

Casing Spacer Technology Leaders

Benefit today. Save down the line.



www.racispacers.com

raci
NORTH AMERICA

*Raci has been the global leader
in casing spacer technology
since 1952.*

Our uniquely designed, engineered and patented spacers are widely respected and our dependability has made us the number one choice of specifiers and installers worldwide.

Our ISO 9001:2000 CERTIFICATION ensures that Raci Spacers consistently provides our customers with the highest standard of products and service.

Why Raci

Manufactured by injection molding, our HDPE spacer has high impact strength and a low coefficient of friction which exceeds industry standards. Raci is the strongest and safest casing spacer solution.



Each spacer element represents a flexible section that has a toothed male butt strap at one end and an appropriately toothed female slot on the other end. Absolutely no metallic parts are involved in their assembly. This design allows for on site adjustments for any variances within the O.D. range. Coupled with their flexibility they cover all types of pipe from O.D. range 1.65 inches (42 mm) and upward.

Raci spacers offer many advantages over the standard skid and strap application and over other models of manufactured spacers.



- Manufactured entirely out of high-density polyethylene with **no metal bolts or attachments required.**
- Quickly and easily assembled by manually fitting elements one into the other.
- Spacers slide into casing with ease.
- Tooth insertion method allows on site adjustment to fit a wide range of pipe diameters and coatings.
- Provide long term corrosion protection.
- **Provide projections around the entire circumference of the carrier pipe.** A minimum of 1 projection for every 1 inch of carrier pipe O.D.
- Spacers maintain continual long-term support for the carrier pipe and its contents.
- Can be installed on coated or plain concrete, ductile iron, plastic and steel pipe.
- Spacers maintain grade during installation.

Choosing a Spacer

Casing spacers are used to install carrier pipe inside the encasement pipe in order to provide support around the periphery of the pipe as it naturally rotates while being pushed through the casing.

The innovation and engineering behind Raci Spacers provides you with the best long-term protection.

Physical characteristics Raci High Density Polyethylene Spacers

Yield Strength	3625 PSI	25 N/mm ²	ASTM D 638
Tensile Strength	2900 PSI	20 N/mm ²	ASTM D 638
Elongation at break	200%	200%	ASTM D 638
Hardness shore D	65	65	ASTM D 2240
Min working temperature	-4° F	-20° C	-
Dielectric strength	>940 Kv/inch	>37 Kv/mm	ASTM 149/64
UVL stabilization	yes	yes	-



Customers around the world choose Raci spacers for a wide range of applications

Raci casing spacers and dual containment pipe spacers are available for pipe sizes 1.65" (42 mm) and upward. Our customers around the world use Raci Spacers for a range of applications:

- Municipal water pipe and water transmission pipeline cased crossings.
- Drainage lines that need to be protected and in double containment.
- Oil and gas pipeline cased crossings and casings along highways, roads and railroads.
- Municipal sewer pipe cased crossings.
- Dual containment pipe application for waste water and hazardous materials (for concentrated hazardous materials please contact your distributor for chemical resistance tables).

All Raci insulators and spacers meet the following criteria for separating casing and carrier pipes:

- Ensures electrical insulation between the two pipes.
- Fastens tightly on the carrier pipe to ensure no horizontal movement during insertion.
- Resistant to both mechanical and thermal shocks and stresses particularly during installation.
- Made of materials which do not conduct electricity and are permanently resistant to chemical corrosion.
- Permanently prevent bells from sliding or resting on casing pipe.
- Provide constant projections around the entire circumference of the carrier pipe. A minimum of 1 projection for every 1 inch of carrier pipe O.D.

SPECIAL APPLICATIONS

On request spacers can be manufactured in other types of plastic material according to the mechanical and temperature requirements of the application.

Choosing a Spacer

Appropriate spacer selection and installation provides the best long-term protection.

With the information below and using our selection charts, the type and number of spacer elements required for each ring and how far they will be spaced can be determined.

- Clearance desired between casing and carrier pipe.
- Length of application.
- Linear weight of filled carrier pipe.
- Exact bell, flange or coupling O.D.
- Exact carrier pipe O.D.
- Exact casing Pipe I.D.

Spacer selection simplified.

SIZE	CARRIER PIPE O.D.	RECOMMENDED SOLUTION
Small	Up to 200 mm or 7 in Up to 280 mm or 11 in	S/T or C/D/I A/B
Medium	Up to 530 mm or 20 in Up to 1000 mm or 38 in	F/G M/N or P/Q
Large	Up to 1750 mm or 68 in Up to 3400+ mm or 134+ in	L E/H



Formulas

Our basic formulas below will help you choose the correct Raci Spacer element.

1 FORMULA ONE To determine height required

$\text{casing pipe ID} - \text{carrier pipe O.D.} / 2$ will give you the desired range for element height.

Go to the table that best addresses the carrier pipe O.D. and load carrying capacity to determine the different heights that are available within that style.

2 FORMULA TWO To clear the bell

$(\text{carrier pipe O.D.}) + (2 \text{ times height of element}) > \text{O.D. of bell} + \text{clearance factor}^* \times 2$

*Clearance factor is .6 inches or 15 mm and ensures bell clearance.

3 FORMULA THREE For insertion ease

$(\text{carrier pipe O.D.}) + (2 \text{ times height of element}) + \text{clearance factor}^* < \text{the I.D. of casing pipe}$

*Clearance factor is .6 inches or 15 mm and ensures insertion ease.

*When working in inches the clearance factor is .6

Once you have determined the element type and the height necessary return to the table to determine the number of elements required to complete a ring.

4 FORMULA FOUR Number of rings required

$\text{length of application} / \text{distance between rings} + 3^*$

*The spacing of Raci spacer rings must ensure that the carrier pipe is fully supported throughout its length.

! Please see note on page 15

To guard against the effects of differential loading at the entrance and exit points of the casing, two rings are used at the beginning and end of the casing, regardless of pipe size or length.

Products

Raci Spacers are divided into 3 groups which address a wide range of pipe sizes, and weights. Individual spacers within each group have specific load carrying capacities. The tables below state these figures with a built in safety factor. All of these factors must be verified to determine the best spacer type for the application.

SMALL	SPACER	IDEAL PIPE RANGE	RUNNER HEIGHT AVAILABLE
	S, T	60 – 164 mm O.D. 2.4 – 6.5 in O.D.	20 mm .79 in
	C, D, I	42 – 200 mm O.D. 1.6 – 7.9 in O.D.	15 mm .59 in
	A, B	55 – 281 mm O.D. 2.2 – 11.1 in O.D.	19, 36, 50 mm .75, 1.42, 1.97 in
<hr/>			
MEDIUM			
	F, G	92 – 528 mm O.D. 3.6 – 20.8 in O.D.	25, 41, 60, 75 mm .98, 1.61, 2.36, 2.95 in
	M, N	143 – 1015 mm O.D. 5.6 – 39.9 in O.D.	18, 25, 36, 41, 50, 75, 90 mm .7, .98, 1.42, 1.61, 1.97, 2.95, 3.54 in
	P, Q	143 – 1015 mm O.D. 5.6 – 39.9 in O.D.	110, 120 mm 4.33, 4.73 in
<hr/>			
LARGE			
	L	450 – 1340* ¹ mm O.D. 18 – 52* ¹ in O.D.	25, 41, 50, 75, 100, 125, 150, 175, 200 mm .98, 1.61, 1.97, 2.95, 3.94, 4.92, 5.91, 6.89, 7.87 in
	E, H	421 – 3400* ² mm O.D. 8.7 – 134* ² in O.D.	25, 41, 60, 75, 90, 110, 130 mm .98, 1.61, 2.36, 2.95, 3.54, 4.33, 5.11 in

*1 for O.D. larger than 52" (1340) please contact your distributor. *2 for O.D. larger than 134" (3400) please contact your distributor.

Safe now. Save later.

Easy to install and field adjustable, our casing spacers are the number one choice of specifiers and installers.

Our uniquely engineered casing spacers are designed and tested to provide continuous support and protection during installation and over the long-term.

With no metal parts, our injection-molded polyethylene spacers are corrosion-resistant, saving you money in the long run.



Assembly & Installation

This document contains important information for installation of Raci Casing Spacers. Read and understand these before installation. In the event of disagreement between this document and any other installation notes, the information in this document shall prevail. Failure to follow these instructions may limit the success of your Raci Casing Spacer installation.

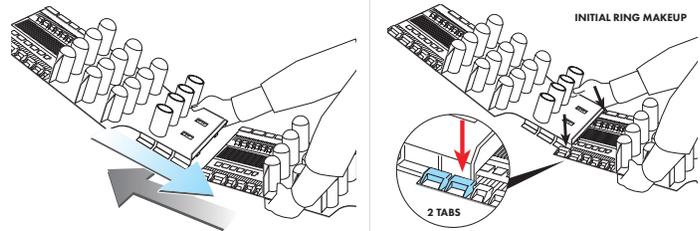
BEFORE YOU BEGIN

- Your ring configuration may include mixed Raci spacer elements (e.g. F & G, or M&N, etc.). Ensure that each ring is assembled in the steps below including the correct number and type of each element. Consult your Sales Quotation or Sales Order for more information.
- Raci spacer elements are single-use only and cannot be reused if damaged, worn from a previous installation or were disassembled. Ensure all the spacers for the installation are clean, undamaged and in otherwise good condition prior to beginning ring assembly and installation.
- Installation temperatures below 41°F / 5°C make elements less flexible and harder to install.
- Choose the installation tool suitable for the type and height of the spacer element before starting.
- Before starting with the installation, check the number of elements for each spacer ring is correct and of the right type.

STEP 1 - INITIAL MAKE UP

Insert the male end into the slot of the next spacer, engaging it to the 2nd marker tab. Continue in this fashion until you have a belt of elements ready to wrap around the carrier pipe.

- ⚠ Do not engage any spacer past the 2nd tab at this time. Going beyond 2 tabs may prevent proper tightening at later steps.
- Once inserted, spacer elements cannot be disassembled or backed off without damaging the Raci element.

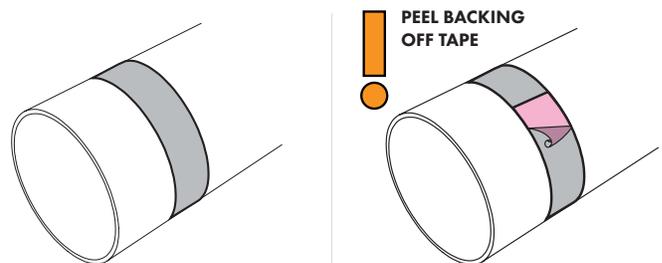


STEP 2 - TAPING

Apply double-sided tape to the outside of the carrier pipe where the spacer ring will be located, via this method:

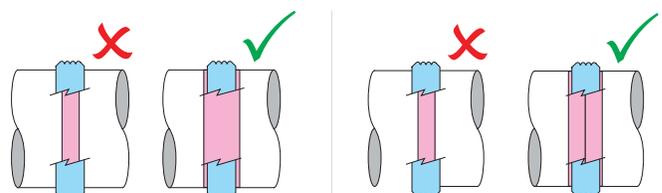
a.) Wrap the tape around the entire circumference of the pipe, ensuring that the width of the tape is equal to or wider than the width of the Raci element being used.

b.) Peel the tape backing off to exposing the outside face of adhesive. Leave this step until just before you are ready to place the ring on the carrier.



TAPE WIDER THAN ELEMENT RING DOUBLE UP IF REQUIRED

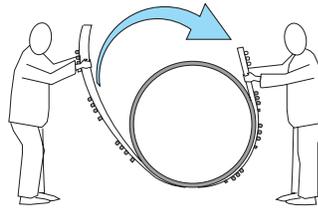
- ⚠ Tape must be as wide or wider than the Raci element. Use wider tape, or run a second course of tape segments next to the first course if additional width required.



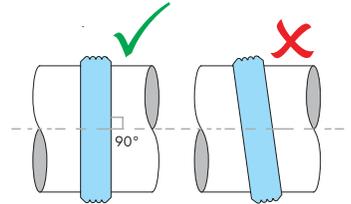
STEP 3 - WRAPPING

Wrap the spacer belt loosely around the pipe and close the ends by hand up to the 2nd tab, same as in **Step 1**.

- ⚠ Ensure the spacer ring is aligned with the tape, and is not at an angle. For proper engagement, the spacer ring must be square to the carrier pipe.
- ⚠ Tape backing must be removed prior to this step.



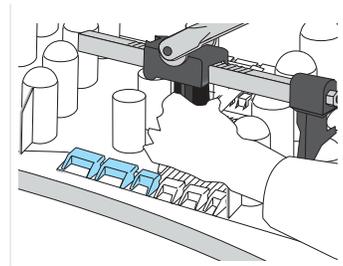
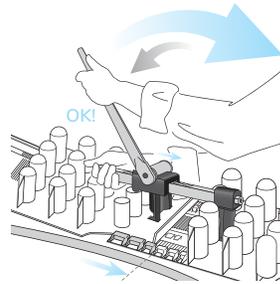
ENSURE RING SQUARE TO PIPE



STEP 4 - INITIAL TIGHTENING

Use the Raci Tool to tighten each spacer element connection evenly up to the 3rd tab. Periodically check alignment to make sure the spacer ring is still square to the carrier pipe, and is on the tape applied in **Step 2**.

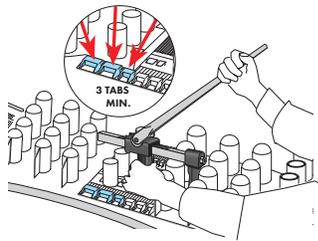
- ⚠ Tightening past the 3rd tab at this step may prevent all elements from connecting properly.



STEP 5 - FINAL TIGHTENING

Continue to work around the spacer ring with the Raci tool to gradually and evenly tighten the ring around the carrier pipe. Each element should have about the same number of tabs engaged.

- ⚠ Do not use a snipe or cheater bar on the handle of the Raci tool.



STEP 6 - CONTINUE INSTALLATION

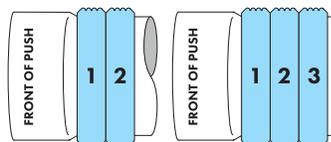
Repeat **Steps 1 - 5**, spacing the element rings out per the spacing information provided with the Sales Quotation or Sales Order until the entire carrier pipe has spacer rings installed. Once tightened, the spacer ring and carrier pipe are ready to be installed into the casing.

CARRIER INSERTION NOTES

If carrier pipe is pushed into the casing, note the required number of lead and tail rings on the push, and ensure that these are installed prior to starting.

- ⚠ Casing Lubrication is strongly recommended. Periodic re-lubrication may be required.
- ⚠ Make sure the casing interior and elements are free of dirt, mud and debris prior to push.
- ⚠ Just prior to inserting the pipe lengths, make sure to re-tighten each spacer ring just before they are inserted into the casing.

LEAD RING CONFIGURATION



← PUSH

0 - 200 ft
[0 - 60 m]
2 LEAD RINGS

Regular spacing.

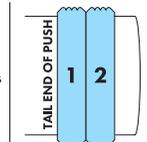
← PUSH

200 - 400 ft
[60 - 120 m]
3 LEAD RINGS

Reduce spacing to 70% for first 200 ft (60 m) and use regular spacing for the 2nd 200 ft (60 m).

Please contact your distributor for Raci engineering recommendations for spacing and special recommendations.

TAIL RING CONFIG.



← PUSH

2 TAILING RINGS AT END OF PUSH

Raci Spacer Options: **Small**

Type S, T 20 mm element support height of .79 inches						
O.D. range inches		O.D. range mm		No. of elements to make a ring		
min	max	min	max	S	T	
2.32	2.67	59	68	2	-	
2.71	2.95	69	75	1	1	
2.99	3.30	76	84	-	2	
3.46	4.01	88	102	3	-	
4.06	4.21	103	107	2	1	
4.25	4.48	108	114	1	2	
4.53	4.72	115	120	-	3	
4.76	5.19	121	132	4	-	
5.24	5.51	133	140	3	1	
5.55	5.74	141	146	2	2	
5.79	5.98	147	152	1	3	
6.02	6.61	153	168	-	4	

MAXIMUM LOAD MUST NOT EXCEED 250 LBS/110 KG PER RING

Type C, D, I 15 mm element support height of .59 inches						
O.D. range inches		O.D. range mm		No. of elements to make a ring		
min	max	min	max	C	D	I
1.65	2.05	42	52	-	-	1
2.28	3.15	58	80	1	-	-
3.19	3.90	81	99	-	1	-
3.94	5.24	100	133	1	-	1
5.28	6.69	134	170	1	1	-
6.73	7.87	171	200	-	2	-

MAXIMUM LOAD MUST NOT EXCEED 440 LBS/200 KG PER RING

Type A,B 19, 36, 50 mm						
O.D. range inches		O.D. range mm		No. of elements to make a ring		
min	max	min	max	A	B	
2.17	2.52	55	64	-	2	
2.36	2.76	60	70	1	1	
2.68	3.03	68	77	2	-	
3.35	3.86	85	98	-	3	
3.54	4.17	90	106	1	2	
3.86	4.57	98	116	3	-	
4.65	5.20	118	132	-	4	
4.92	5.51	125	140	1	3	
5.51	6.22	140	158	4	-	
6.22	7.09	158	180	2	3	
7.01	7.87	178	200	5	-	
7.87	9.45	200	240	-	7	
8.46	9.53	215	242	6	-	
9.41	10.71	239	272	6	1	
9.65	11.06	245	281	7	-	

Elements	Runner Height In.	Max Load Per Ring	
		Lbs	Kg
A/B 19	0.75	770	350
A/B 36	1.42	550	250
A/B 50	1.97	440	200

Raci Spacer Options: **Medium**

Type F, G 25, 41, 60, 75 mm					
O.D. range inches		O.D. range mm		No. of elements to make a ring	
min	max	min	max	F	G
3.62	4.41	92	112	1	1
4.45	5.98	113	152	2	-
6.02	7.40	153	188	2	1
7.44	8.82	189	224	3	-
8.86	10.24	225	260	3	1
10.28	11.61	261	295	4	-
11.65	12.32	296	313	4	1
12.36	14.80	314	376	5	-
14.84	17.56	377	446	6	-
17.60	20.79	447	528	7	-
Elements	Runner Height In.	Max Load Per Ring			
		Lbs		Kg	
F/G 25	0.98	1540		700	
F/G 41	1.61	1870		850	
F/G 60	2.36	1870		850	
F/G 75	2.95	1870		850	

Type M, N 18, 25, 36, 41, 50, 75, 90 mm				Type P, Q 110, 120 mm	
O.D. range inches		O.D. range mm		No. of elements to make a ring	
min	max	min	max	M/P	N/Q
5.63	6.61	143	168	1	1
6.65	7.91	169	201	2	-
7.95	8.94	202	227	1	2
8.98	9.92	228	252	2	1
9.96	11.26	253	286	3	-
11.30	12.24	287	311	2	2
12.28	13.27	312	337	3	1
13.31	15.55	338	395	4	-
15.59	16.57	396	421	4	1
16.61	19.88	422	505	5	-
19.92	23.23	506	590	6	-
23.27	26.54	591	674	7	-
26.57	29.88	675	759	8	-
29.92	36.02	760	915	9	-
33.46	39.96	850	1015	10	-
Elements	Runner Height In.	Max Load Per Ring			
		Lbs		Kg	
M/N 18	0.70	2425		1100	
M/N 25	0.98	2535		1150	
M/N 36	1.42	4400		2000	
M 41	1.61	3968		1800	
M/N 50	1.97	3638		1650	
M/N 75	2.95	4300		1950	
M/N 90	3.54	3858		1750	
P/Q 110	4.33	2315		1050	
P/Q 120	4.72	2200		1000	

Raci Spacer Options: Large

Type L 25, 41, 50, 75, 100, 125, 150, 175, 200					
O.D. range inches		O.D. range mm		No. of elements to make a ring	
min	max	min	max	L	
17.72	20.07	450	510	5	
21.26	24.01	540	610	6	
24.61	28.14	625	715	7	
28.15	31.69	715	805	8	
31.69	35.23	805	895	9	
35.24	38.77	895	985	10	
38.78	42.32	985	1075	11	
42.32	45.66	1075	1160	12	
45.67	49.21	1160	1250	13	
49.21	52.75	1250	1340	14	
52.76	56.29	1340	1430	15	
56.30	59.84	1430	1520	16	
59.84	63.38	1520	1610	17	
63.39	68.89	1610	1750	18	
Elements	Runner Height In.	Max Load Per Ring			
		Lbs		Kg	
L 25, 41, 50	0.98, 1.61, 1.97	6600		3000	
L 75	2.95	5500		2500	
L 100	3.94	5500		2500	
L 125	4.92	4400		2000	
L 150, 175, 200	5.91, 6.89, 7.87	3300		1500	

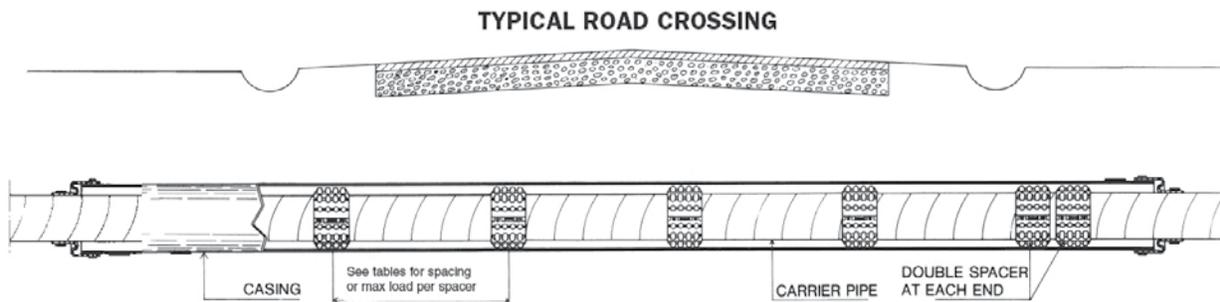
Type E and H 25, 41, 60, 75, 90, 110 and 130 mm					
O.D. range inches		O.D. range mm		No. of elements to make a ring	
min	max	min	max	E	H
16.58	18.30	421	465	4	1
18.35	20.86	466	530	5	-
20.91	24.80	531	630	6	-
24.84	28.74	631	730	7	-
28.78	32.67	731	830	8	-
32.29	35.82	820	910	9	-
35.83	40.55	910	1030	10	-
40.59	45.62	1031	1159	11	-
45.67	53.54	1160	1360	13	-
53.58	62.99	1361	1600	15	-
63.03	70.82	1601	1799	17	-
70.87	83.07	1800	2110	20	-
83.11	95.66	2111	2430	23	-
95.71	112.59	2431	2860	27	-
112.64	134.40 *1	2861	3414	32	-
Elements	Runner Height In.	Max Load Per Ring			
		Lbs		Kg	
E/H 25, 41, 60	0.98, 1.61, 2.36	11000		5000	
E/H 75	2.95	8800		4000	
E/H 90	3.54	9000		4100	
E/H 110	4.33	7600		3450	
E/H 130	5.11	7150		3250	

*1 for O.D. larger than 134" (3400) please contact your distributor



Distance between spacers must be calculated so the maximum load per spacer ring does not exceed the max. load carrying capacity for the type used as shown in the tables. Maximum load per spacer is calculated based on the weight of the pipe filled with liquid divided by the number of spacer rings installed. The maximum distance of 10 feet/ 3 metres shall not be exceeded due to the danger of the pipe sagging between the spacers support points unless the pipe manufacturer states differently.

Specifications



The spacers should be of a projection type that has a minimum number of projections around the circumference that total the number of diameter inches. For example: 8" pipe should have a minimum of 8 projections and 18" pipe should have a minimum of 18 projections.

Spacing between spacer rings (span) should be calculated based on the actual installed load (weight of pipe filled with liquid) but should not exceed 10 feet/ 3 meters. Refer to the tables for the load carrying capacity of each type of Raci spacer used.

Spacer should also have a minimum height that clears the pipe bell or as otherwise indicated on the plans.

Casing spacers should be projection type – non metallic spacers constructed of preformed sections of high-density polyethylene. Spacers should be ISO 9001:2000 certified for strength and quality.

Casing spacers should be installed using double backed tape provided with the spacers in order to fasten them tightly to the carrier pipe.



www.racispacers.com

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