

Benefit today. Save down the line.



**raci**<sup>®</sup>  
NORTH AMERICA

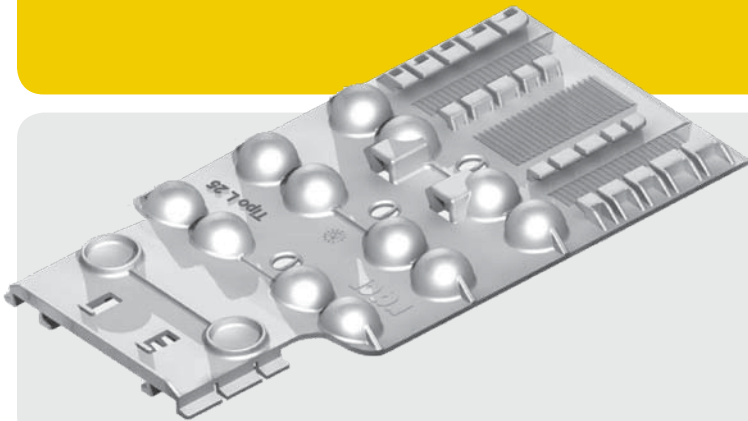
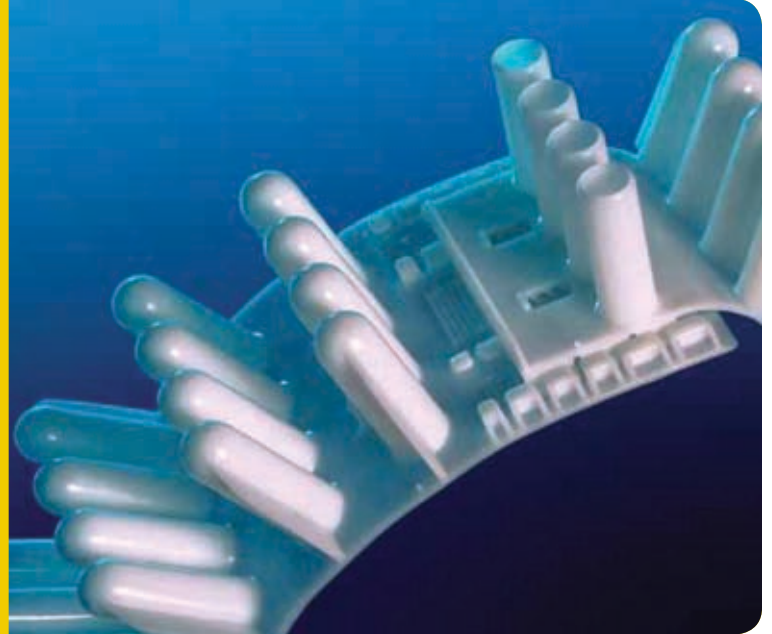
Raci has been the global leader in casing spacer technology since 1952. Our uniquely designed, engineered and patented spacers are widely respected and our dependability has made us the number one choice of specifiers and installers worldwide.

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

# The strongest and safest casing spacer solution.

Manufactured by injection molding, our HDPE spacer has high impact strength and a low coefficient of friction which exceeds industry standards.

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.
- Spacers maintain continual long-term support for the carrier pipe and its contents.
- **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.
- Provide long term corrosion protection.
- Can be installed on coated or plain concrete, ductile iron, plastic and steel pipe.
- Spacers maintain grade during installation



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 twists 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/mm2	ASTM D 638
Tensile Strength	2900 PSI	20 N/mm2	ASTM D 638
Elongation at Break	800%	800%	ASTM D 638
Hardness Shore D	65	65	ASTM D 2240
Minimum 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 use Raci spacers for a wide range of applications.

Raci casing spacers and dual containment pipe spacers are available for pipe sizes 1.65" to 150"+ (42mm to 3800mm +). Our customers around the world use Raci spacers for a range of applications.

- municipal water pipe and water transmission pipeline cased crossings
- municipal sewer pipe cased crossings
- oil and gas pipeline cased crossings and casings along highways, roads and railroads
- drainage lines that need to be protected and in double containment
- 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
- Permanently prevent bells from sliding or resting on casing pipe
- Fastens tightly on the carrier pipe to ensure no horizontal movement during insertion
- Made of materials which do not conduct electricity and are permanently resistant to chemical corrosion
- Resistant to both mechanical and thermal shocks and stresses particularly during installation
- 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.





# 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.

The selection of spacer type depends on the following dimensions:

- exact carrier pipe O.D.
- exact bell, flange or coupling O.D.
- exact casing Pipe I.D.
- clearance desired between casing and carrier pipe
- length of application
- linear weight of filled carrier pipe






## Spacer selection simplified.




	Carrier Pipe O.D.	Recommended Spacer
Small	Up to 177 mm or 7 inches	S/T or C/D/I
	Up to 304 mm or 12 inches	A/B
Medium	Up to 508 mm or 20 inches	F/G
	Up to 838 mm or 33 inches	M/N or P/Q
Large	Up to 1270 mm or 50 inches	L
	Up to 3810 mm or 150 inches	E/H





# Spacer Elements

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	Diameter Pipe Range	Runner Height Available
	S, T	60 – 164 mm O.D. 2 – 7 inch O.D.	20 mm .79 inches
	C, D, I	42 – 200 mm O.D. 2 – 8 inch O.D.	15 mm .59 inches
	A, B	55 – 281 mm O.D. 2 – 12 inch O.D.	19, 36 and 50 mm .75, 1.42 and 1.97 inches

Medium	Spacer	Diameter Pipe Range	Runner Height Available
	F, G	92 – 528 mm O.D. 3 – 20 inch O.D.	25, 41, 60, 75 mm .98, 1.61, 2.36 and 2.95 inches
	M, N	143 – 1015 mm O.D. 6 – 39 inch O.D.	18, 25, 36, 41, 50, 75, and 90 mm .7, .98, 1.42, 1.61, 1.97, 2.95, and 3.54 inches
	P, Q	143 – 1015 mm O.D. 6 – 39 inch O.D.	110 and 120 mm 4.33 and 4.73 inches

Large	Spacer	Diameter Pipe Range	Runner Height Available
	L	360 – 1241 mm O.D. 14 – 48 inch O.D.	25, 50, 75, 100, 125, 150, 175, 200 mm .98, 1.97, 2.95, 3.94, 4.92, 5.91, 6.89 and 7.87 inches
	E, H	221 – 3414 mm O.D. 9 – 134 inch O.D.	25, 41, 60, 75, 90, 110 and 130 mm .98, 1.61, 2.36, 2.95, 3.54, 4.33, 5.11 inches



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

#### Formula One To determine height required

Casing pipe ID - Carrier pipe OD / 2 will give you the desired range for element height.

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

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#### Formula Two To clear the bell

(carrier pipe O.D.) + ( 2 times height of element) is greater than O.D of Bell + 15 mm\*

\*Clearance factor of .6 inches/15 mm ensures bell clearance.

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#### Formula Three For insertion ease

(Carrier OD) + (2 times height of element) + 15 mm\* < the ID of casing pipe.

\*Clearance factor of .6 inches /15mm ensures insertion ease.

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.

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#### Formula Four Number of rings required

Length of application / distance between rings + 3\*

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

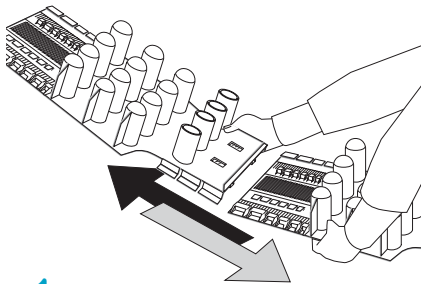
To guard against the effects of differential loading at the entrance and exit points of the casing, two rings are used at the beginning and end of the each casing, regardless of pipe size or length.





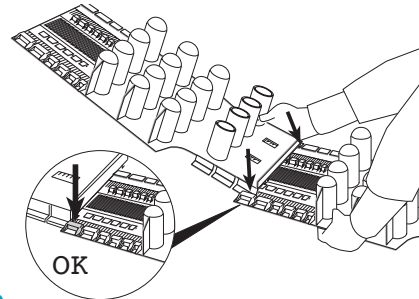
## Assembly Instructions

Raci Spacers are simple to install. Please ensure the contact zone between the carrier pipe and spacer is taped with a self amalgamating or bituminous tape.



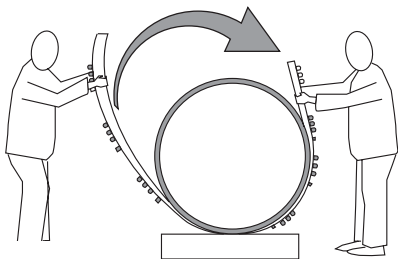
1

Insert the male button-strap into the slot of the next pieces until you have assembled the required number of elements to circle the pipe in order to create a belt of elements.



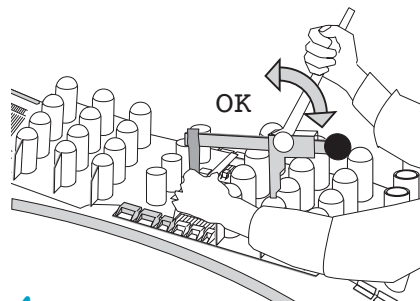
2

**REMINDER:** use double backed tape provided with the spacers in order to fasten them tightly to the carrier pipe.



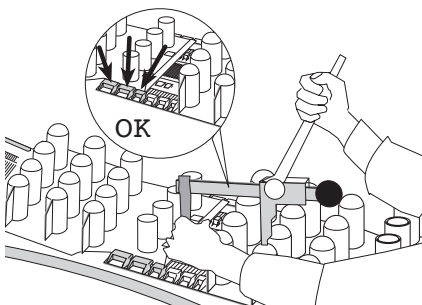
3

Wrap the spacer belt around the pipe and close the ends by hand, inserting the male butt-strap into the slot to make a complete ring.



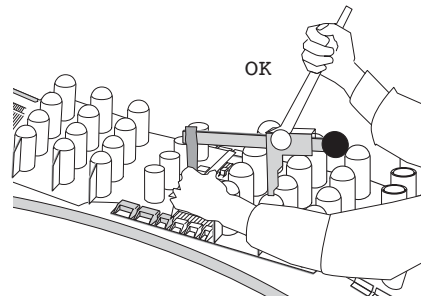
4

Start to fasten the ring around the pipe. Using the clamp, tighten each element up to the end of the third tooth.



5

For the final clamping around the pipe, tighten gradually in order to obtain as much as possible an omogeneous number of engaged teeth.



6

Distance between spacers must be calculated so the maximum load per spacer ring does not exceed the maximum 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.

Type **S** and **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
2.36	2.76	60	70	2	
2.68	2.99	68	76	1	1
3.03	3.39	77	86		2
3.54	4.13	90	105	3	
4.17	4.72	106	120	1	2
4.76	5.43	121	138	4	
5.47	6.06	139	154	2	2
6.10	6.46	155	164	1	3

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

Type **C**, **D** and **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 220 LBS/100 KG PER RING**

Type **A** and **B** 19, 36 and 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

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.

# RACI SPACER OPTIONS: MEDIUM

Type **F** and **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	4.53	92	115	1	1
4.57	5.98	116	152	2	
6.02	7.40	153	188	2	1
7.44	8.34	189	224	3	
8.35	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 75	2.95			1870	850

Type **M** and **N** 18, 25, 36, 41, 50, 75, and 90 mm

Type **P** and **Q** 110 and 120

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	1	2
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	32.68	760	830	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			4409	2000
M 41	1.61			3968	1800
M/N 50	1.97			3638	1650
M/N 75	2.95			4299	1950
M/N 90	3.54			3858	1750
P/Q 110	4.33			2315	1050
P/Q 120	4.73			1874	850

\* not applicable for P/Q types



Type <b>L</b> 25, 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	
14.17	16.34	360	415	4	
17.63	20.36	448	517	5	
21.14	24.57	537	624	6	
24.61	28.50	625	724	7	
28.54	32.56	725	827	8	
32.59	36.26	828	921	9	
36.29	40.55	922	1030	10	
40.59	44.80	1031	1138	11	
44.84	48.86	1139	1241	12	
Elements	Runner Height In.			Max Load Per Ring	
				Lbs	Kg
L 25	0.98			6614	3000
L50	1.97			6614	3000
L 75	2.95			5512	2500
L 100	3.94			5512	2500
L 125	4.92			3307	1500
L 150	5.91			3307	1500
L 175	6.89			3307	1500
L 200	7.87			3307	1500

Type <b>E</b> and <b>H</b> 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
8.70	10.55	221	268	2	1
10.59	12.60	269	320	3	
12.64	14.41	321	366	3	1
14.45	16.54	367	420	4	
16.57	18.31	421	465	4	1
18.35	20.87	466	530	5	
20.91	24.80	531	630	5	1
24.84	28.74	631	730	7	
28.78	32.68	731	830	8	
32.72	36.61	831	930	9	
36.65	40.55	931	1030	10	
40.59	45.63	1031	1159	11	
45.67	53.54	1160	1360	13	
53.58	62.99	1361	1600	15	
63.03	70.83	1601	1799	17	
70.87	83.07	1800	2110	20	
83.11	95.67	2111	2430	23	
97.71	112.6	2431	2860	27	
112.64	134.41	2861	3414	32	
Elements	Runner Height In.			Max Load Per Ring	
				Lbs	Kg
E/H 25	0.98			7826	3550
E./H 41	1.61			7385	3350
E/H 60	2.36			8929	4050
E/H 75	2.95			8598	3900
E/H 90	3.54			9039	4100
E/H 110	4.33			7606	3450
E/H 130	5.11			6834	3100

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.



## Raci specification suggestion for casing spacers

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.

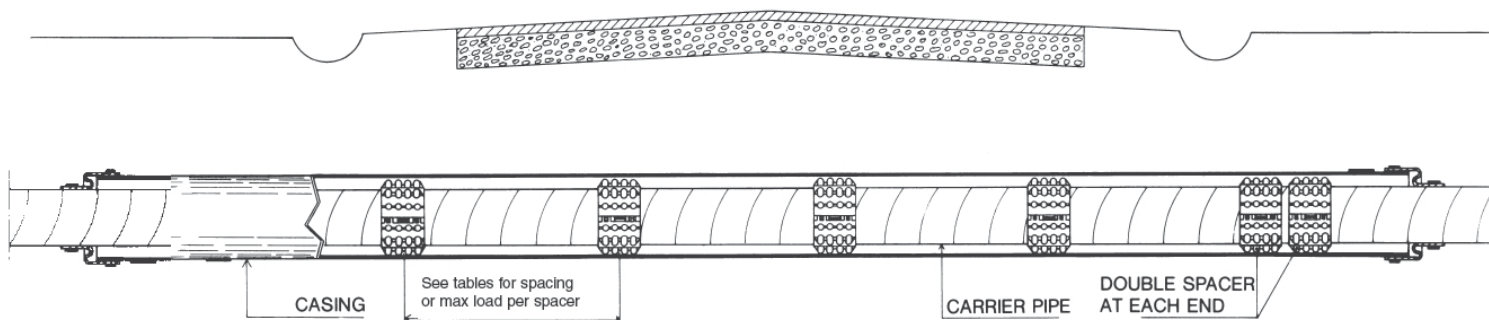
Spacing between spacer rings (span) should be calculated based on the actual installed load (weight of pipe filled with liquid) but should not exceed 10 feet / 3 meters. Refer to the tables for the load carrying capacity of each type of Raci spacer used.

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.

### TYPICAL ROAD CROSSING

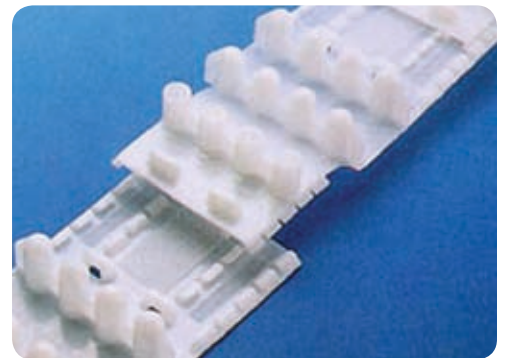


## Safe now. Save later.

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.

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

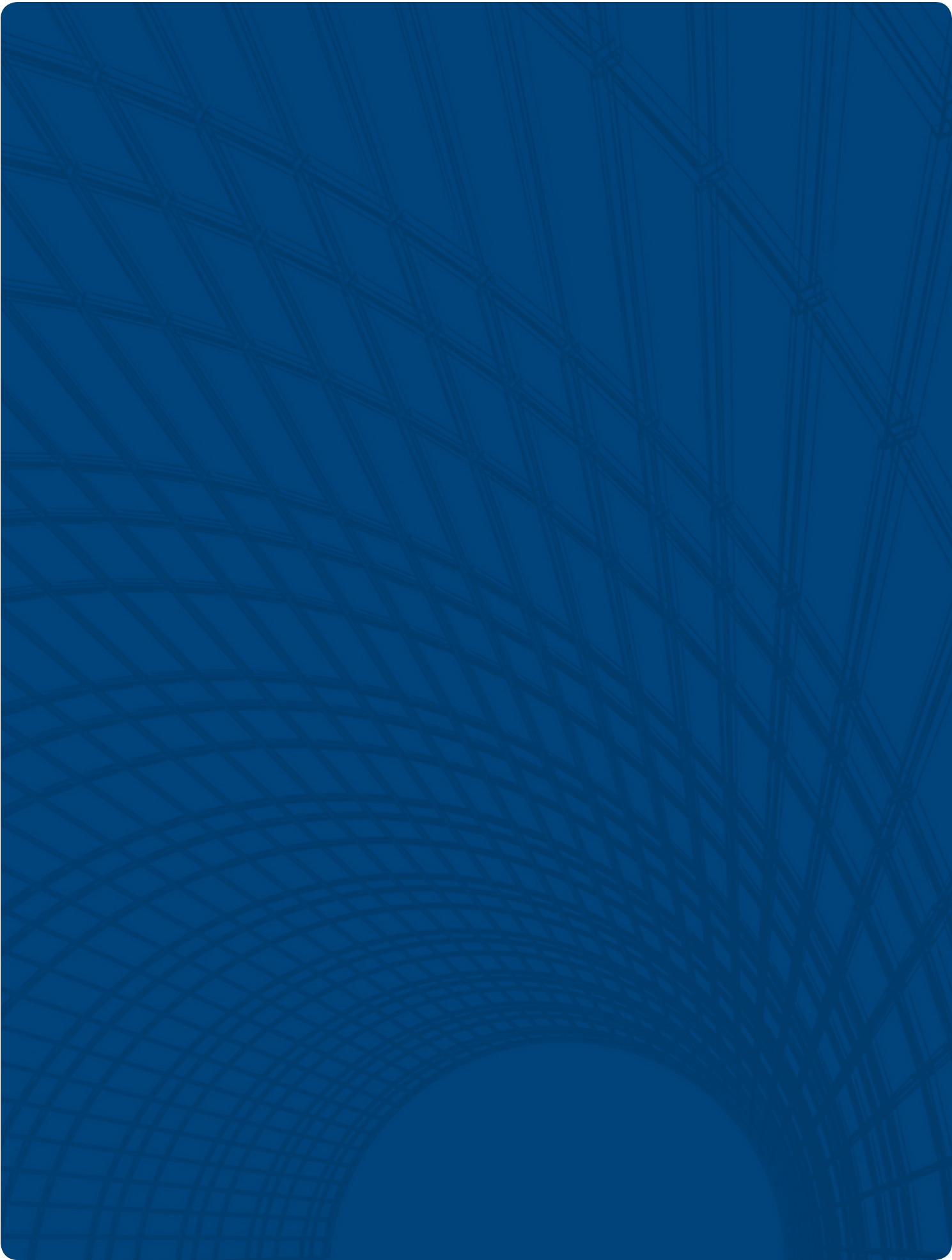


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