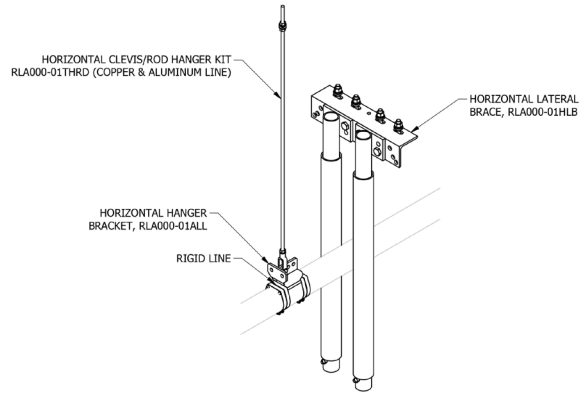
This configuration requires one (1) RLA000-01ALL Universal Horizontal Hanger Bracket and one (1) RLA000-01VSxx(xx="CU" for Copper Outer Conductor Line or xx="AL" for Aluminum Outer Conductor Line) Horizontal Vertical Spring. The horizontal hanger spacing should be an average of 480-inches (12,192-mm) for 3-1/8 and 4-1/16-inch Aluminum Outer Conductor Rigid Line, 240-inches (6,096-mm) for 3-1/8 and 4-1/16-inch Copper Outer Conductor or 6-1/8-inch Aluminum Outer Conductor Rigid Line and 120-inches (3,048-mm) 6-1/8, 7-3/16 and 8-3/17-inch Copper outer Conductor Rigid Line. In addition, an RLA000-01HLB Horizontal Lateral Brace to prevent lateral motion should be installed every 240-inches (6,096-mm) for the entire length of the horizontal run.

Three Point Horizontal Spring Hanger



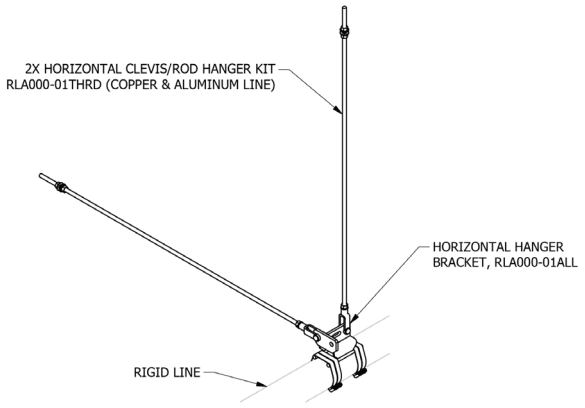
This configuration requires one (1) RLA000-01ALL Universal Horizontal Hanger Bracket, one (1) RLA000-01VSxx (xx="CU" or Copper Outer Conductor Line or xx="AL" for Aluminum Outer Conductor Line) Horizontal Vertical Spring and two (2) RLA000-1HS Horizontal Side Springs. The horizontal hanger spacing should be an average of 480-inches (12,192-mm) for 3-1/8 and 4-1/16-inch Aluminum Outer Conductor Rigid Line, 240-inches (6,096-mm) for 3-1/8 and 4-1/16-inch Copper Outer Conductor or 6-1/8-inch Aluminum Outer Conductor Rigid Line and 120-inches (3,048-mm) 6-1/8, 7-3/16 and 8-3/17-inch Copper outer Conductor Rigid Line. When this configuration is used the RLA000-01HLB Horizontal Lateral Brace to prevent lateral motion is not required.

Single Point Horizontal Fixed Hanger



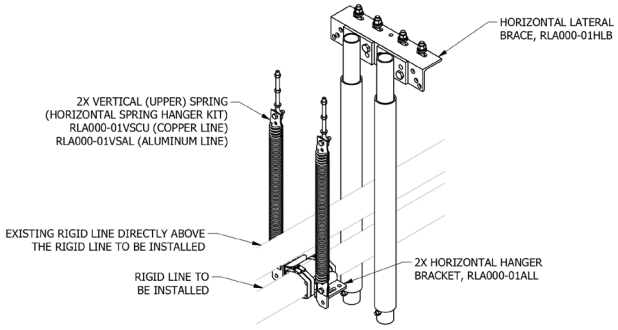
This configuration requires one (1) RLA000-01ALL Universal Horizontal Hanger Bracket and one (1) RLA000-01THRD Horizontal Clevis/Rod Hanger Kit. The horizontal hanger spacing should be an average of every 120-inches (3,048-mm) for all rigid line sizes and types. In addition, an RLA000-01HLB Horizontal Lateral Brace to prevent lateral motion should be installed every 240-inches (6,096-mm) for the entire length of the horizontal run.
NOTE: Horizontal fixed hangers should only be installed beyond the minimum horizontal run length (see table page 63).

Two Point Horizontal Fixed Hanger



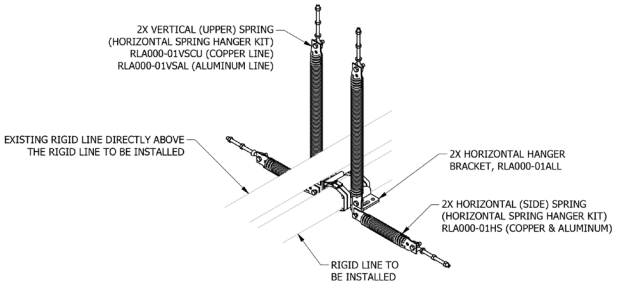
This configuration requires one (1) RLA000-01ALL Universal Horizontal Hanger Bracket and two (2) RLA000-01THRD Horizontal Clevis/Rod Hanger Kit. The horizontal hanger spacing should be an average of every 120-inches (3,048-mm) for all rigid line sizes and types. When this configuration is used the RLA000-01HLB Horizontal Lateral Brace to prevent lateral motion is not required. NOTE: Horizontal fixed hangers should only be installed beyond the minimum horizontal run length (see table page 63).

Two Point Horizontal Spring Hanger



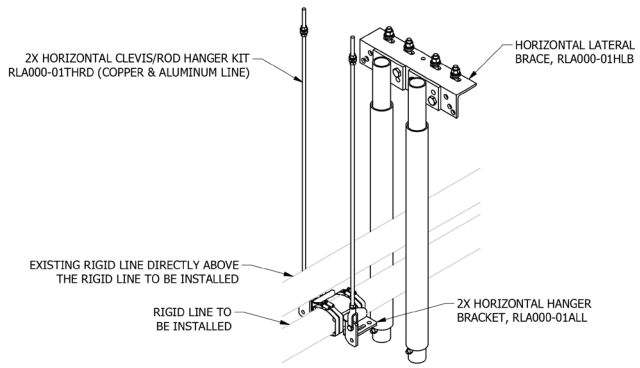
This configuration requires two (2) RLA000-01ALL Universal Horizontal Hanger Bracket and two (2) RLA000-01VSxx(xx="CU" for Copper Outer Conductor Rigid Line or xx="AL" for Aluminum Outer Conductor Rigid Line) Horizontal Vertical Spring. The horizontal hanger spacing should be an average of 480-inches (12,192-mm) for 3-1/8 and 4-1/16-inch Aluminum Outer Conductor Rigid Line, 240-inches (6,096-mm) for 3-1/8 and 4-1/16-inch Copper Outer Conductor or 6-1/8-inch Aluminum Outer Conductor Rigid Line and 120-inches (3,048-mm) 6-1/8, 7-3/16 and 8-3/17-inch Copper outer Conductor Rigid Line. In addition, an RLA000-01HLB Horizontal Lateral Brace to prevent lateral motion should be installed every 240-inches (6,096-mm) for the entire length of the horizontal run.

Two Point Horizontal Spring Hanger



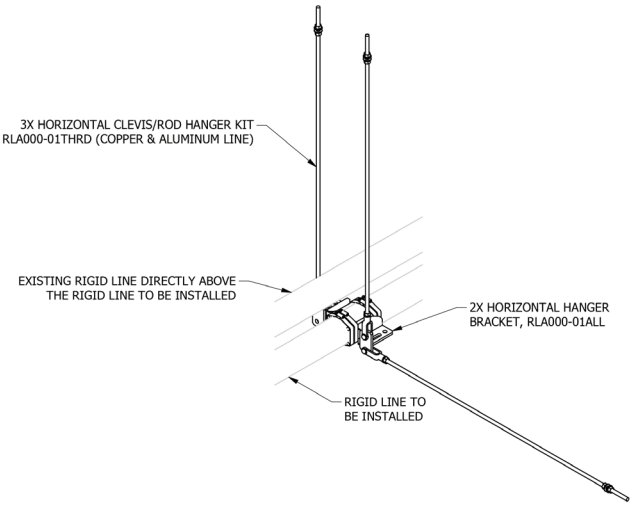
This configuration requires two (2) RLA000-01ALL Universal Horizontal Hanger Bracket, two (2) RLA000-01VSxx (xx="CU" for Copper Outer Conductor Rigid Line or xx="AL" for Aluminum Outer Conductor Rigid Line) Horizontal Vertical Spring and two (2) RLA000-1HS Horizontal Side Springs. The horizontal hanger spacing should be an average of 480-inches (12,192-mm) for 3-1/8 and 4-1/16-inch Aluminum Outer Conductor Rigid Line, 240-inches (6,096-mm) for 3-1/8 and 4-1/16-inch Copper Outer Conductor or 6-1/8-inch Aluminum Outer Conductor Rigid Line and 120-inches (3,048-mm) 6-1/8, 7-3/16 and 8-3/17-inch Copper outer Conductor Rigid Line.

Two Point Horizontal Fixed Hanger

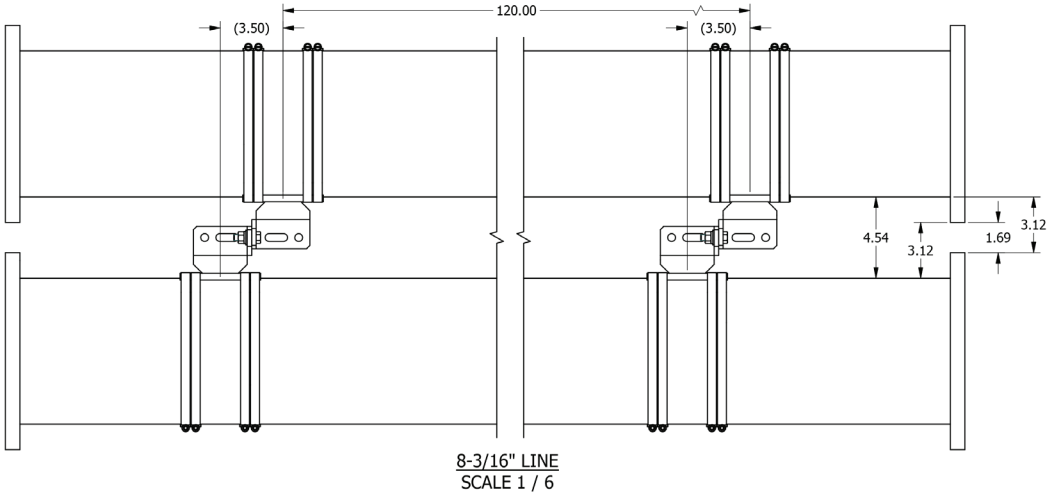


This configuration requires two (2) RLA000-01ALL Universal Horizontal Hanger Bracket and two (2) RLA000-01THRD Horizontal Clevis/Rod Hanger Kit. The horizontal hanger spacing should be an average of every 120-inches (3,048-mm) for all rigid line sizes and types. In addition, an RLA000-01HLB Horizontal Lateral Brace to prevent lateral motion should be installed every 240-inches (6,096-mm) for the entire length of the horizontal run. NOTE: Horizontal fixed hangers should only be installed beyond the minimum horizontal run length (see table page 63).

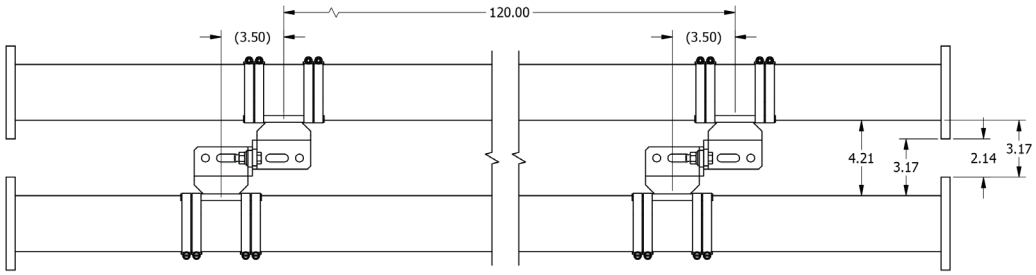
Three Point Horizontal Fixed Hanger



This configuration requires two (2) RLA000-01ALL Universal Horizontal Hanger Bracket and three (3) RLA000-01THRD Horizontal Clevis/Rod Hanger Kit. The horizontal hanger spacing should be an average of every 120-inches (3,048-mm) for all rigid line sizes and types. When this configuration is used the RLA000-01HLB Horizontal Lateral Brace to prevent lateral motion is not required. NOTE: Horizontal fixed hangers should only be installed beyond the minimum horizontal run length (see table page 63).



8-3/16" LINE
SCALE 1 / 6

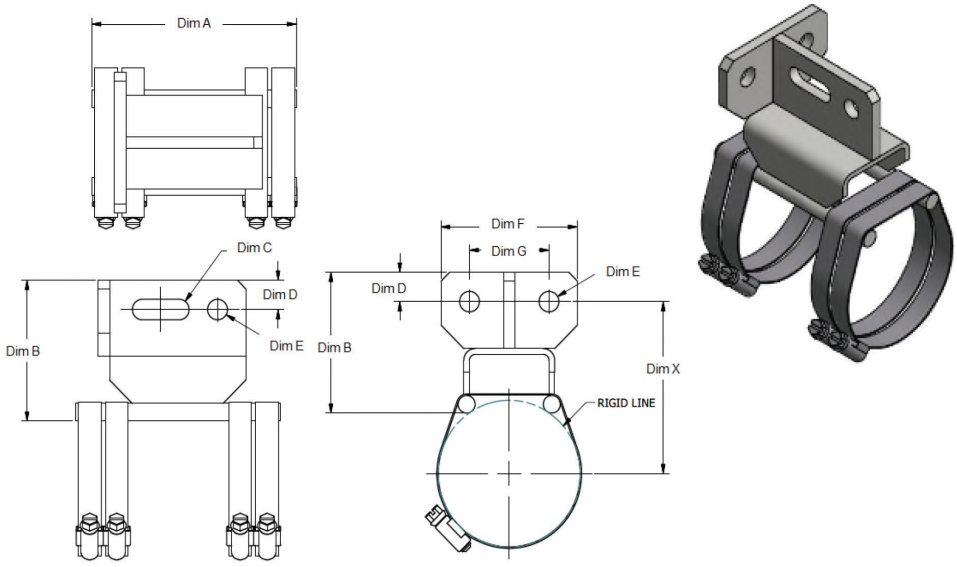


3-1/8" LINE
SCALE 1 / 6

RLA000-01ALL Horizontal Hanger Brackets configured to support two transmission lines side by side.

Universal Horizontal Hanger Brackets

The Universal Horizontal Hanger Bracket includes the bracket assembly and a quantity of four (4) HC0062 Stainless Steel Hose Clamps (2.500-in (64-mm) to 4.500-in (114-mm)) for 3-1/8-inch and 4-1/16 rigid transmission lines and four (4) HC0128 Stainless Steel Hose Clamps (2.500-in (64-mm) to 8.500-in (216-mm)) for 6-1/8-inch, 7-3/16-inch and 8-3/16-inch rigid lines. This bracket is used in combination with the RLA000-01VSCU Horizontal Vertical Spring for Copper Outer Conductor Rigid Line or the RLA000-01VSAL Horizontal Vertical Spring for Aluminum Outer Conductor Rigid Line to provide vertical support for the weight of the horizontal run while allowing the differential expansion of the vertical transmission line run. lateral support is provided by adding two (2) RLA000-1HS Horizontal Side Springs or using the RLA000-01HLB Horizontal Lateral Brace. The horizontal hanger spacing should be an average of 480-inches (12,192-mm) for 3-1/8 and 4-1/16-inch Aluminum Outer Conductor Rigid Line, 240-inches (6,096-mm) for 3-1/8 and 4-1/16-inch Copper Outer Conductor or 6-1/8-inch Aluminum Outer Conductor Rigid Line and 120-inches (3,048-mm) 6-1/8, 7-3/16 and 8-3/17-inch Copper outer Conductor Rigid Line. In addition, an RLA000-01HLB Horizontal Lateral Brace to prevent lateral motion should be installed every 240-inches (6,096-mm) for the entire length of the horizontal run. Beyond the length of Minimum Horizontal Run (see Table on Page 62) the Universal Horizontal Hanger Bracket can be used with the RLA000-01THRD Horizontal Clevis/Rod Hanger Kit. The horizontal hanger spacing should average of every 120-inches (3,048-mm) for all rigid line sizes and types. In addition, an RLA000-01HLB Horizontal Lateral Brace to prevent lateral motion should be installed every 240-inches (6,096-mm) for the entire length of the horizontal run if no other lateral support is provided by Horizontal Side Springs or Horizontal Clevis/Rod Kits.

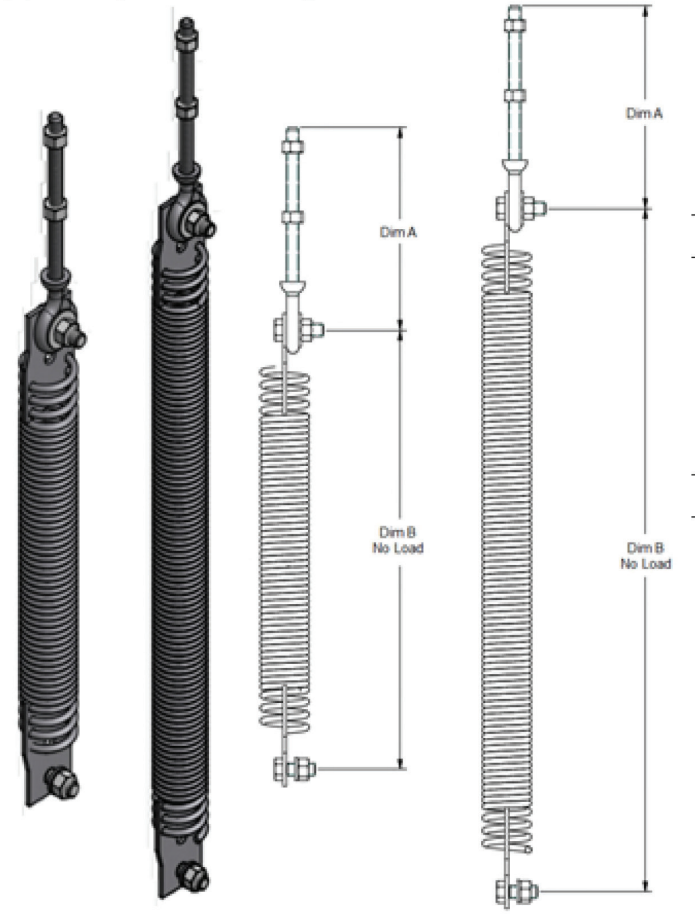


Universal Horizontal Hanger Bracket Specifications

Part No.	RLA000-01ALL				
Dim A	4.500-in	(114-mm)	Line Size	Dim X	
Dim B	3.000-in	(76-mm)	3-1/8-inch	3.670-in	(93-mm)
Dim C	0.44 x 1.25-in	11 x 32-mm	4-1/16-inch	4.200-in	(107-mm)
Dim D	0.625-in	(16-mm)	6-1/8-inch	5.300-in	(135-mm)
Dim E	0.440-in	(11-mm)	7-3/16-inch	5.830-in	(148-mm)
Dim F	3.000-in	(76-mm)	8-3/16-inch	6.350-in	(161-mm)
Dim G	1.750-in	(44-mm)			
Weight	1.6-lbm	(0.7-kg)			

Horizontal Vertical Springs

The Horizontal Vertical Spring comes in two (2) versions the RLA000-01VSCU for Copper Outer Conductor Rigid Line and the RLA000-01VSAL for Aluminum Outer Conductor Rigid Line. These are used in combination with the RLA000-01ALL Universal Horizontal Hanger Bracket to provide vertical support for the weight of the horizontal run while allowing the differential expansion of the vertical transmission line run, lateral support is provided by adding two (2) RLA000-1HS Horizontal Side Springs or using the RLA000-01HLB Horizontal Lateral Brace. The horizontal hanger spacing should be an average of 480-inches (12,192-mm) for 3-1/8 and 4-1/16-inch Aluminum Outer Conductor Rigid Line, 240-inches (6,096-mm) for 3-1/8 and 4-1/16-inch Copper Outer Conductor or 6-1/8-inch Aluminum Outer Conductor Rigid Line and 120-inches (3,048-mm) 6-1/8, 7-3/16 and 8-3/16-inch Copper outer Conductor Rigid Line. In addition, an RLA000-01HLB Horizontal Lateral Brace to prevent lateral motion should be installed every 240-inches (6,096-mm) for the entire length of the horizontal run.



Horizontal Vertical Spring Specifications

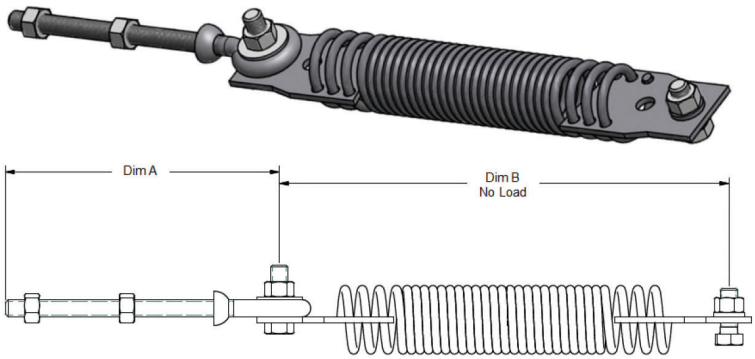
Part No.	RLA000-01VSCU
Line Type	Copper Outer
Dim A	6.000-in (152-mm)
Dim B	13.400-in (340-mm)
Weight	2.4-lbm (1.1-kg)
Attachment Hardware	3/8-inch

Part No.	RLA000-01VSAL
Line Type	Aluminum Outer
Dim A	6.000-in (152-mm)
Dim B	20.500-in (521-mm)
Weight	3.6-lbm (1.6-kg)
Attachment Hardware	3/8-inch

Horizontal Side Springs

The Horizontal Side Spring, Part Number RLA000-01HS are used in pairs (two (2)) in combination with the RLA000-01ALL Universal Horizontal Hanger Bracket and the RLA000-01VSCU Horizontal Vertical Spring for Copper Outer Conductor Rigid Line or the RLA000-01VSAL Horizontal Vertical Spring for Aluminum Outer Conductor Rigid Line to provide lateral support to the horizontal transmission line run while allowing the differential expansion of the vertical transmission line run. The horizontal hanger spacing should be an average of 480-inches (12,192-mm) for 3-1/8 and 4-1/16-inch Aluminum Outer Conductor Rigid Line, 240-inches (6,096-mm) for 3-1/8 and 4-1/16-inch Copper Outer Conductor or 6-1/8-inch Aluminum Outer Conductor Rigid Line and 120-inches (3,048-mm) 6-1/8, 7-3/16 and 8-3/17-inch Copper outer Conductor Rigid Line. When this configuration is used the RLA000-01HLB Horizontal Lateral Brace to prevent lateral motion is not required.

Rigid Line. When this configuration is used the RLA000-01HLB Horizontal Lateral Brace to prevent lateral motion is not required.

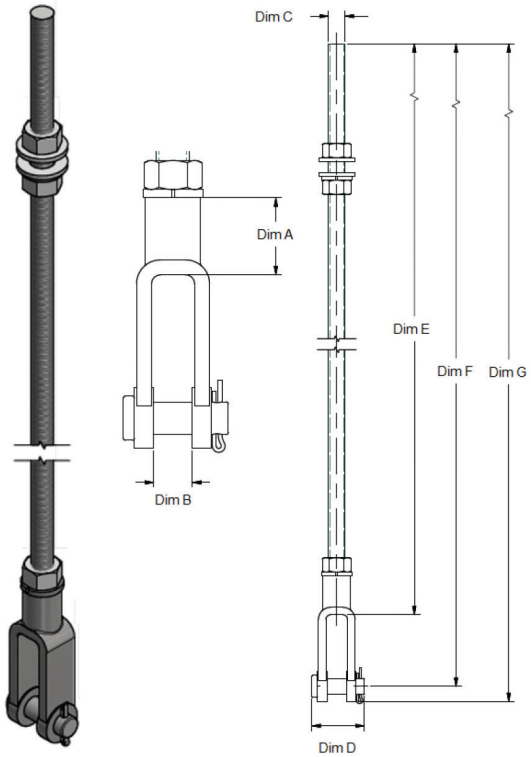


Horizontal Side Spring Specifications

Part No.	RLA000-01HS
Dim A	6.000-in (152-mm)
Dim B	9.600-in (244-mm)
Weight	1.8-lbm (0.8-kg)
Attachment Hardware	3/8-inch

Horizontal Clevis Rod Kits

The Horizontal Clevis Rod Kit, Part Number RLA000-01THRD are used in combination with the RLA000-01ALL Universal Horizontal Hanger Bracket to provide vertical support for the weight of the horizontal run while allowing expansion and contraction of the horizontal run. They are to be used beyond the length of Minimum Horizontal Run (see Table on Page 62). A second Horizontal Clevis Rod Kit can be installed horizontally to provide the required lateral support to the horizontal transmission line run while allowing the differential expansion of the horizontal transmission line run. When this configuration is used the RLA000-01HLB Horizontal Lateral Brace to prevent lateral motion is not required. The horizontal hanger spacing should be an average of every 120-inches (3,048-mm) for all copper outer conductor rigid line sizes and 240-inches (6,096-mm) for all aluminum outer conductor rigid line. In cases were a horizontal rod cannot be installed an RLA000-01HLB Horizontal Lateral Brace can be used to prevent lateral motion and should be installed every 240-inches (6,096-mm) for the entire length of the horizontal run if no other lateral support is provided by Horizontal Side Springs or Horizontal Clevis Rod Kits.

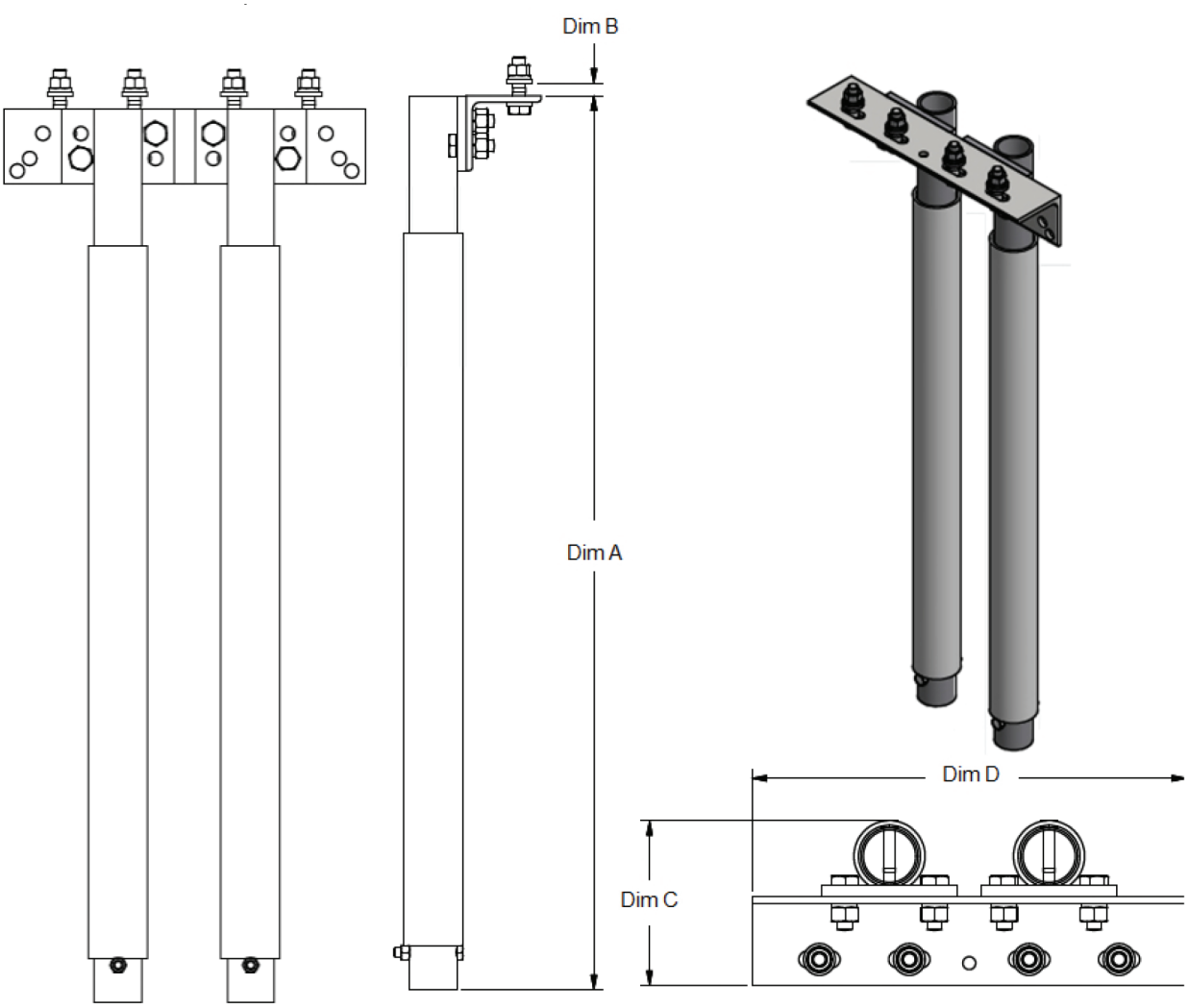


Horizontal Clevis/Rod Kit Specifications

Part No.	RLA000-01THRD	
Dim A	0.880-in	(22-mm)
Dim B	0.440-in	(11-mm)
Dim C	0.380-in	(10-mm)
Dim D	1.190-in	(30-mm)
Dim E	36.000-in	(914-mm)
Dim F	37.630-in	(956-mm)
Dim G	37.970-in	(964-mm)
Weight	1.4-lbm	(0.6-kg)
Attachment Hardware	3/8-inch	

Horizontal Lateral Braces

The Horizontal Lateral Brace, Part Number RLA000-01HLB are used in combination with the RLA000-01ALL Universal Horizontal Hanger Bracket to provide lateral support to the horizontal run of transmission line run while allowing expansion and contraction of both the vertical and horizontal run. They can be used with both Horizontal Vertical Spring Hanger and Horizontal Fixed Hangers and provide lateral support for the single point attachment configurations of both types. The Horizontal Lateral Brace spacing should be an average of every 240-inches (6,096-mm) for all rigid line sizes and types. If other lateral support is provided in the horizontal run by Horizontal Side Springs or Horizontal Clevis/Rod Kits, then a Horizontal Lateral Brace is not required.

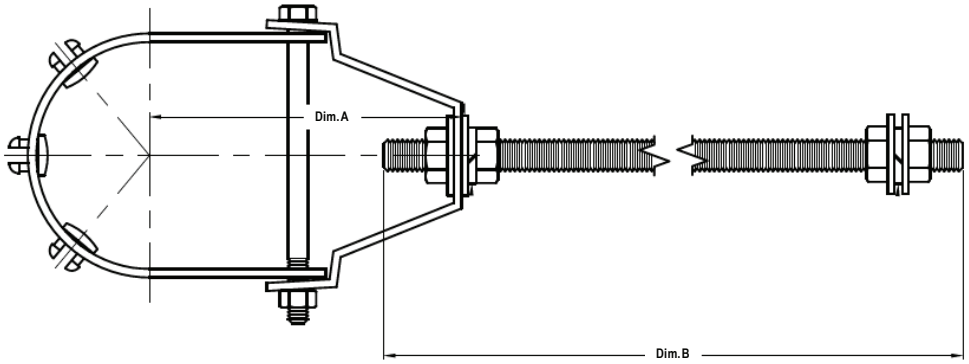


Vertical Lateral Brace Specifications

Part No.	Dim A	Dim B	Dim C	Dim D	Dim E	Weight	Attached Hardware
RLA000-01HLB	32.750-in (832-mm)	0.060 - 0.750-in (2 - 19-mm)	35.810-in (910-mm)	5.510-in (140-mm)	14.500-in (368-mm)	17.8-lbm (8.1-kg)	1/2-inch

Horizontal Slip Hangers

For indoor use only. Supports horizontal transmission line runs accommodates lateral motion due to expansion and contraction. Includes threaded rod and hardware to allow height adjustment.

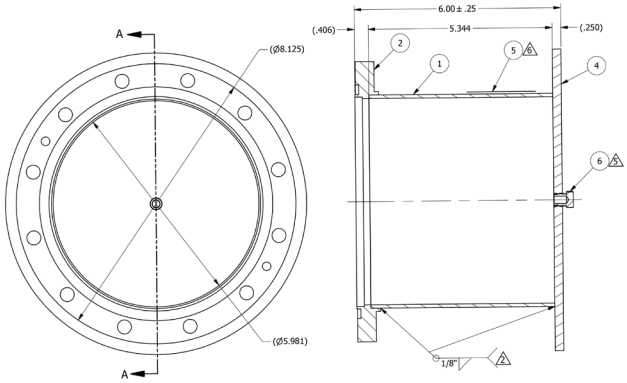


RLAx00-22A Horizontal Sliding Hanger

Unflanged Coupling Specifications

Part No.	Line Size	Dim A		Dim B		Weight		Attachment of Hardware
RLA100-22A	1-5/8-inch	3.000-in	(76-mm)	36.000-in	(914-mm)	1.8-lbm	(0.8-kg)	3/8-inch
RLA300-22A	3-1/8-inch	4.880-in	(124-mm)	36.000-in	(914-mm)	2.0-lbm	(0.9-kg)	1/2-inch
RLA400-22A	4-1/16-inch	5.500-in	(140-mm)	36.000-in	(914-mm)	2.2-lbm	(1.0-kg)	1/2-inch
RLA600B-22A	6-1/8-inch	6.940-in	(176-mm)	36.000-in	(914-mm)	3.8-lbm	(1.7-kg)	1/2-inch
RLA700-22A	7-3/16-inch	8.380-in	(213-mm)	36.000-in	(914-mm)	11.0-lbm	(5.0-kg)	1/2-inch
RLA800-22A	8-3/16-inch	8.380-in	(213-mm)	36.000-in	(914-mm)	11.0-lbm	(5.0-kg)	1/2-inch

End Caps



End caps are used during installation to allow pressurizing transmission line runs during installation, when installation is interrupted by weather or to allow pressurization of rigid line runs that are temporarily not in use. End caps include a 1/8-inch NPFT pipe plug which can be replaced with a gas inlet valve to allow connection to a dry air or nitrogen source.

End Cap Specifications

Part No.	Line Size	Dim A		Dim B		Weight	
RLA300A-50	3-1/8-inch	5.180-in	(132-mm)	3.750-in	(95-mm)	4.0-lbm	(1.8-kg)
RLA400-50	4-1/16-inch	6.188-in	(157-mm)	4.125-in	(105-mm)	5.2-lbm	(2.4-kg)
RLA600B-50	6-1/8-inch	8.120-in	(206-mm)	6.000-in	(152-mm)	11.3-lbm	(5.1-kg)
RLA700-50	7-3/16-inch	9.500-in	(241-mm)	6.000-in	(152-mm)	19.0-lbm	(8.6-kg)
RLA800B-50	8-3/16-inch	11.000-in	(279-mm)	6.000-in	(152-mm)	21.0-lbm	(9.5-kg)

Rigid Transmission Line Installation Tool Kit

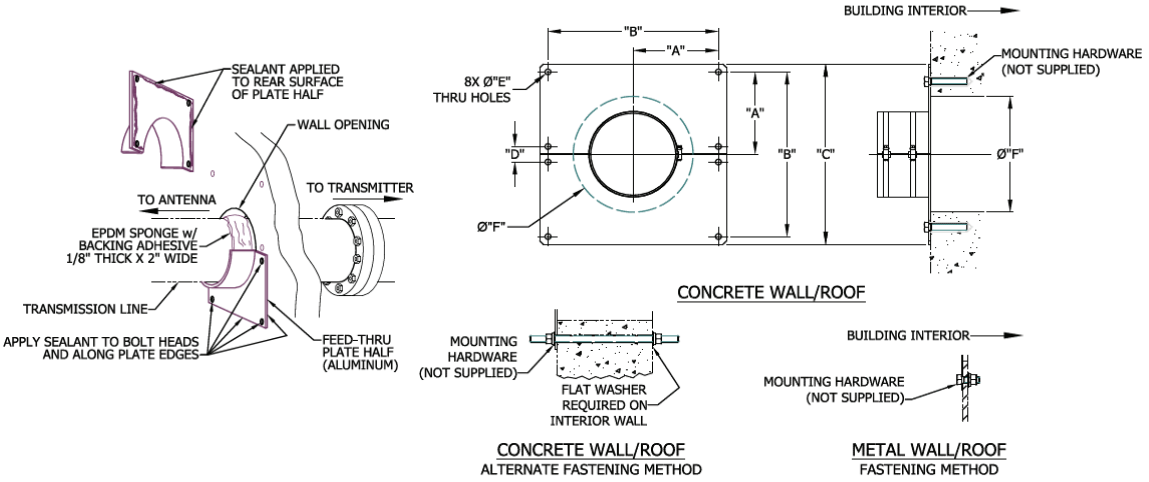
The MACX-TK MACXLine Installation Tool Kit contains all of the specialty tools required to install copper outer conductor rigid transmission line.

Part No.	Descriptions
MACX-TK	MACXLine Installation Tool Kit. Contains all unique tools necessary to assemble MACXLine and 1329Line transmission line systems. Includes: 5 Packages of assorted grit garnet paper. 3/8-inch drive torque wrench 2-Piece strap wrench set 5/16-inch hex bit socket 5/32-inch hex bit socket Tool box

Wall Roof Feed Thru Plates

Wall/Roof Feed Thru Plates are split aluminum plates that accommodate passage of a section of copper or aluminum rigid transmission line through the metal or concrete wall or roof of the transmitter equipment building. The two piece plate is supplied with EPDM weatherproofing sponge with backing and provides for proper weather sealing of the line to the building. Eight (8) (Four (4) in the RLA100-15) mounting holes are sized, refer to dimension "E" in table, for 3/8-inch or ½-inch mounting hardware (customer supplied).

Accurately determine the entry point where the rigid line penetrates the structure. Cut out the designated area at the point of entry, refer to dimension "F" in table. Insert a single rigid line section through the entry opening. Complete both the exterior and interior installation of horizontal rigid line run. Ensure that the rigid line is suspended at the point of entry and not resting on either the top or bottom of the entry opening.



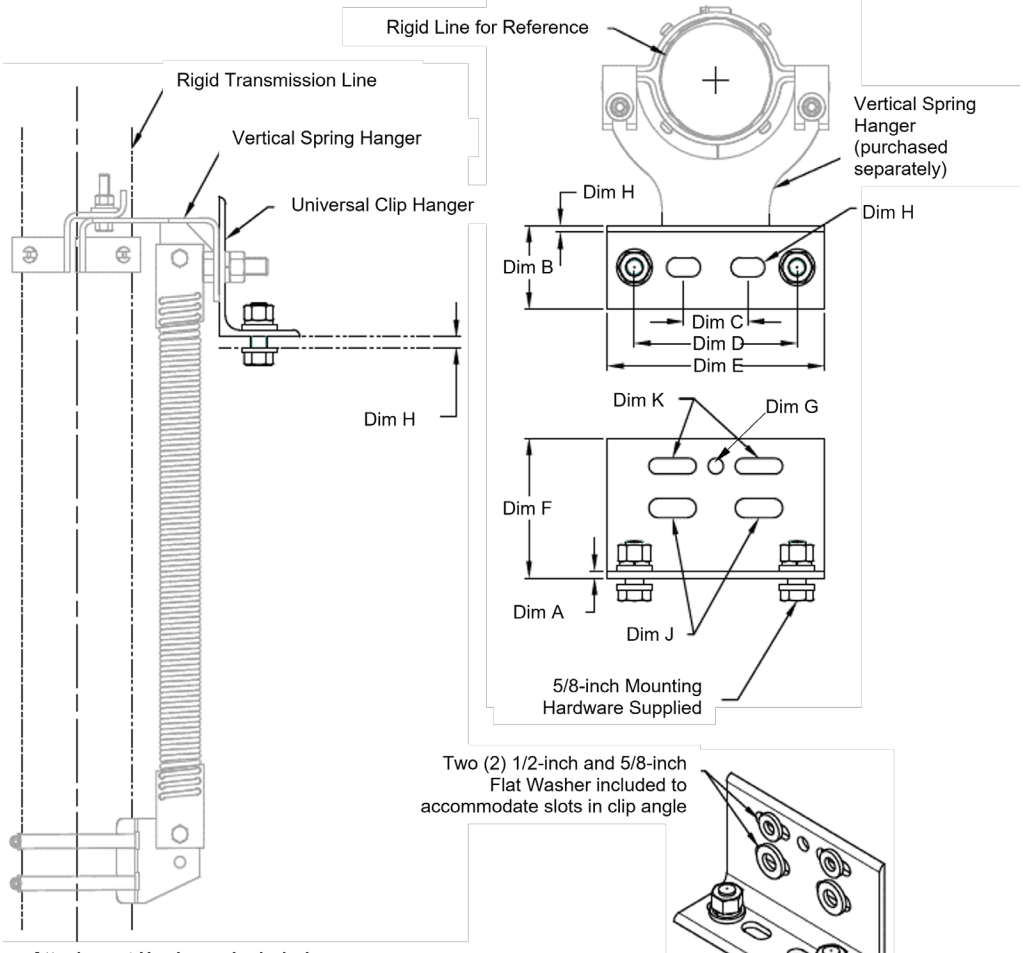
Wall/Roof Feed Thru Plate Specifications

Part No.	Line Size	Dim A	Dim B	Dim C	Dim D	Dim E	Dim F	Weight
RLA100-15	1-5/8-inch	2.250-in (57-mm)	4.750-in (121-mm)	6.000-in (152-mm)	-- --	0.438-in (11-mm)	3.000-in (76-mm)	0.9-lbm (0.4-kg)
RLA300-15A	3-1/8-inch	3.400-in (86-mm)	6.800-in (173-mm)	8.000-in (203-mm)	1.200-in (30-mm)	0.438-in (11-mm)	6.000-in (152-mm)	1.1-lbm (0.5-kg)
RLA400-15A	4-1/16-inch	3.400-in (86-mm)	6.800-in (173-mm)	8.000-in (203-mm)	1.200-in (30-mm)	0.438-in (11-mm)	7.000-in (178-mm)	1.2-lbm (0.5-kg)
RLA600-15A	6-1/8-inch	6.400-in (163-mm)	12.800-in (325-mm)	14.000-in (356-mm)	1.200-in (30-mm)	0.438-in (11-mm)	9.000-in (229-mm)	2.9-lbm (1.3-kg)
RLA700-15AL	7-3/16-inch	7.000-in (178-mm)	14.000-in (356-mm)	16.000-in (406-mm)	2.000-in (51-mm)	0.563-in (14-mm)	10.000-in (254-mm)	17.0-lbm (7.7-kg)
RLA800B-15	8-3/16-inch	7.000-in (178-mm)	14.000-in (356-mm)	16.000-in (406-mm)	2.000-in (51-mm)	0.563-in (14-mm)	12.000-in (305-mm)	17.0-lbm (7.7-kg)

Additional Installation Accessories
Rigid Transmission Line Attachment Brackets

Horizontal Angle Member Rigid Line Hanger Attachment Bracket

ERI's Horizontal Angle Member Rigid Line Hanger Attachment Bracket for 1-5/8-inch, 3-1/8-inch, 4-1/16-inch, 6-1/8-inch, 7-3/16-inch, and 8-3/16-inch rigid transmission lines. Supports vertical fixed, spring, and sliding ring hangers manufactured by all major rigid transmission suppliers. Includes 5/8-inch hardware to attach to drilled or punched horizontal angle members. The mounting hardware supplied can accommodate thickness connection range from 0.06-inches to 0.50-inches. Spring hanger is shown for reference only and is not included; order separately.



Attachment Hardware included:

2 each	WF08GA	1/2-inch Flat washer F436 galvaized structural
2 each	NU1011GA	5/8-inch-11 nut A563 galvanized
2 each	WL10GA	5/8-inch galvanized lock washer
6 each	WF10GA	5/8-inch galvanized flat washer
2 each	SC1011H0175GA	5/8-inch-11 x 1.75-inch A325 galvanized hex bolt

Horizontal Angle Member Rigid Line Hanger Attachment Bracket Specifications

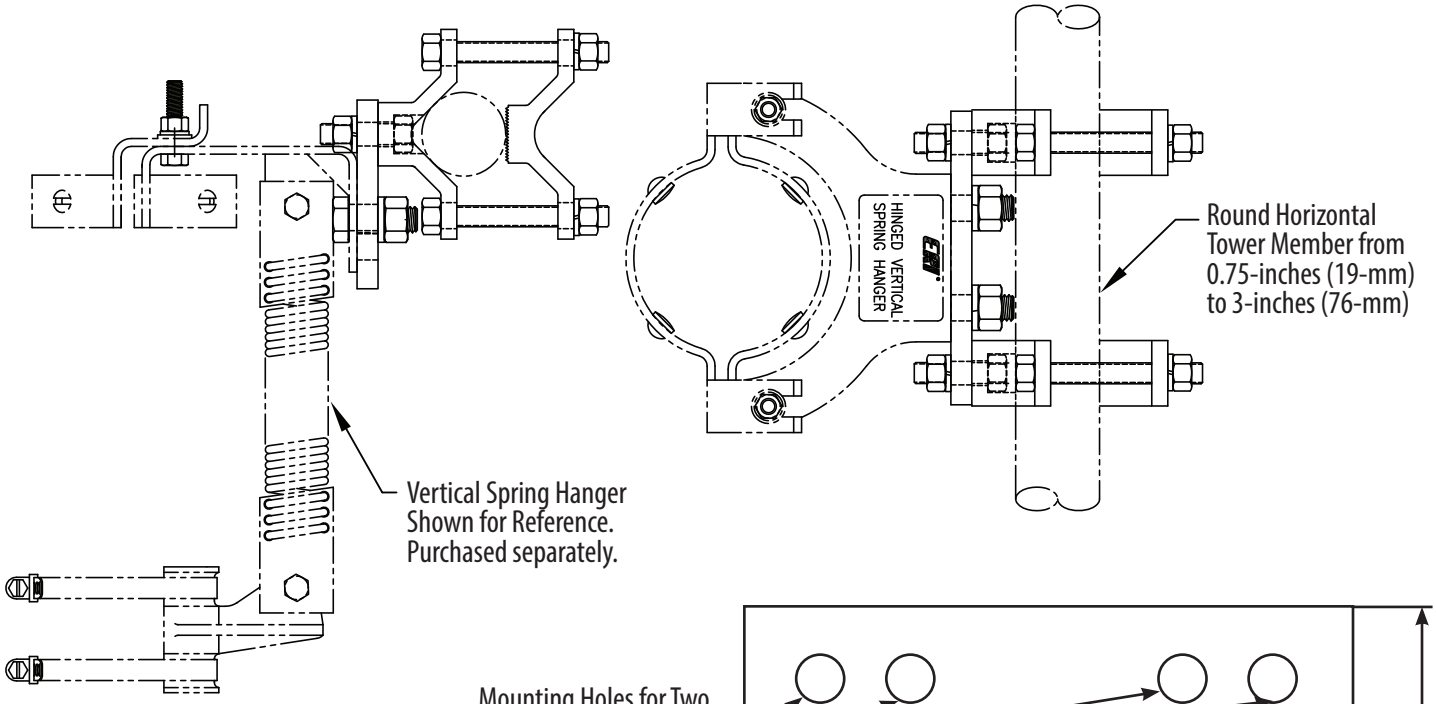
Part No.	RLA001-00KIT				
Dim A	0.250-in	(6-mm)	Dim H	0.06 x 0.50-in	2 x 13-mm
Dim B	3.000-in	(76-mm)		With One (1) Flat Washer	
Dim C	2.380-in	(60-mm)		0.06 x 0.31-in	2 x 8-mm
Dim D	6.000-in	(152-mm)		With Two (2) Flat Washers	
Dim E	8.000-in	(203-mm)	Dim J	0.688 x 1.75-in	(17 x 44-mm)
Dim F	5.000-in	(127-mm)		two (2) slots for 5/8-inch mounting hardware	
Dim G	0.563-in	(14-mm)		5/8-inch Hardware Spacing	
	hole for 1/2-inch mounting hardware			2.13 to 4.25-in	(54 to 108-mm)
Weight	5.0-lbm	(2.3-kg)	Dim K	0.563 x 1.75-in	(14 x 44-mm)0.688 x
				two (2) slots for 1/2-inch mounting hardware	
				1/2-inch Hardware Spacing	
				2.00 to 4.38-in	(51 to 111-mm)

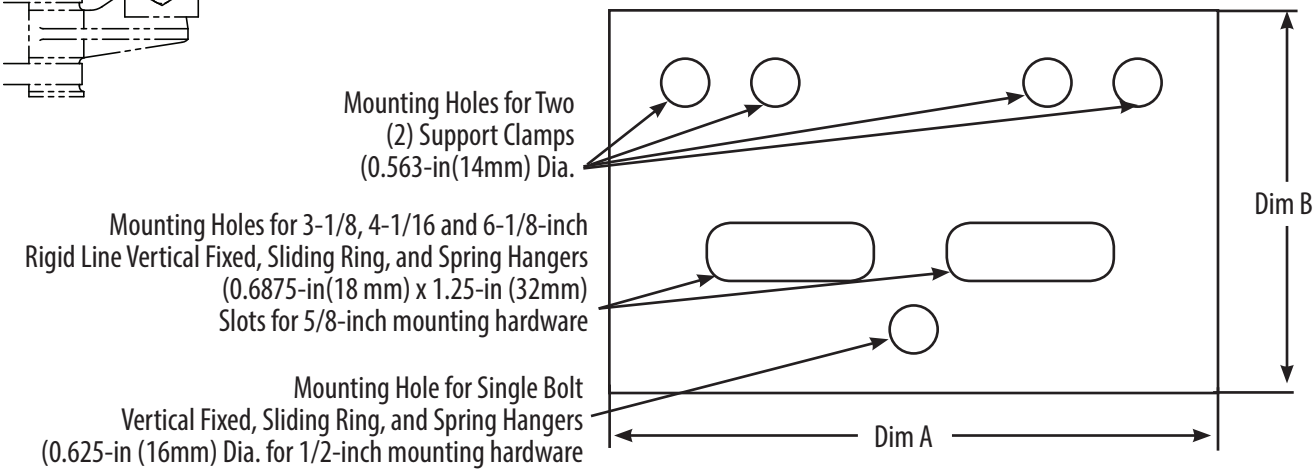
Horizontal Round Member Rigid Line Hanger Attachment Bracket

Universal Rigid Line Hanger Attachment Bracket for 3-1/8-inch, 4-1/16-inch and 6-1/8-inch rigid transmission vertical fixed and spring line hangers. The universal hanger attachment bracket provides an interface to adapt light weight vertical fixed hangers and vertical spring hangers to round horizontal tower members from 0.75-inches (19 mm) to 3-inches (76mm) in diameter. This provides an off-the-shelf solution eliminating the need to have custom brackets fabricated prior to commencing installation.

Horizontal Round Member Rigid Line Hanger Attachment Bracket Specifications

Part Number	RLA001-02	
Dim A	7.000-in	(178-mm)
Dim B	4.500-in	(114-mm)
Weight	19.0-lbm	(8.6-kg)

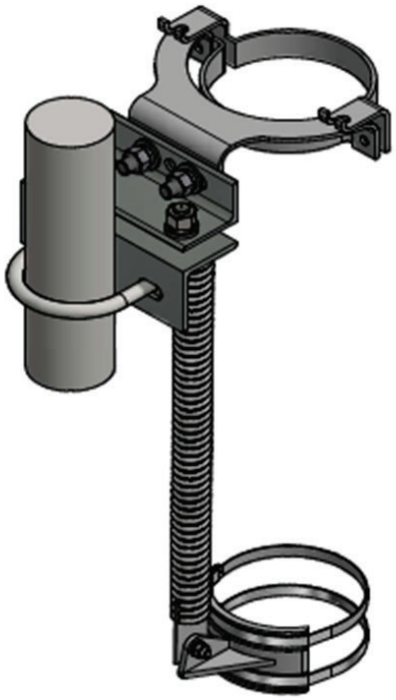


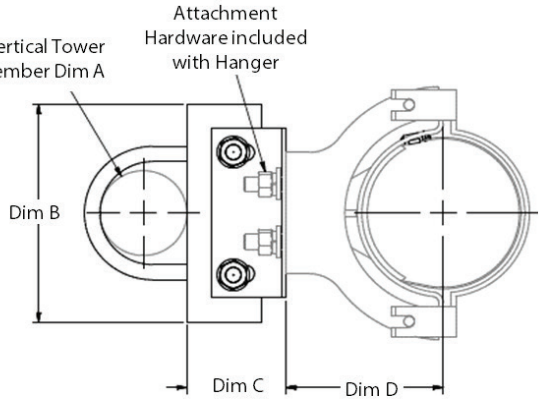


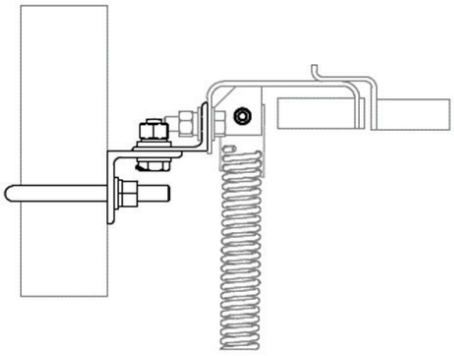
Vertical Round Member Rigid Line Hanger Attachment Bracket

Spring hanger shown for reference only and is not included, order separately.

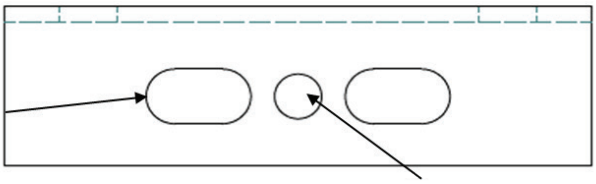
ERI's Vertical Round Member Rigid Line Hanger Attachment Bracket for 1-5/8-inch, 3-1/8-inch, 4-1/16-inch, 6-1/8-inch, 7-3/16-inch, and 8-3/16-inch rigid transmission line vertical fixed, spring, and sliding ruing hangers. The universal hanger attachment bracket provides an interface to adapt light-weight vertical fixed hangers and vertical spring hangers to round vertical tower members from 1.25-inches (19 mm) to 6.13-inches (156mm) in diameter. The bracket provides an off-the-shelf solution eliminating the need to have custom brackets fabricated before commencing installation.







Mounting Slots for 3-1/8, 4-1/16, 6-1/8, 7-3/16 and 8-3/16-inch Rigid Line Vertical Fixed, Spring, and Sliding Hangers 0.69-in (18 mm) x 1.25-in (32 mm) Slots for up to 5/8-inch mounting hardware accomodates hanger attachment hardware spacing from 2.13 to 3.75-inches (54 to 95-mm)



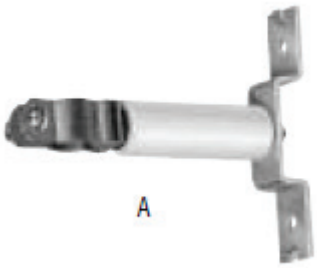
Mounting Hole for Single Bolt Vertical Fixed, Spring and Sliding Hangers (0.56-inch (14-mm) Diameter for 1/2-inch mounting hardware

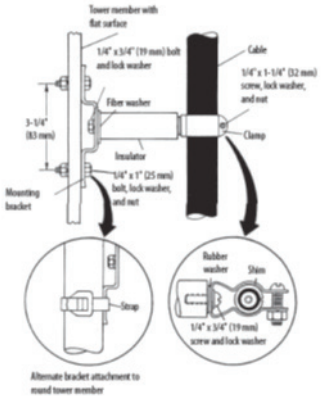
Part Number	Dim A		Dim B		Dim C		Weight	
RLA002-187K	0.75 to 1.25 in	(19 to32 mm)					10.1 lbm	(4.6 kg)
RLA002-287K	1.25 to 2.13 in	(32 to54 mm)	7.00 in	(178 mm)			13.0 lbm	(5.9 kg)
RLA002-387K	2,13 to 3.13 in	(54 to79 mm)			3.00 to 4.13 in	(76 to 105 mm)	21.2 lbm	(9.6 kg)
RLA002-487K	3.13 to 4.13 in	(79 to105 mm)					42.9 lbm	(19.5 kg)
RLA002-587K	4.13 to 5.13 in	(105 to130 mm)	9.00 in	(229 mm)			58.7 lbm	(26.6 kg)
RLA002-687K	5.13 to 6.13 in	(130 to 156 mm)					80.8 lbm	(36.7 kg)

Insulated Hangers

Insulated Hangers for ¼,⅜, ½ and ⅞-inch Cables

Part Number	Description
11662-3	Insulated hanger for 1/4-inch, 3/8-inch and 1/2-inch cables, single piece. Hangers do not include hardware kit. Use two each SC0420H0100, 1/4-20 X 1" Hex head machine bolt, or two each SC0420H0075, 1/4-20 X 3/4" Hex head machine bolt, plus two each NU0420, 1/4-20 Hex nut and two each WL04SS, 1/4" split lock washer. Two sets required per hanger. To attach to flat tower members. Requires 9/16-inch in diameter hole. Use 12395-1, 100 Ft. Stainless Steel Wraplock Kit to attach hangers to round tower members. For use on insulated towers. Recommended maximum spacing 3.0-feet (0.9 meters).
11662-2	Insulated hanger for 7/8-inch cable, single piece. Hangers do not include hardware kit. Use two each SC0420H0100, 1/4-20 X 1" Hex head machine bolt, or two each SC0420H0075, 1/4-20 X 3/4" Hex head machine bolt, plus two each NU0420, 1/4-20 Hex nut and two each WL04SS, 1/4" split lock washer. Two sets required per hanger. To attach to flat tower members. Requires 9/16-inch in diameter hole. Use 12395-1, 100 Ft. Stainless Steel Wraplock Kit to attach hangers to round tower members. For use on insulated towers. Recommended maximum spacing 3.0-feet (0.9 meters).
17261D-A.pdf	Installation Instructions





Hardware for mounting to tower member with flat surface:

Part Number	Description
SC0420H0100	1/4-20 X 1-inch Hex head machine bolt, stainless steel. Used to attach 11662-2 and 11662-3 Insulated Hanger to flat tower members. Requires 9/16-inch in diameter hole. Also requires one each NU0420 and one each WL04SS. Two required per hanger.
SC0420H0075	1/4-20 X ¾-inch Hex head machine bolt, stainless steel. Used to attach 11662-2 and 11662-3 Insulated Hanger to flat tower members. Requires 9/16-inch in diameter hole. Also requires one each NU0420 and one each WL04SS. Two required per hanger.
NU0420	1/4-20 Hex nut, stainless steel for SC0420H0100 or SC0420H0075. Two required per hanger.
WL04SS	¼-inch split lock washer stainless steel for SC0420H0100 or SC0420H0075. Two required per hanger.

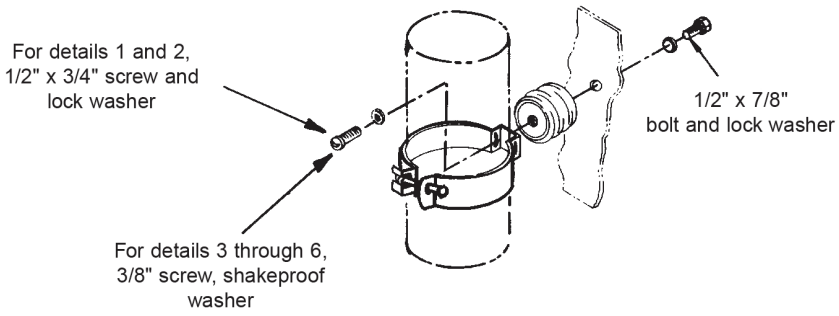
Mounting to round tower member:

Part Number	Description
12395-1	100 Ft. Stainless Steel Wraplock, with fasteners. Use to attach ¼-inch to 7/8-inch insulated hangers to round members. Not to be used to attach cable or waveguide directly to towers.

Insulated Hangers for 1-¼-inch to 5-inch Cables

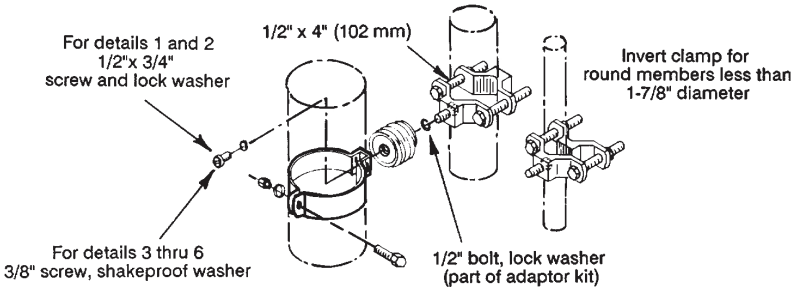
Part Number	Description
33948-5	Insulated hanger for 1-1/4-inch HELIAX, single piece. For use on insulated towers. Use Part Number 13550, Round member adapter for attaching hangers to round tower members up to 3 inches diameter or Part Number 13555A, Angle Adapter for attaching to angle tower members. Hanger includes ½-inch x 7/8-inch bolt and lock washer for attachment to flat tower members (requires 9/16-inch hole). Recommended maximum spacing 3.0-feet (0.9 meters).
33948-3	Insulated hanger for 1-5/8-inch HELIAX, single piece. For use on insulated towers. Use Part Number 13550, Round member adapter for attaching hangers to round tower members up to 3 inches diameter or Part Number 13555A, Angle Adapter for attaching to angle tower members, up to 7/8 inches thick. Hanger includes ½-inch x 7/8-inch bolt and lock washer for attachment to flat tower members (requires 9/16-inch hole). Recommended maximum spacing 3.0-feet (0.9 meters).
33948-6	Insulated hanger for 2-1/4-inch HELIAX, single piece. For use on insulated towers. Use Part Number 13550, Round member adapter for attaching hangers to round tower members up to 3 inches diameter or Part Number 13555A, Angle Adapter for attaching to angle tower members. Hanger includes ½-inch x 7/8-inch bolt and lock washer for attachment to flat tower members (requires 9/16-inch hole). Recommended maximum spacing 3.0-feet (0.9 meters).
33948-2	Insulated hanger for 3-inch HELIAX, single piece. For use on insulated towers. Use Part Number 13550, Round member adapter for attaching hangers to round tower members up to 3 inches diameter or Part Number 13555A, Angle Adapter for attaching to angle tower members. Hanger includes ½-inch x 7/8-inch bolt and lock washer for attachment to flat tower members (requires 9/16-inch hole). Recommended maximum spacing 5.0-feet (1.5 meters).
33948-4	Insulated hanger for 4-inch HELIAX, single piece. For use on insulated towers. Use Part Number 13550, Round member adapter for attaching hangers to round tower members up to 3 inches diameter or Part Number 13555A, Angle Adapter for attaching to angle tower members. Hanger includes ½-inch x 7/8-inch bolt and lock washer for attachment to flat tower members (requires 9/16-inch hole). Recommended maximum spacing 5.0-feet (1.5 meters).
33948-1	Insulated hanger for 5-inch HELIAX, single piece. For use on insulated towers. Use Part Number 13550, Round member adapter for attaching hangers to round tower members up to 3 inches diameter or Part Number 13555A, Angle Adapter for attaching to angle tower members. Hanger includes ½-inch x 7/8-inch bolt and lock washer for attachment to flat tower members (requires 9/16-inch hole). For use on insulated towers. Recommended maximum spacing 5.0-feet (1.5 meters).
	17823E.pdf Insulated Hanger Installation Instructions

Direct Attachment.
Attach hanger to insulator. Attach insulator to tower.

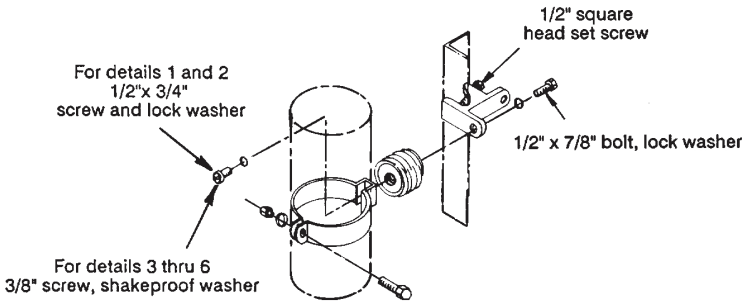


For Direct Attachment, the tower member must have 9/16″ (14 mm) clear holes.

Round Member Attachment.
Attach insulator to clamp half. Attach hanger to insulator. Attach round member adapter clamp halves to tower.



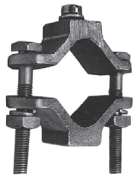
Angle Member Attachment.
Attach insulator to angle adapter. Attach hanger to insulator. Attach adapter/hanger assembly to tower member.



Insulated Hanger Angle Member Adapter for 1-1/4 to 5-inch Cable

Part Number	Description
13555A	Angle Member Adapter, Single piece. For insulated hangers. Maximum member thickness 7/8 inches (22 mm). For 1-1/4-inch to 5-inch cable. Includes two 5/8-inch hardware attachment holes, to accommodate 1/2-inch hardware.
13555A-1	Angle Member Adapter Single piece. For insulated hangers. Maximum member thickness 7/8 inches (22 mm). For 1-1/4-inch to 5-inch cable. Includes two 3/4-inch hardware attachment holes, to accommodate 5/8-inch hardware.
13555A-2	Angle Member Adapter Single piece. For insulated hangers. Maximum member thickness 7/8 inches (22 mm). For 1-1/4-inch to 5-inch cable. Includes two 7/16-inch hardware attachment holes, to accommodate 3/8-inch hardware.

Insulated Hanger Round Member Adapter for 1-1/4 to 5-inch Cables



Part Number	Description
13550	Round member adapter for attaching hangers to round tower members up to 3 inches diameter, includes 1/2-inch x 1-1/4-inch hanger attachment bolt and nut. For 5-inch HELIAX and for insulated hangers for 1-1/4-inch to 5-inch. Single piece.

Other Mounting Accessories

HGK0001 Hoisting Grip Hoisting Grip Hanger Kit

Part Number	Description
HGK0001	Hoisting grip hanger kit to attach HELIAX hoisting grips to tower. Includes 18-inches of chain, 12-inch x 12-inch turnbuckle and two shackles. One required for each hoisting grip and one hoisting grip required for each 200-feet (60-meters) of vertical run.
II-HGK-0001	Installation Instructions

Hanger Attachment Hardware Kits

Part Number	Description
HWK0005	Stainless Hardware Kit; Qty 10 each of 3/8"-16UNC x 3/4" long socket head cap screw, small OD 3/8" split lock-washer and 3/8"-16 hex nut. Uses 5/16" Hex Allen wrench, not supplied.
HWK0001	Stainless Hardware Kit; Qty 10 each of 3/8"-16UNC x 1" long socket head cap screw, small OD 3/8" split lock-washer and 3/8"-16 hex nut. Uses 5/16" Hex Allen wrench, not supplied.
HWK0004	Stainless Hardware Kit; Qty 10 each of 1/2"-13UNC x 1-1/4" long socket head cap screw, regular ½" split lock-washer and ½"-13 hex nut. Uses 3/8" Hex Allen wrench, not supplied.

Round Member Adapter Kit

Part Number	Description
31670-1E	Round member adapter kit quantity of 10 for 1-inch to 2-inch round members. Stainless steel clamps to mount 1/2 to 4-inch cable hangers to round support members. Two each are needed for 3 and 4-inch cable hangers.
31670-2E	Round member adapter kit quantity of 10 for 2-inch to 3-inch round members. Stainless steel clamps to mount 1/2 to 4-inch cable hangers to round support members. Two each are needed for 3 and 4-inch cable hangers.
31670-3E	Round member adapter kit quantity of 10 for 3-inch to 4-inch round members. Stainless steel clamps to mount 1/2 to 4-inch cable hangers to round support members. Two each are needed for 3 and 4-inch cable hangers.
31670-4E	Round member adapter kit qty 10 for 4-inch to 5-inch round members. Stainless steel clamps to mount 1/2 to 4-inch cable hangers to round support members. Two each are needed for 3 and 4-inch cable hangers.
31670-5E	Round member adapter kit quantity of 10 for 5-inch to 6-inch round members. Stainless steel clamps to mount 1/2 to 4-inch cable hangers to round support members. Two each are needed for 3 and 4-inch cable hangers.
31670-6E	Round member adapter kit quantity of 10 for 6-inch to 8-inch round members. Stainless steel clamps to mount 1/2 to 4-inch cable hangers to round support members. Two each are needed for 3 and 4-inch cable hangers.

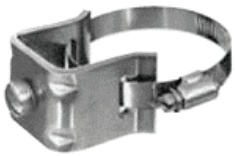
Standoff Adapter Kit

Part Number	Description
HR30848-4	1.0-inch standoff adapter kit for 1 to 3-inch leg, quantity of 10 per kit. Includes hardware to attach non-insulated butterfly hanger. Requires ERI part number 31670-() round member adapter kit, one per kit. Shown with round member adapter purchased separately.
HR30848-1	1.0-inch standoff adapter kit for 3 to 6-inch leg, quantity of 10 per kit. Includes hardware to attach non-insulated butterfly hanger. Requires ERI part number 31670-() round member adapter kit, one per kit. Shown with round member adapter purchased separately. HR41108A 2.5-inch standoff adapter kit for 3 to 6-inch leg, quantity of 10 per kit. Includes hardware to attach non-insulated butterfly hanger. Requires ERI part number 31670-() round member adapter kit, one per kit. Shown with round member adapter purchased separately.

Angle Member Adapter for 5-inch Cables

Part Number	Description
33981A-1	Angle Member Adapter Kit of 10 pieces. Stainless steel. For mounting 5-inch HELIAX cable hangers to angle tower members up to 7/8" (22 mm) thick

Round Member Adapter/Tower Standoff for 5-inch Cables

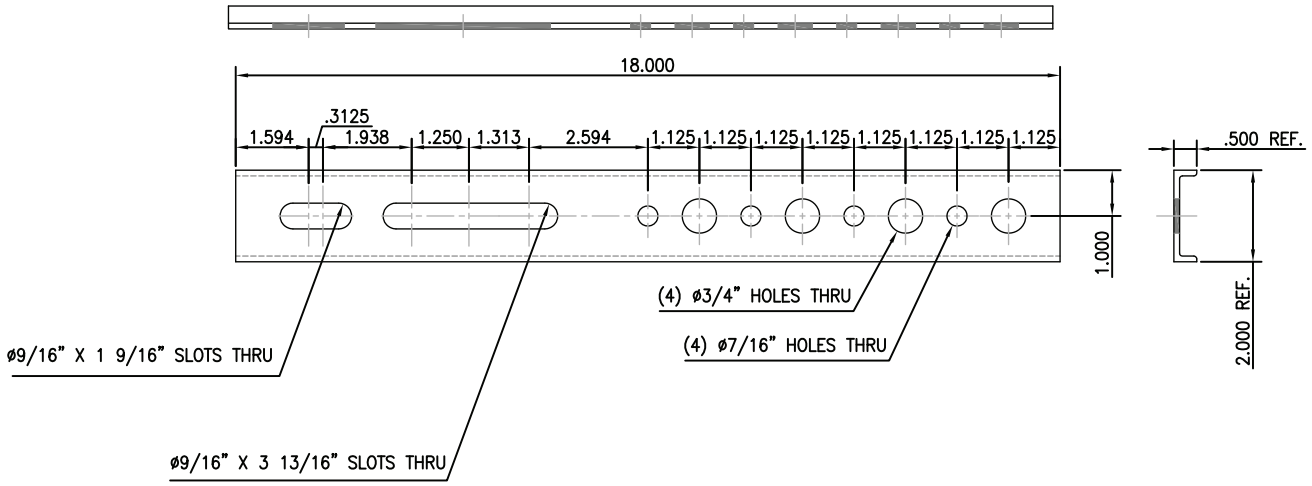


Part Number	Description
43130-1E	Round member adapter/tower standoff kit of 10 for mounting 5-inch HELIAX to round support member 3 to 4 inches (75 to 100 mm) in diameter. 2.5-inch (60 mm) standoff
43130-2E	Round member adapter/tower standoff kit of 10 for mounting 5-inch HELIAX to round support member 4 to 5 inches (100 to 125 mm) in diameter. 2.5-inch (60 mm) standoff
43130-3E	Round member adapter/tower standoff kit of 10 for mounting 5-inch HELIAX to round support member 5 to 6 inches (125 to 150 mm) in diameter. 2.5-inch (60 mm) standoff
43130-4E	Round member adapter/tower standoff kit of 10 for mounting 5-inch HELIAX to round support member 6 to 8 inches (125 to 150 mm) in diameter. 2.5-inch (60 mm) standoff, stainless steel.
13550	Round member adapter for attaching hangers to round tower members up to 3 inches diameter, includes 1/2-inch x 1-1/4-inch hanger attachment bolt and nut. For 5-inch HELIAX and for insulated hangers for 1-1/4-inch to 5-inch. Single piece.

Hoisting Grip for 5-inch Cables

Part Number	Description
31031-1	Hoisting Grip for 5-inch coaxial cables. Use at 200 ft (60 m) intervals to raise cable on tower. Remains in place to support cable at completion of installation. Use Part Number HGK0001 Hoisting Grip Hanger Kit to permanently secure hoisting grip in place.

TAL0003 Bolt on Feed Line Tab



Part Number	Description
TAL0003	Bolt on feed line tab for mounting to round vertical tower member up to 5.00-inches (127 mm) in diameter. Includes four (4) 7/16-inch mounting holes for 3/8-inch attachment hardware and four (4) 3/4-inch mounting holes for snap in hangers. Tab is 18.00-inches (457 mm) wide and includes to mounting slots to attach to tower leg with a single galvanized U-bolt, not included and must be purchased separately.
UB0813-0212GA2	Galvanized U-Bolt 1/2-13 X 2-1/8-inch center-to-center with nut, lock washers and flat washers. Galvanized. One required for TAL0003 for connecting to vertical round tower member up to 1-1/2-inches in diameter.
UB0813-0262GA2	Galvanized U-Bolt 1/2-13 X 2-5/8-inch center-to-center with nut, lock washers and flat washers. Galvanized. One required for TAL0003 for connecting to vertical round tower member from 1-5/8-inches to 2-inches in diameter.
UB0813-0312GA2	Galvanized U-Bolt 1/2-13 X 3-1/8-inch center-to-center with nut, lock washers and flat washers. Galvanized. One required for TAL0003 for connecting to vertical round tower member from 2-1/8-inches to 2-1/2-inches in diameter.
UB0813-0362GA2	Galvanized U-Bolt 1/2-13 X 3-5/8-inch center-to-center with nut, lock washers and flat washers. Galvanized. One required for TAL0003 for connecting to vertical round tower member from 2-5/8-inches to 3-inches in diameter.
UB0813-0412GA2	0412GA2 Galvanized U-Bolt 1/2-13 X 4-1/8-inch center-to-center with nut, lock washers and flat washers. Galvanized. One required for TAL0003 for connecting to vertical round tower member from 3-1/8-inches to 3-1/2-inches in diameter.
UB0813-0462GA2	Galvanized U-Bolt 1/2-13 X 4-5/8-inch center-to-center with nut, lock washers and flat washers. Galvanized. One required for TAL0003 for connecting to vertical round tower member from 3-5/8-inches to 4-inches in diameter.
UB0813-0512GA2	Galvanized U-Bolt 1/2-13 X 5-1/8-inch center-to-center with nut, lock washers and flat washers. Galvanized. One required for TAL0003 for connecting to vertical round tower member from 4-1/8-inches to 4-1/2-inches in diameter.
UB0813-0562GA	Galvanized U-Bolt 1/2-13 X 5-5/8-inch center-to-center with nut, lock washers and flat washers. Galvanized. One required for TAL0003 for connecting to vertical round tower member from 4-5/8-inches to 5-inches in diameter.

Transmission Line System Planning

Rigid transmission line systems provide a connection path, with high power handling capability and low loss, to deliver transmitter power to the antenna. The section provides the information to select the proper rigid transmission line size and type for the vast majority of terrestrial radio and television broadcast applications but there are many factors that can impact proper transmission line selection. It is recommended that other resources such as the transmission line chapters of the SBE Engineering Handbook (ISBN-13: 978-0071826266) or the NAB Engineering Handbook (11th Edition ISBN-13: 978-1138930513) be consulted as these resources include detailed information on all of the derating factors that may apply to special situations. You can also contact ERI for assistance in selecting the proper transmission line ty0pe and size for your specific requirements. This section of the catalog discusses the specifics of transmission line selection and installation requirements. For information on the detailed electrical and mechanical specifications, dimensional information, included hardware and other information please refer to the individual component information provided in this catalog.

Selecting the Proper Transmission Line

In general, the selection of transmission lines is based on:

1. Operating Frequency
2. Type of Service (Modulation Scheme)
3. Power Rating
4. Characteristic impedance
5. Efficiency (attenuation)
6. Tower loading (size and weight)

Special consideration is required if the broadcast service using the system is digital, due to the higher peak to average ratios of digital signals versus analog transmission formats or for systems that combine several digital television or FM channels into a single transmission line and antenna.

Operational and Electrical Parameters

When a system designer is selecting transmission lines for specific applications a number of performance and operational factors need to be considered. As seen in the table of typical specifications in general the larger the transmission line diameter the lower its attenuation (insertion loss) and the higher its power handling capability. If the transmission system includes an antenna that requires pressurization and/or the transmitter power output is greater than two kilowatts, for digital television or FM services, then semi-flexible air cable or rigid transmission line is used. For those applications utilizing an antenna that does not require pressurization small diameter (1-5/8 inch or less) foam dielectric semi-flexible cables are usually employed.

Characteristic Impedance

The characteristic impedance of a transmission line is determined by the relative diameters of the inner and outer conductors and is expressed with the following equation:

$$Z_0 = \frac{60}{\sqrt{\varepsilon_r}} \times log_{10}\left(\frac{ID}{OD}\right)$$

where:

Z_0 = characteristic impedance

ε_r = dielectric constant or relative permittivity of dielectric to air

ID = inside electrical diameter of the outer conductor (inches)

OD = outside electrical diameter of the inner conductor (inches)

When this formula is applied one finds mathematically that for maximum peak power handling, characteristic impedance should be 30 ohms. If the desire is for maximum average power handling, the characteristic impedance should be about 60 ohms and for minimum attenuation, the characteristic impedance should be 77 ohms. As a compromise and to provide the greatest utility the characteristic impedance of commercially available coaxial transmission line is either 50 or 75 ohms.

The vast majority of semi-flexible and rigid transmission lines have a characteristic impedance of 50 ohms. In general, 50-ohm transmission lines are used in VHF digital television and FM broadcast services as attenuation losses are lower at these channels and they provide high average power handling capability relative to their physical size. Rigid transmission lines in larger sizes are usually 75-ohm for UHF digital television service as the attenuation losses are less than 50-ohm transmission lines of the same size.

Cut-Off Frequency

Coaxial transmission lines are wideband and they can generate undesirable modes of propagation above a certain frequency. This is called the cut-off frequency, (fc). The cut-off frequency is inversely proportional to the inner and outer conductor dimensions (and dielectric constant). Larger diameter lines have cut-off frequencies below 700 MHz, which can make some line sizes unsuitable for operation at higher UHF television channels or in microwave applications. Different transmission line manufacturers use different factors of safety in specifying maximum operating frequency and so this should be considered when making a specific product selection.

Line Size	Calculated Cut-Off (MHz)	Useful Cut-Off (MHz)	Outer I.D. (in)	Inner O.D. (in)
7/8-inch 50 ohm	6659	6000	0.785	0.341
1 5/8-inch 50 ohm	3422	3000	1.527	0.664
3 1/8-inch 50 ohm	1727	1600	3.027	1.315
4 1/16-inch 50 ohm	1328	1262	3.935	1.711
6 1/8-inch 50 ohm	874	806	5.981	2.600
6 1/8-inch 75 ohm	975	830	5.981	1.711
7 3/16-inch 75 ohm	833	752	7.000	2.000
8 3/16-inch 75 ohm	729	704	8.000	2.290

Table 1 Rigid Transmission Line Cut Off Frequencies.

Attenuation

The attenuation of a given size and type of transmission is expressed as loss per unit length as either dB per 100 feet (dB per 100 meters). In this catalog attenuation values for ERI rigid transmission lines can be found under Rigid Line Attenuation and Power Handling, beginning on Page 10 As noted previously, as the transmission line size increases the loss value falls. In all coaxial transmission lines as the frequency increases the attenuation losses also increases as the conductor losses increase in direct proportion Attenuation results from dielectric losses and conductor losses. In commercially available transmission line designs air occupies most of the space between the inner and outer conductor. The PTFE and PE materials selected to provide support to the inner conductor in rigid transmission line sections, air dielectric semi-flexible transmission lines, or as the dielectric material in foam dielectric semi-flexible cables have extremely low dielectric losses. The primary source of attenuation losses in transmission lines is the conductor losses which are related to the material dimensions, conductivity and permeability of copper inner conductors used. The attenuation constant for rigid and air dielectric transmission line, with copper inner conductors can be calculated as shown below:

$$\alpha = \frac{0.433}{Z_o} \times \left(\frac{1}{D} + \frac{1}{d} \right) \times \sqrt{f}$$

where:
a = attenuation
Z_0 = characteristic impedance
ID = inside electrical diameter of the outer conductor (inches)
OD = outside electrical diameter of the inner conductor (inches)
f = frequency

Note that ERI derates the transmission line attenuation specifications to 95% to account for conductor surface conditions and connection losses. Also, attenuation increases with temperature and the generally accepted practice is to calculate published specifications based on an ambient temperature of 20 degrees C. (68 degrees F) with no differential for the higher inner conductor temperature during operation. The attenuation correction factor for higher operating temperatures can be calculated with the formula shown below:

$$M_{\alpha} = \sqrt{1 + \sigma_{o}(T_{t} - T_{o})}$$

where:
M_{α} = Attenuation adjustment factor
σ_{o} = temperature coefficient of resistance at standard rating (for copper conductors at 20 degrees C. σo = 0.00393/degrees C.)
T_{t} = inner conductor temperature, °C
T_{t} = inner conductor temperature, °C

Once the attenuation constant and any correction factors have been applied then the transfer efficiency of the system can be determined. The total attenuation (αtotal, dB) is found by multiplying the attenuation constant by total length of the transmission line system. The total attenuation is converted to efficiency with the formula shown below:

$$Efficiency\% = \frac{100}{10^{\left(\frac{\alpha_{total}}{10}\right)}}$$

One final note regarding attenuation, semi-flexible coaxial transmission lines used for broadcast service usually always have corrugated outer conductors and often have corrugated inner conductors. The corrugations actually increase the distance the signal needs to travel, when compared to rigid transmission line which incorporates smooth walled inner and outer conductors.

Power Handling

The power rating specifications for coaxial transmission line is expressed as two separate operating specifications:

· Average power handling capability is determined by the amount of heat created by loss. This operational parameter is limited by the performance of the dielectric material. ERI rigid transmission lines it is based inner conductor operating temperature of 102 degrees C. (216 degrees F.).

· Peak power handling capability represents the maximum peak power which is determined by the maximum voltage gradient that can be safely present, based on the calculated DC breakdown voltage with a safety factor applied.

Average Power

For a given size and type of transmission line the average power handling capability is determined by the amount of heat created by loss. This is limited by the long term performance of the dielectric material when exposed to the elevated. For rigid transmission line inner conductor operating temperature is normally 102 degrees C. (216 degrees F.) while semi-flexible transmission lines are rated to operate with inner conductor temperatures of 100 degrees C. (212 degrees F.) or 121 degrees C. (250 degrees F.), depending on line size.

Transmission line components are usually designed to provide a useful life of twenty (20) years or more. If the system is operated at power levels or in ambient temperatures that exceed those ratings useful life will be significantly reduced. In systems with multiple users combined into a single run of transmission line power planning is straightforward, since average power rating are based on temperature rise of coaxial components, the sum of the transmitter outputs is used to check average power safety factor.

Peak Power

The transmission line Peak Power rating is essentially the voltage at which the line will arc from the inner to the outer conductor. The Peak Power rating is derived from the DC production test voltage. Transmission lines and components are tested at the factory using a DC Hi-Pot test. This test is performed by connecting electrodes to the inner conductor and the outer conductor and applying a DC production test voltage for one minute to confirm the component will not arc over.

General industry practice is to set the DC production test voltage at 35% of the calculated value of air breakdown (≈30 kV/cm). The peak power rating of a particular transmission line is derived by converting the DC voltage breakdown of two cylinders placed coaxially is shown below:

$$P_{PK} = \frac{\left(\frac{E_P \times 0.707 \times 0.7}{SF}\right)^2}{Z_c}$$

where:
PPK = Cable power rating, standard conditions
E_p = dc production test voltage
0.707 = RMS factor
0.7 = dc to RF factor (empirically verified)
SF = Safety factor on voltage
= 1.4 for semi-flexible cables
= 2.0 for rigid coaxial lines
Z_C = Characteristic impedance

The term, Peak Power, is misleading. It is a power term in watts based on a root mean square voltage, not a peak voltage. The peak voltage rating of the components in a multiplex facility is critical. Just like in average power considerations, peak voltages add up, but the modulation of the carrier must be also be considered. The Average power rating of the transmission line system is critical for systems with only one or two channels. In combined system the equivalent peak power rises as the square of the number of carriers. The peak power capability is often the limiting factor for multiplexing several signals. The peak voltage for a system is calculated with the following formula:

$$E_{pk} = (\sqrt{2}) \times \sqrt{F_{env} \times Z_c \times P_t}$$

where:
E_{pk} = Peak RF Voltage
P_t = Transmitter Power Output
Z_C = Characteristic impedance
F_{env} = From Table below:

Single Station		*Fenv*
FM Analog	0 dB	1
FM IBOC (OFDM)	10 dB	10
8VSB TV	7 dB	5
Multiplexed Stations		
FM Analog	0 dB	1
FM IBOC (OFDM)	6 dB	4
8VSB TV	7 dB	5

Table 2 Peak to Average Power Factors

For combined systems simply perform the Peak RF Voltage calculation for each station and sum them. The maximum allowable peak voltage recommended for various transmission line sizes is shown in Table 2.

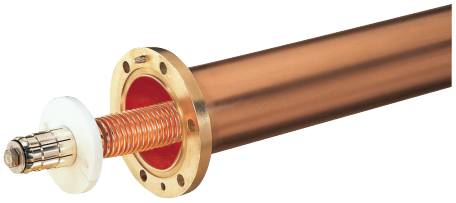
Size	Impedance	Peak Power Rating	DC Production Test Voltage	Max Peak Voltage
7/8-inch	50 ohms	41 kW	6 kV	2.100 kV
1-5/8-inch	50 ohms	132 kW	11 kV	3.643 kV
3-1/8-inch	50 ohms	440 kW	19 kV	6.640 kV
4-1/16-inch	50 ohms	710 kW	24 kV	8.427 kV
6-1/8-inch	50 ohms	1500 kW	35 kV	12.394 kV
6-1/8-inch	75 ohms	1069 kW	36 kV	12.600 kV
7-3/16-inch	75 ohms	1426 kW	42 kV	14.700 kV

Table 3 Rigid Transmission Line Peak Power Ratings, DC Production Test Voltages and Recommended Maximum Peak Voltage Ratings by Transmission Line Size and Type for ERI Rigid Transmission Lines

Voltage Standing Wave Ratio (VSWR)

The voltage standing wave ratio is defined as the maximum to the minimum standing wave voltage. In any transmission line system some energy transmitted through a coaxial line is reflected back and lost. The reflections are caused by variations in impedance along transmission line from corrugations, production variations, dents, flange reflections, inner connectors, or due to an impedance mismatch between line and the antenna. If the voltage distribution in the system is uneven, resulting in standing wave along the transmission line. A perfect VSWR would be 1:1 and no system can achieve this level of performance and so a system VSWR of 1.1:1 or less is generally considered to be good performance. Another way to express this performance parameter is Return Loss which is the ratio of the reflected wave to the incident wave expressed as a positive number of dB's. The Return Loss of a system with a VSWR of 1.1:1 would 27 dB.

Differential Expansion



MACX350A 3-1/8-inch MACXLine®
Rigid Line Section Captive Inner Connector with Bellows Compensator

The inner conductor of a transmission line runs substantially hotter than the outer conductor it will expand to a greater length. For a long useful service life the transmission line must incorporate some method to accommodate the differential expansion between the two coaxial conductors. In semi-flexible cables this is done by corrugating the inner and outer conductors. Rigid transmission lines the inner conductor of a 20-foot rigid line section will expand 0.166 inches at rated average power. In rigid transmission lines this movement causes degradation of the contact surfaces at each of the line section connections and over time the metal particles can lead to a catastrophic failure of the transmission line system. ERI MACXLine includes a compensation bellows in each rigid line section to accommodate differential expansion. This method eliminates any sliding of the contact point between line sections.

Velocity Factor

The addition of dielectric material causes the signal in transmission line to propagate more slowly and velocity factor is expressed as a percentage of the speed of light. Published specifications for transmission lines include a velocity factor and this needs to be considered when phase matching transmission lines of different types. In transmission line systems that use dual transmission lines to provide additional power handling capability the two transmission lines must be matched to have identical electrical lengths for the system to operate properly. Velocity factors for the transmission line products in this catalog can be found in the specification table titled "Rigid Line Common Specifications" on page 8.

Derating Factors

In planning transmission line systems it is important to understand the transmission line operating specifications and how they are derived. Most manufactures employ standard conditions for their power and operating specifications. In general, attenuation and average and peak power ratings are based on a VSWR 1.0 and at atmospheric pressure. As a part of the selection process derating factors must be applied to the published average and peak power specifications. Usually the transmission line system for AM broadcast service (530 to 1710 kHz) is limited by Peak Power Rating and multi-station combined FM and digital television transmission line systems are limited by Total Peak RF Voltage. For transmission line systems used by a single FM broadcast station or a single digital television station the Average Power Rating of the line is usually the limiting factor.

Derating Average Power for VSWR

The total average power in a given run of transmission line is the total of the forward and reflected power applied to the line. For systems that include more than signal the sums of the combined forward and reflected power of all the signals in the system must be less than the average power rating of the line employed. It is recommended that the expected worst case VSWR be applied when sizing the average power handling required for the transmission line. For most terrestrial broadcast applications a VSWR of 1.50 :1 is suggested as the minimum value applied. Table 4 provides the Reflection Coefficient that can be used to derive the Reflected Power in a transmission line from a given transmitter power output for a range of VSWR and Return Loss values.

Reflection Coefficient	Return Loss	VSWR
35%	-9.1-dB	2.077 : 1.00
30%	-10.5-dB	1.857 : 1.00
25%	-12.0-dB	1.667 : 1.00
20%	-14.0-dB	1.500 : 1.00
15%	-16.5-dB	1.353 : 1.00
10%	-20.0-dB	1.222 : 1.00
5%	-26.0-dB	1.105 : 1.00
1%	-40.0-dB	1.020 : 1.00

Table 4 Reflection, Return Loss and VSWR Conversion Table

Derating Peak Power for Modulation and VSWR

The peak power rating of transmission line must be derated for VSWR and the Modulation of the broadcast service it will carry and the transmitter power must be less that this calculated derated value. The table below shows the methods for derating peak power for broadcast service. For DTV, compare to +6 dB peak power levels for 8VSB, not the average signal power.

Modulation	Peak Power Derating Calculation
AM	$P_{MAX} = \frac{P_{PK}}{(1 + M)^2 \times VSWR}$
FM and DTV	$P_{MAX} = \frac{P_{PK}}{VSWR}$

P_{MAX} = Derated peak power
P_{PK} = Peak power rating of cable
M = Amplitude modulation index (100% = 1.0)
V_{SWR} = Voltage standing wave ratio

Derating Average and Peak Power for Altitude

The transmission line average and peak power ratings must be derated for altitude because the lower atmospheric pressure reduces heat transfer from the inner and outer conductors and the dielectric strength of the air inside the transmission line. The recommended derating factors are shown in Table 5.

Altitude above Sea Level feet (meters)	P1/P Average Power	P1/P Peak Power
0 (0)	1.00	1.00
5000 (1524)	0.92	0.69
8000 (2438)	0.87	0.53
10,500 (3200)	0.84	0.44
15,000 (4572)	0.78	0.30

Selecting the Correct Line Section Length

The flanged connections between the individual rigid transmission line sections cause a small reflection as there is a small impedance mismatch at each connection. These reflections add up in a long transmission line run and cause a high VSWR spike in the system. These critical frequencies can be determined with the following formula:

$$F_c = \frac{492.15 \times V_p \times n}{L_{ft}}$$

where:
F_c = Critical frequency in MHz
V_p = Relative velocity
L_{ft} = Transmission section line length in feet
n = Any integer

Table 6 lists the recommended standard rigid transmission line section lengths for Region II television channels and the FM broadcast band. In cases where multiple television channels are combined in a single run of transmission a broadband rigid transmission line must be used. These systems are available from ERI and use a proprietary technique to randomize individual transmission line section lengths to minimize the VSWR spikes caused by the flange reflections.

ERI and use a proprietary technique to randomize individual transmission line section lengths to minimize the VSWR spikes caused by the flange reflections.

US Television Channels

20.00-foot (6.096 meter) Section Length
Channels: 2, 3, 5, 6, 7, 8, 9, 11, 12, 14, 15, 18, 19, 22, 23, 27, 31, 32, 35, 36

19.75-foot (6.020 meter) Section Length
Channels: 16, 20, 24, 28, 33

19.5-foot (5.944 meter) Section Length
Channels: 4, 10, 13, 17, 21, 25, 26, 29, 30, 34

FM Radio Frequencies

Foot (meter)	MHz
20.00 (6.096) Sections	88.1 - 95.9
	100.3 - 107.9
19.50 (5.944) Sections	96.1 - 98.3
19.00 (5.791) Sections	98.5 - 100.1
17.50 (5.342) Sections	88.1 – 107.9

Table 6 Recommended rigid transmission line section lengths for Region II Television and FM frequencies.

Rigid Transmission Line Support Selection

Proper installation and support of a rigid transmission line system is one of the key factors to the reliability and longevity of the system. Rigid transmission line is usually selected when the power handling required exceeds the power handling capability of semi-flexible transmission line. Since rigid transmission line is not corrugated it also has lower loss than equivalently sized semi-flexible transmission line. Also, rigid transmission line is supplied in sections it is often easier to ship and off load at site versus a large reel of semi-flexible cable.

The copper and aluminum outer conductors employed in rigid waveguide and coaxial transmission lines expand and contract at a different rate, with changes in ambient temperature, then the steel used to construct the tower. With a 100 degree change in temperature the differential expansion between the tower and a copper transmission line is 3 inches. So, this requires some method of supporting the transmission line while allowing these different expansion rates as the temperature varies between day and night and through the changes in seasons.

Steel	0.0000065 in/in/Degrees F
Copper	0.000009 in/in/Degrees F
Aluminum	0.000013 in/in/Degrees F

Table 7 Coefficient of thermal expansion

Hardware Size	Torque Value
3/8-inch (10 mm)	21 lb-ft (28 Nm)
1/2-inch (13 mm)	46 lb-ft (62 Nm)
5/8-inch (16 mm)	76 lb-ft (103 Nm)

Table 8 Hardware Torque Specifications

Rigid line hangers are designed to support a transmission line run based on the length of the Vertical Line Run (Antenna Input to Bottom Elbow) and the Horizontal Line Run (Bottom Elbow to the Gas Barrier). The hanger requirements for copper outer conductor and aluminum outer conductor transmission line are similar with some minor differences required due to the greater thermal expansion coefficient of aluminum versus steel. Table 8 lists the hardware torque specifications that apply to the installation of all of the rigid transmission line hanger components discussed in this section.

Vertical Run Installation Requirements

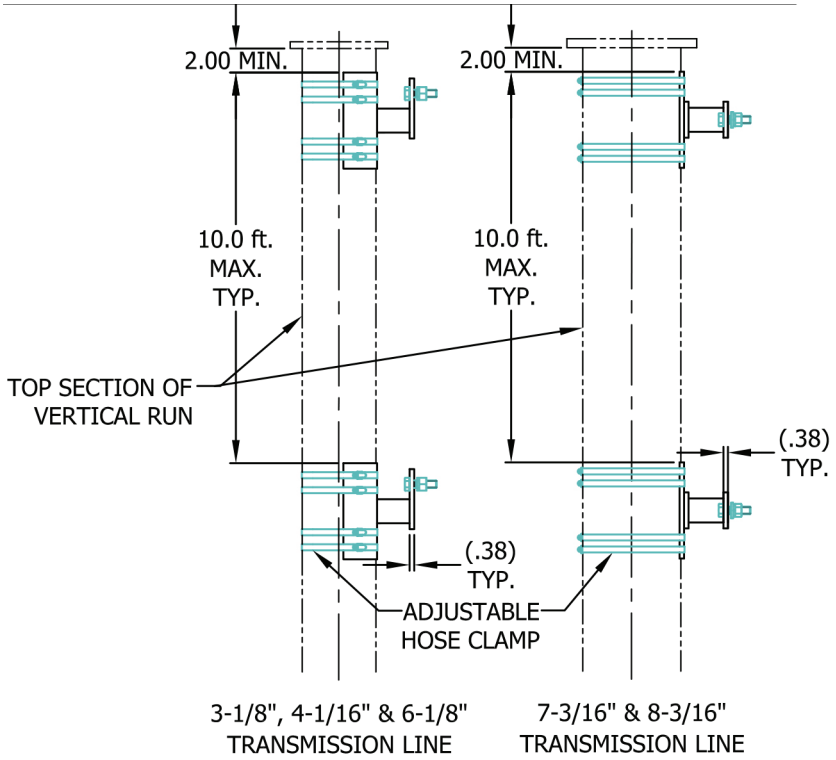
Vertical Fixed Hangers

A rigid transmission line system employs one or more fixed hangers at the top of the vertical run. These fixed hangers are installed near the antenna input. In most installations an elbow complex made up of four (4) 90-degree elbows is installed at the antenna input. This elbow complex provides expansion compensation between the fixed hanger(s) and the antenna input. The elbow complex can be disassembled without disturbing any part of the transmission line system or the antenna input section.

Minimum Quantity	Vertical Run Length
Two (2)	500 feet (152.4 meters)
Three (3)	1000 feet (304.8 meters)
Four (4)	1500 feet (457.2 meters)
Five (5)	2000 feet (609.6 meters)

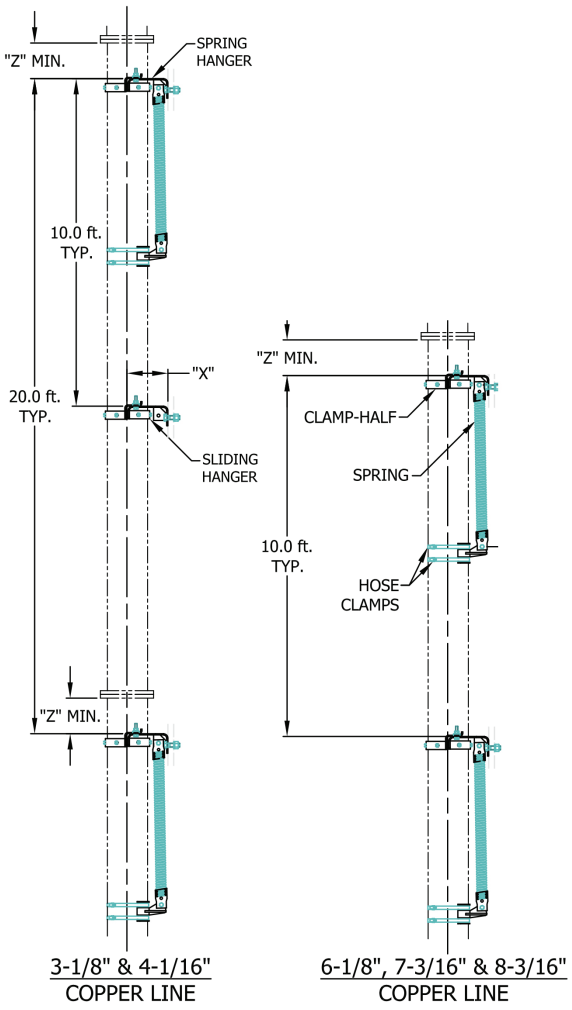
Table 9 Vertical Rigid Hanger Requirements for Rigid Transmission Line Systems

The weight of the vertical run is supported by Fixed Vertical Rigid Hangers that are installed at the top of the vertical run immediately below the elbow complex at the input to the antenna. A minimum of two (2) Vertical Rigid Hangers is required in any rigid transmission line run up to 500-feet (152.4-meters) in length. One additional Vertical Rigid Hanger is added for each additional 500-feet (152.4-meters) of vertical run length.



The first (highest) Vertical Rigid Hanger should be installed as close as possible, vertically, of the antenna input to prevent excessive differential expansion from putting stress on the antenna input but it should be below the antenna input elbow complex so that the vertical transmission line run is supported if the elbow complex should ever require disassembly. The additional required Vertical Rigid Hangers should be installed with an average vertical separation of 10-feet (3.0-meters) below the first Vertical Rigid Hanger. The Vertical Rigid Hangers include attachment hardware to connect to holes in tower members. In most cases additional brackets are required to attach the bracket to the tower. The most popular hanger support brackets available from ERI are detailed in this catalog in the section titled "Rigid Transmission Line Attachment Brackets" beginning on page 69.

Vertical Spring and Sliding Hangers



Vertical Spring and Sliding Hanger Installation

The balance of the vertical run below to Vertical Rigid Hanger installed on the top section(s) of rigid line are supported by a combination of Vertical Spring Hangers and Vertical Sliding Hangers for 1-5/8-inch, 3-1/8-inch and 4-1/16-inch rigid transmission lines. The larger 6-1/8-inch, 7-3/16-inch and 8-3/16-inch line sizes require the Vertical Spring Hangers be used for all of the vertical run below the Vertical Fixed Hangers installed on the top section(s).

For 1-5/8-inch rigid transmission line one Vertical Spring Hanger is required for every 50-feet (15.2-meters) of vertical run below the Vertical Fixed Hangers and Vertical Sliding Hangers should be installed with an average vertical separation of 10-feet (3.0-meters).

Rigid transmission line systems with 3-1/8-inch and 4-1/16-inch line require one (1) Vertical Spring Hanger installed an average of every 20-feet (6.1-meters) below the lowest Vertical Rigid Hangers. For 6-1/8-inch, 7-3/16-inch and 8-3/16-inch rigid line systems one (1) Vertical Spring Hanger should be installed an average of every 10-feet (3.0-meters) below the lowest Vertical Rigid Hangers.

	Dimension "Z"	
Vertical Run Height	**Copper Line**	**Aluminum Line**
Up to 1000-feet (304.8-meters)	4.0-inches (102-mm)	8.0-inches (203-mm)
Up to 2000-feet (609.6-meters)	8.0-inches (203-mm)	16.0-inches (406-mm)

Table 10 Minimum Flange to Hanger Distance for Vertical Spring and Vertical Sliding Hangers for all Rigid Transmission Line Sizes and Types

After the installation of the Vertical Spring Hangers (and Vertical Sliding Hangers for smaller lines) the vertical springs must be set according to the spring setting table included in the installation instructions. The spring setting are based on the overall vertical line run length and on the ambient air temperature during installation. It is important to avoid large variations in tension and so it is recommended that all spring hangers should be set within hours of each other.

Horizontal Run Length	**Copper Line**		**Aluminum Line**	
Up to 100-feet (30.5-meters)	16.0-feet	(4.9-meters)	24.0-feet	(7.3-meters)
101-feet (30.8-meters) to 200-feet (61.0-meters)	32.0-feet	(9.8-meters)	48.0-feet	(14.6-meters)

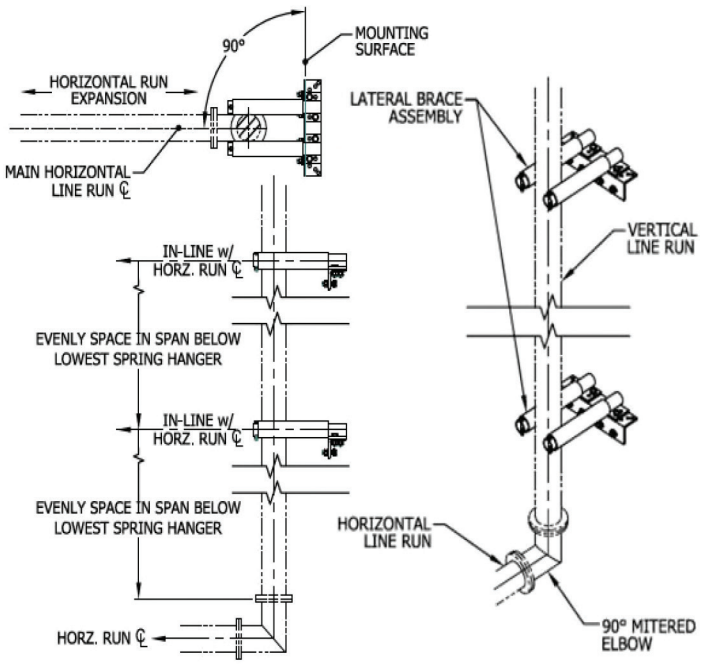
Table 11 Minimum Distance from Elbow at Base of Vertical Line Run to Lowest Vertical Spring/Sliding Hanger

At the base of the vertical line run the system must allow for the differential expansion and contraction of the horizontal line run. The distance from the elbow at the base of the vertical line run to the lowest Vertical Spring or Sliding Hanger should be the distance shown in Table 11.

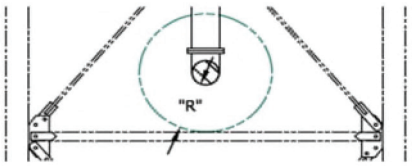
Vertical Lateral Braces

The base of the vertical line run must be allowed to move to accommodate the expansion and contraction of the horizontal line run as the temperature varies between day and night and through the changes of the seasons. At the same time, if lateral motion is not controlled it causes undesirable mechanical stresses and cause damage to the system. To prevent lateral motion ERI manufactures Vertical Lateral Braces that are adjustable to fit all available rigid transmission line sizes.

All systems require two (2) Vertical Lateral Brace Assemblies installed at the base of the vertical line run evenly spaced in the vertical span below the lowest Vertical Spring/Sliding Hanger and the elbow at the base of the vertical line run. They should be installed in-line with the horizontal run expansion, as shown, using the ½-inch mounting hardware supplied.



Vertical Lateral Brace Installation



Minimum Radial Clearance Required

In addition, it is important that there be sufficient radial clearance from all tower member, other transmission lines, conduits, ladders and other obstructions sop that the transmission line expansion and contraction is not impeded. The minimum radial clearance is determined by the transmission vertical run length and transmission line type, with greater clearance required for aluminum outer conductor rigid transmission line.

	Dimension "R"			
Vertical Run Height	**Copper Line**		**Aluminum Line**	
Up to 500-feet (152.4-meters)	1.5-inches	(38-mm)	3.9-inches	(99-mm)
501-feet (152.7-meters) to 1000-feet (304.8-meters)	3.0-inches	(76-mm)	7.8-inches	(198-mm)
1001-feet (305.1-meters) to 1500-feet (457.2-meters)	4.5-inches	(114-mm)	11.7-inches	(297-mm)
1501-feet (457.5-meters) to 2000-feet (609.6-meters)	6.0-inches	(152-mm)	15.6-inches	(396-mm)

Table 12 Minimum Radial Clearance Required at Bottom of Vertical Line Run

The horizontal line run must be long enough to accommodate the expansion and contraction of the vertical line run without damage. The minimum horizontal line run lengths required for most system is listed in .
Minimum horizontal line run length is to be the greater of 20-feet (6.1-meters) or:

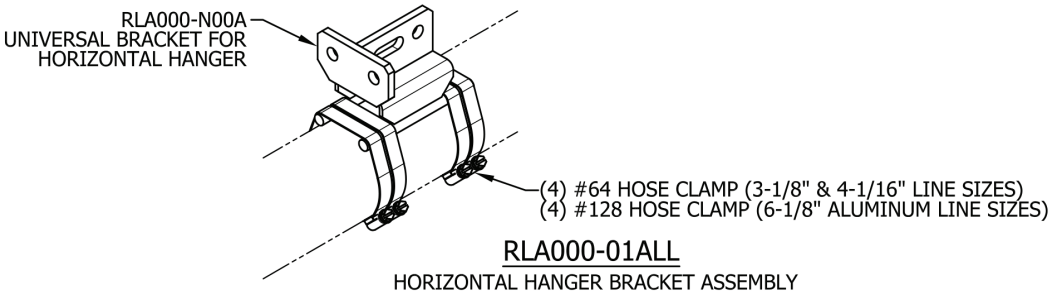
Line Size	**Copper Line**	**Aluminum Line**
3-1/8-inch and 4-1/16-inch	4% of Vertical Run Height	7% of Vertical Run Height
6-1/8-inch	6% of Vertical Run Height	10% of Vertical Run Height
7-3/16-inch and 8-3/16-inch	6% of Vertical Run Height	Not Applicable

Table 13 Minimum Horizontal Run Length

Horizontal Spring Hanger must be used over the entire length of the Minimum Horizontal Line Run to allow for the vertical movement of the run as the vertical line run expands and contracts and also to accommodate horizontal movement of the horizontal line run as it expands and contracts. In addition, lateral motion of the horizontal line run must be controlled by using Horizontal Lateral Braces and/or Horizontal Side Springs.

Beyond the Minimum Horizontal Line Run length, Fixed Horizontal Hangers may be used and on very long horizontal line runs are recommended to prevent wind induced vertical motion, usually referred to as "galloping".

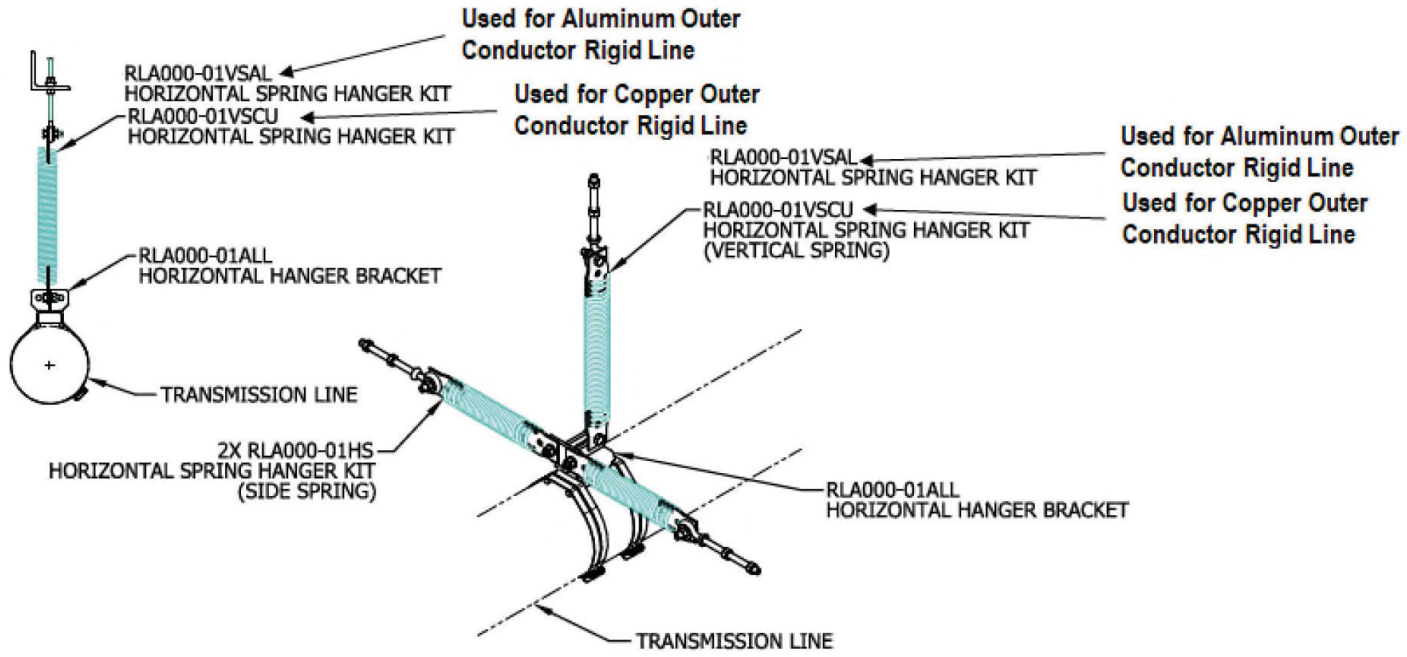
Universal Horizontal Bracket Assembly



RLA000-01ALL
HORIZONTAL HANGER BRACKET ASSEMBLY

ERI's Universal Horizontal Bracket Assembly (RLA000-01ALL) includes components to allow it to be used with all rigid transmission line sizes. The Bracket and hose clamps are fabricated from Stainless Steel so it may be used with copper or aluminum outer conductor transmission line without special galvanic barriers.

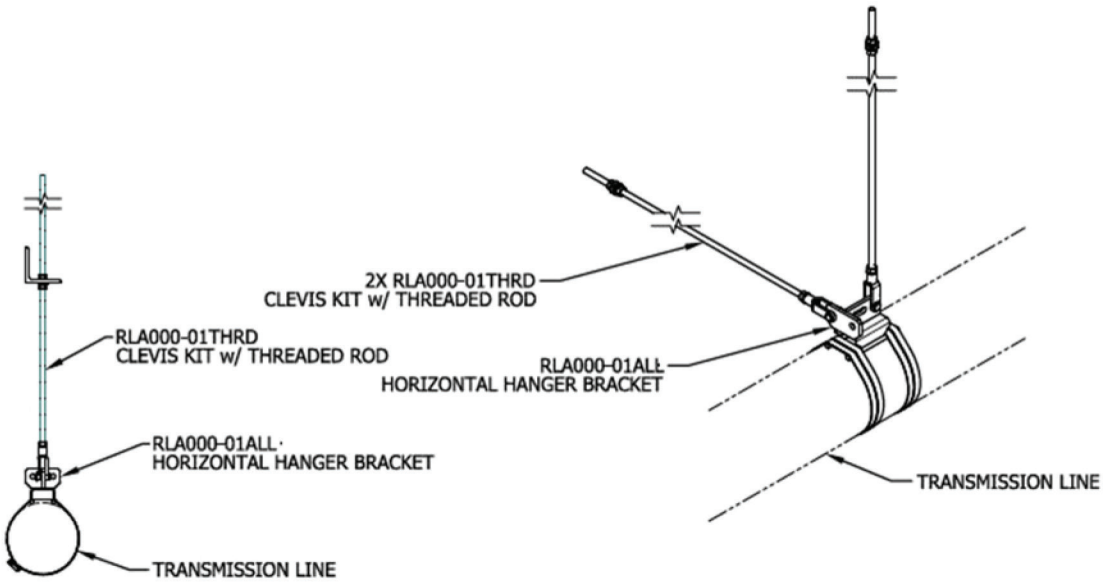
Horizontal Spring Hangers



Universal Horizontal Bracket Assembly with Horizontal Spring Hanger Kits in Single-Point and Three-Point Horizontal Spring Hanger Suspension Configurations

The Universal Horizontal Bracket Assembly when combined with a Horizontal Spring Hanger Kit (RLA000-01VSAL for Aluminum Line or RLA000-01VSCU of Copper Line) to make Single Point Horizontal Spring Hangers. Three-Point Horizontal Spring Hangers can be made by adding two (2) Horizontal Side Spring Hanger Kits (RLA000-01HS). Horizontal Spring Hangers are required for the entire length of the Minimum Horizontal Line Run. The horizontal spring hanger spacing should be an average of 40-feet (12.2-meters) for 3-1/8 and 4-1/16-inch Aluminum Outer Conductor Rigid Line, 20-feet (6.1-meters) for 3-1/8 and 4-1/16-inch Copper Outer Conductor or 6-1/8-inch Aluminum Outer Conductor Rigid Line and 10-feet (3-meters) 6-1/8, 7-3/16 and 8-3/16-inch Copper outer Conductor Rigid Line.

Horizontal Fixed Hangers



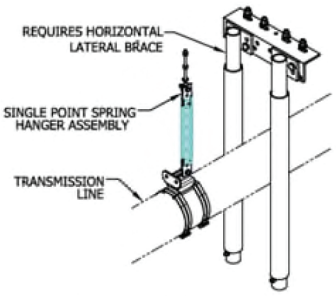
Universal Horizontal Bracket Assembly with Clevis with Threaded Rod Kits in Single-Point and Two-Point Fixed Horizontal Suspension Configurations

Horizontal Lateral Braces

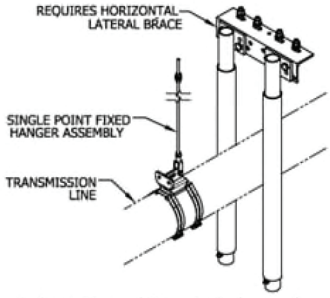
The Horizontal Lateral Brace is used at 20-foot (6.1-meter) intervals along the entire length of the horizontal line run when single-point spring hangers are used. This is the preferred configuration as it provides the best support and control of lateral movement for the horizontal run and is usually the easiest to install in crowded existing transmission line bridges. The Horizontal Lateral Brace is universal for all line sizes.

	Dimension "E"	
Line Size	**Copper Line**	**Aluminum Line**
3-1/8-inch	25.10-inches (638-mm)	33.02-inches (839-mm)
4-1/16-inch	27.49-inches (698-mm)	33.88-inches (861-mm)
6-1/8-inch	27.44-inches (697-mm)	36.77-inches (934-mm)
7-3/16-inch	29.04-inches (738-mm)	
8-3/16-inch	30.78-inches (782-mm)	

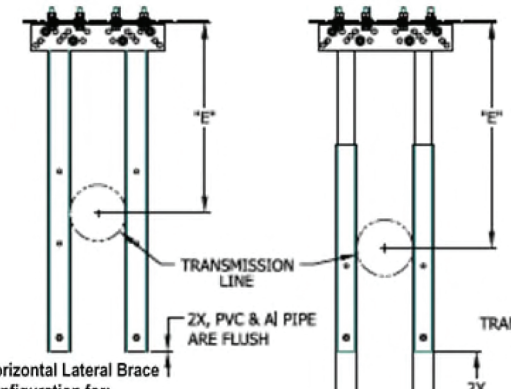
Horizontal Spring Hangers are required for the entire length of the Minimum Horizontal Line Run. The horizontal spring hanger spacing should average of 40-feet (12.2-meters) for 3-1/8 and 4-1/16-inch Aluminum Line, 20-feet (6.1-meters) for 3-1/8 and 4-1/16-inch Copper Line or 6-1/8-inch Aluminum Line and 10-feet (3-meters) 6-1/8, 7-3/16 and 8-3/16-inch Copper Line. Horizontal Fixed Hangers can be used on the portion of the horizontal run that exceeds the Minimum Horizontal Line Run. The horizontal fixed hanger spacing should be an average of every 10-feet (3-meters) for all copper line sizes and 20-foot (6.1-meter) for all aluminum line.



Horizontal Lateral Brace typical mounting configuration with Single-Point Horizontal Spring Hanger

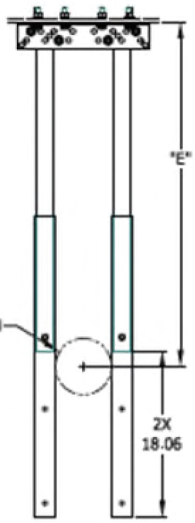


Horizontal Lateral Brace typical mounting configuration with Single-Point Horizontal Fixed Hanger



Horizontal Lateral Brace configuration for:
- 3-1/8-in, 4-1/16-in and 6-1/8-inch copper line vertical runs up to 2,000-feet (610-meters)
- 7-3/16-in and 8-3/16-inch copper line vertical runs up to 1,000-feet (305-meters)

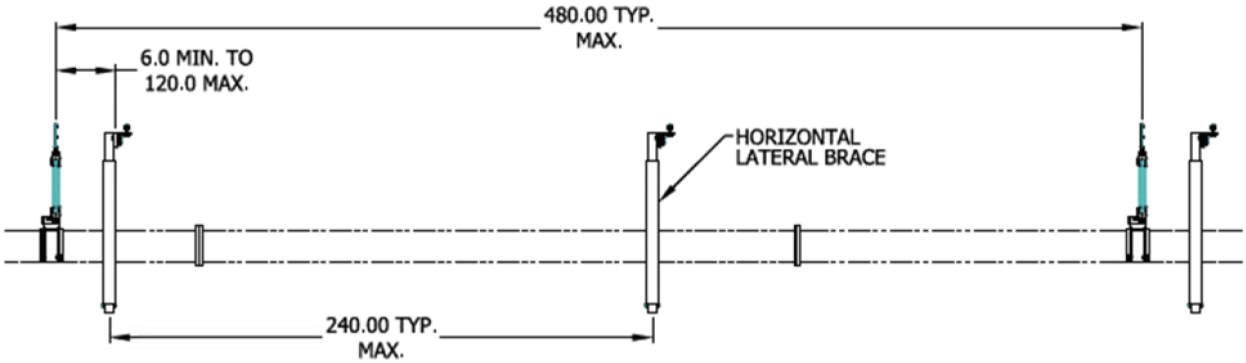
Horizontal Lateral Brace configuration for:
- 3-1/8-in, 4-1/16-in and 6-1/8-inch aluminum line vertical runs up to 1,000-feet (305-meters)
- 7-3/16-in and 8-3/16-inch copper line vertical runs up to 2,000-feet (610-meters)



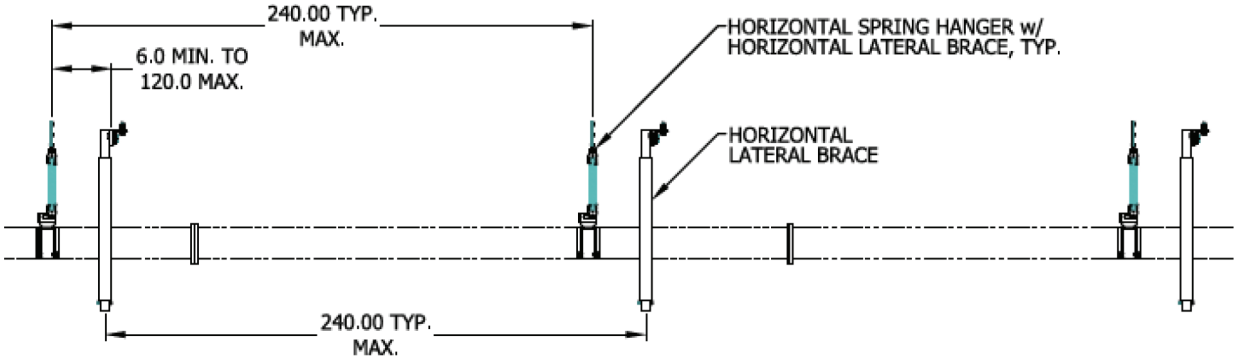
Horizontal Lateral Brace configuration for:
- 3-1/8-in, 4-1/16-in and 6-1/8-inch aluminum line vertical runs up to 2,000-feet (610-meters)

Horizontal Lateral Braces are configured to accommodate all of the configurations show above. The RLA000-01HLB includes PVC guides which can be adjusted to any of the lengths shown. When installed with no guide adjustments ("FLUSH") their length is 35.81-inches (910-mm). When extended to the first position ("2X 10.25") length is 46.06-inches (1170-mm) and when extended to the second position ("2X 18.06) they are 54.07-inches (1373-mm) in length.

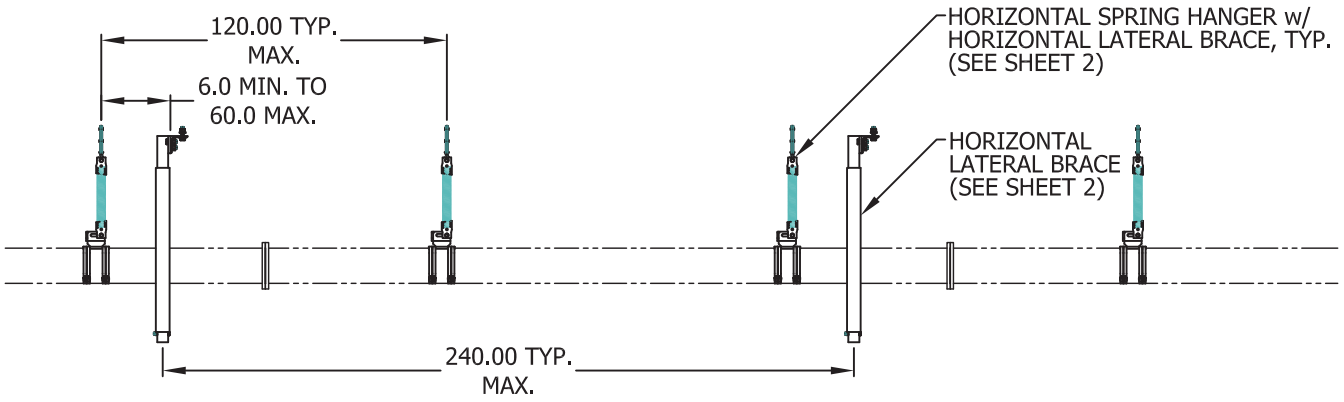
Horizontal Lateral Brace Typical Mounting Configurations and Length Adjustment for all Applications



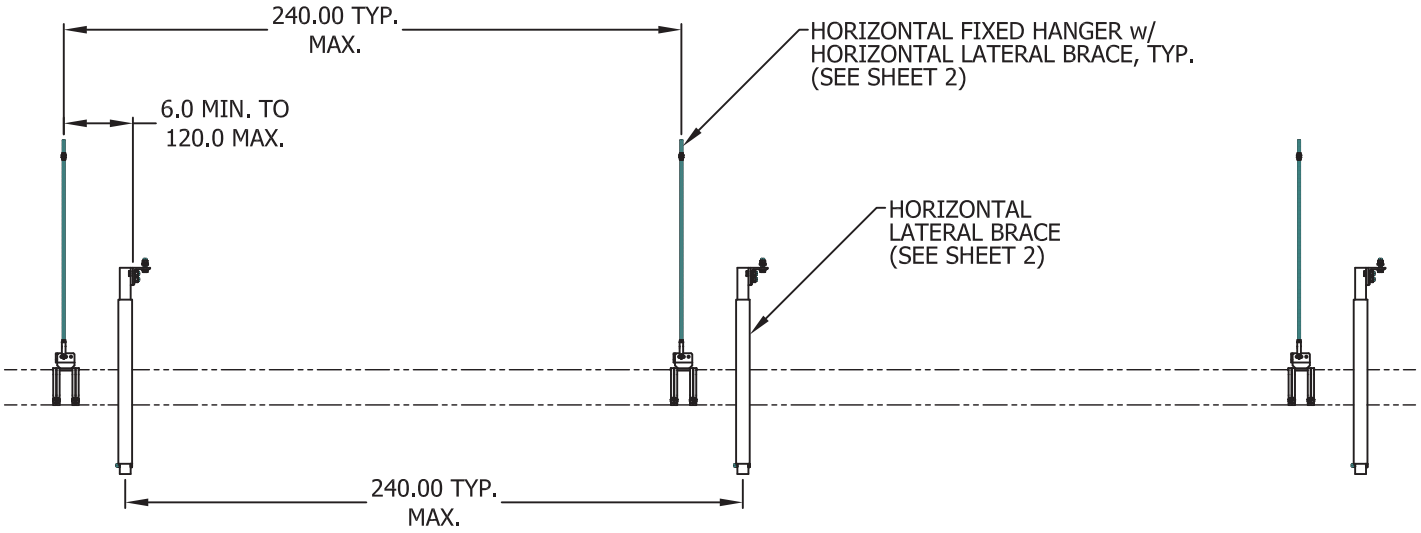
Horizontal Lateral Brace and Horizontal Spring Hanger Configuration for 3-1/8-inch and 4-1/16-inch Aluminum Outer Conductor Transmission Line Horizontal Line Runs



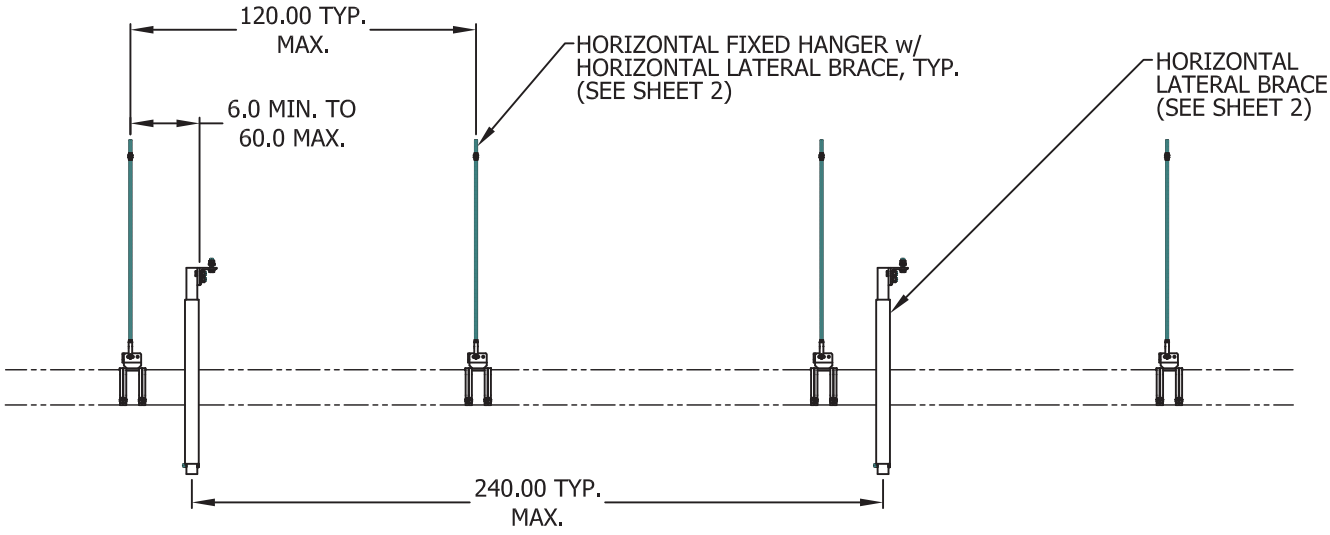
Horizontal Lateral Brace and Horizontal Spring Hanger Configuration for 3-1/8-inch and 4-1/16-inch Copper Outer Conductor and 6-1/8-inch Aluminum Outer Conductor Transmission Line Horizontal Line Runs



Horizontal Lateral Brace and Horizontal Spring Hanger Configuration for 6-1/8-inch, 7-3/16 and 8-3/16-inch Copper Outer Conductor Transmission Line Horizontal Line Runs



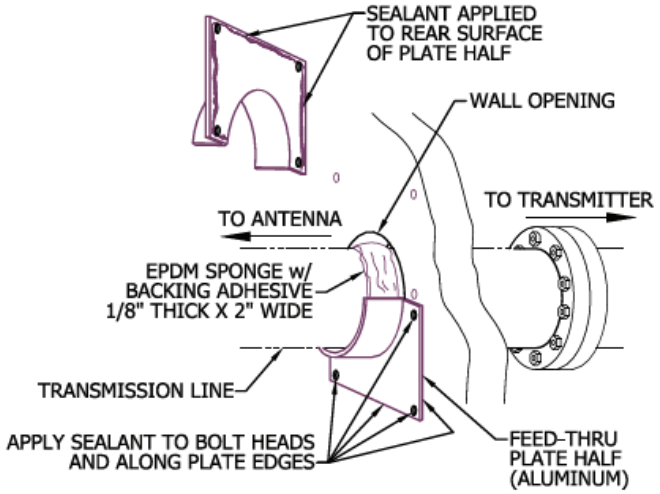
Horizontal Lateral Brace and Horizontal Fixed Hanger Configuration for 3-1/8-inch, 4-1/16-inch and 6-1/8-inch Aluminum Outer Conductor Transmission Line Horizontal Line Runs

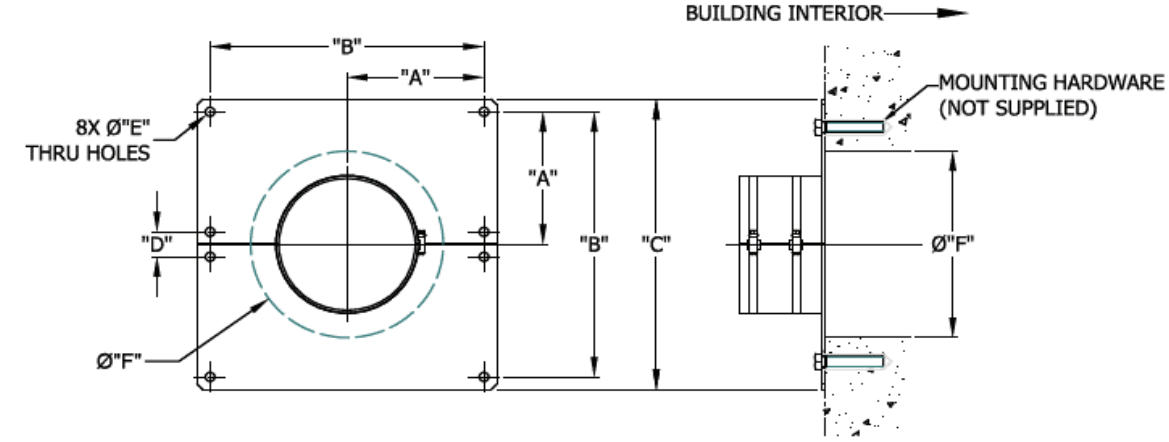


Horizontal Lateral Brace and Horizontal Fixed Hanger Configuration for 3-1/8-inch, 4-1/16-inch, 6-1/8-inch, 7-3/16-inch and 8-3/16-inch Copper Outer Conductor Transmission Line Horizontal Line Runs

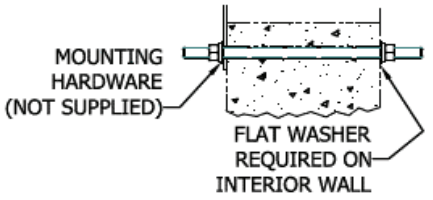
Wall/Roof Feed Thru Plates

Wall/Roof Feed Thru Plates accommodate passage of a rigid line section through a wood, metal or concrete wall or roof of the transmitter building. The plates are provided in two (2) pieces and provide proper weather sealing at the point where the transmission line enters the building. A single plate can be used on the building exterior and a second Wall/Roof Feed Thru Plate can be installed on the interior side of building, at the installer's option. Mounting holes for 3/8-inch or ½-inch (see Dim E) customer supplied hardware are provided to secure the Feed-Thru Plate at the egress point.

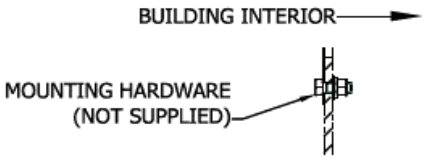




CONCRETE WALL/ROOF



CONCRETE WALL/ROOF
ALTERNATE FASTENING METHOD



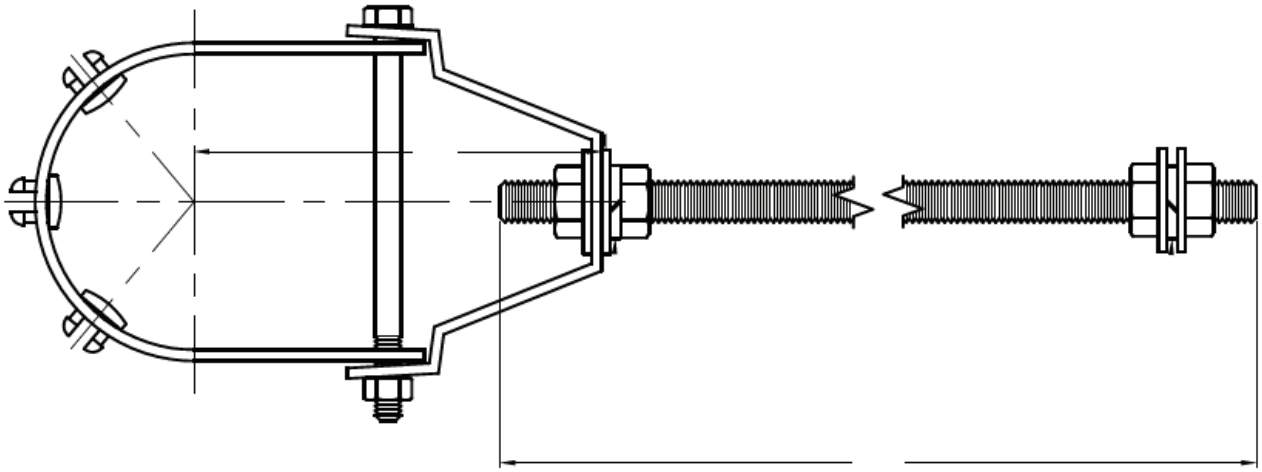
METAL WALL/ROOF
FASTENING METHOD

Wall/Roof Feed Thru Plates

Part No.	Line Size	Dim A	Dim B	Dim C	Dim D	Dim E	Dim F	Weight
RLA100-15	1-5/8-inch	2.250-in (57-mm)	4.750-in (121-mm)	6.000-in (152-mm)	-- --	0.438-in (11-mm)	3.000-in (76-mm)	0.9-lbm (0.4-kg)
RLA300-15A	3-1/8-inch	3.400-in (86-mm)	6.800-in (173-mm)	8.000-in (203-mm)	1.200-in (30-mm)	0.438-in (11-mm)	6.000-in (152-mm)	1.1-lbm (0.5-kg)
RLA400-15A	4-1/16-inch	3.400-in (86-mm)	6.800-in (173-mm)	8.000-in (203-mm)	1.200-in (30-mm)	0.438-in (11-mm)	7.000-in (178-mm)	1.2-lbm (0.5-kg)
RLA600-15A	6-1/8-inch	6.400-in (163-mm)	12.800-in (325-mm)	14.000-in (356-mm)	1.200-in (30-mm)	0.438-in (11-mm)	9.000-in (229-mm)	2.9-lbm (1.3-kg)
RLA700-15AL	7-3/16-inch	7.000-in (178-mm)	14.000-in (356-mm)	16.000-in (406-mm)	2.000-in (51-mm)	0.563-in (14-mm)	10.000-in (254-mm)	17.0-lbm (7.7-kg)
RLA800B-15	8-3/16-inch	7.000-in (178-mm)	14.000-in (356-mm)	16.000-in (406-mm)	2.000-in (51-mm)	0.563-in (14-mm)	12.000-in (305-mm)	17.0-lbm (7.7-kg)

Horizontal Slip Hangers

For indoor use only. Supports horizontal transmission line runs accommodates lateral motion due to expansion and contraction. Includes threaded rod and hardware to allow height adjustment.



RLAx00-22A Horizontal Sliding Hanger

Horizontal Sliding Hangers

Part No.	Line Size	Dim A		Dim B		Weight		Attachment Hardware
RLA100-22A	1-5/8-inch	3.000-in	(76-mm)	36.000-in	(914-mm)	1.8-lbm	(0.8-kg)	3/8-inch
RLA300-22A	3-1/8-inch	4.880-in	(124-mm)	36.000-in	(914-mm)	2.0-lbm	(0.9-kg)	1/2-inch
RLA400-22A	4-1/16-inch	5.500-in	(140-mm)	36.000-in	(914-mm)	2.2-lbm	(1.0-kg)	1/2-inch
RLA600B-22A	6-1/8-inch	6.940-in	(176-mm)	36.000-in	(914-mm)	3.8-lbm	(1.7-kg)	1/2-inch
RLA700-22A	7-3/16-inch	8.380-in	(213-mm)	36.000-in	(914-mm)	11.0-lbm	(5.0-kg)	1/2-inch
RLA800-22A	8-3/16-inch	8.380-in	(213-mm)	36.000-in	(914-mm)	11.0-lbm	(5.0-kg)	1/2-inch

Pressurization

When the installation of the any air dielectric transmission line is complete the gas barrier is installed inside the transmitter building. The transmission line during installation was exposed to the atmosphere and so it must be purged of moisture prior to the application of power. To purge the transmission line to determine the total system volume of the transmission line and the antenna, if it is pressurized, and divide this by the dehydrator flow rate. This figure will provide the number of hours the dehydrator must run to displace the total untreated air in the system. Open the farthest end of the transmission line/antenna system as possible. Run the dehydrator long enough to replace the complete volume of air in the complete system at least three (3) times. If it is not possible to open the far end of the transmission line connect the dehydrator to the system and pressurize to at least 5 psig. Wait 15 minutes for the dry air added to absorb moisture in the system and disconnect the dehydrator and allow the transmission line to vent. Repeat these two steps at least twelve (12) times. After the transmission line has been initially purged maintain a positive 3 to 5 psig dry gas pressure. An alternate to an air dehydrator is dry nitrogen, from a nitrogen generator or delivered in compressed gas cylinders and fitted with a pressure regulator, can also be used to purge and pressurize transmission lines.