Pipeline Accessories

GPT PSI

PSI Plastic Insulators

System DSI



General Information • Technical Data • Selection Guide

EXCLUSIVE AGENT:

中華五金有限公司

CHUNG WAH METAL CO., LTD.

PSI Plastic Insulators System DSI

Material Test Certificate

ruhrgas

TALW-Bauteilprüfung

Prüflabor zertifiziert nach

DIN EN ISO 9001

Werkstoffprüfung

Versuche an DSI- Kunststoffgleitkufen GKO 125 gs,125 gl,36 gs,36 gl

Zug und Einzelstegdruckversuche

Druckversuche mit Segmenten

Druckversuche mit geschlossenem Ring

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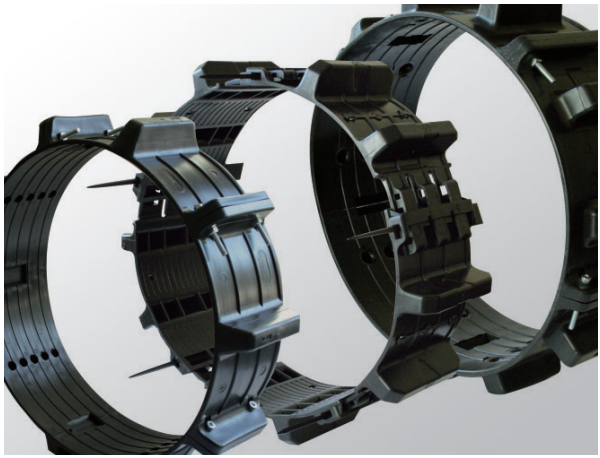
Datum : 03.04.2002

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Datum: 15.04.2002

PSI Plastic Insulators System PSI

General Information



Polypropylen insulators are universally applicable in the installation of pipelines when the carrier pipe runs inside a casing.

Plastic insulators provide various advantages:

- easy installation of the carrier pipe since the plastic material reduces the friction coefficient to a minimum
- minimised friction prevents damage to the protective coating and insulation of the pipes
- a wide range of skid heights ensures concentricity of the carrier pipe in the casing if required
- excellent insulating properties of the plastic material ensures: all requirement of cathodic protection are met.

Plastic insulators are suitable for all pipe diameters from 25 mm upwards and many skid heights are available to suit specific requirements.

PSI Plastic Insulators System PSI

Technical Data

Material
Polypropylene have a good friction coefficient due to steel wax like surface. The sliding friction coefficient is approx. 0.2 as for steel has a coefficient of approx. 0.5. Therefore the abrasion is reduced to a minimum.
The material is strong and yet flexible and is therefore resistant to stress cracking.
Flexibility of the body, stability of the skid form and excellent dielectric insulation are some of the good characteristics of this material.

Installation
Plastic insulator rings are normally installed with the following spacing between the rings:

- pipe dia up to	300 mm	at a spacing of 2.5 m
- pipe dia	400 – 600 mm	at a spacing of 2.0 m
- pipe dia	> 600 mm	at a spacing of 1.5 m

In particular cases, the ring distance may be modified after having examined the installation situation.

Load capacity:

Typ	max. static capacity per ring
PA/PE 0.75 – PA/PE 1.5	85 kg
PA/PE 2.0 – PA/PE 3.0	100 kg
PA/PE 4.0	200 kg
PA/PE 6.0 – PA/PE 12.0	250 kg
AZ/AC 1 / AZ/AC 2	200 kg
GKO-mK	250 kg
MA	650 kg
RGV	1,000 kg
GKO-gl	4,000 kg
GKO-gs	14,200 kg

The weight load data apply to a skid height of up to 75 mm. For skid heights above 75 mm, these values have to be multiplied with the factor 0.75.

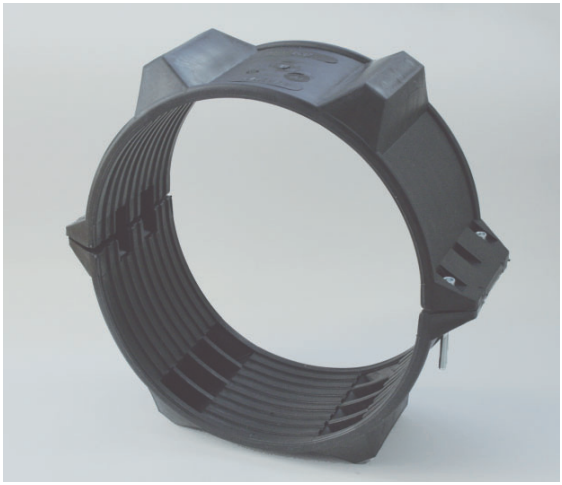
All values are calculated for standard pipes. To determine the correct distance for your individual application many other facts have to be taken into consideration such as wall thickness of the carrier pipe, fluid to be transported… If you need any assistance please contact us.

If you cannot determine the type according to our tables, please specify:
– the O.D. of the carrier pipe (inclusive coating) in mm
– the I.D. of the casing in mm

PSI Plastic Insulator Ring Type PA/PE System DSI

General Information

Pipe O.D. from 25 mm to 336 mm





Type PA/PE insulator rings are available for a pipe O.D. from 25 to 336 mm. They consist of **two halfshell-segments**. The nuts and bolts required for assembly are included.

The type code indicates the carrier pipe O.D. in inch and the skid height in mm (e.g. PA/PE 4-38 = carrier pipe 4", skid height 38 mm).

The skid height is calculated from the difference in diameter of the carrier pipe and the casing. It is important to consider the actual dimensions, including coatings, rather than the nominal sizes.

Example:
- PE- coated carrier pipe ND 100
- O.D. (117.9 x 5.2 mm)
- Steel casing ND 200 (219.1 x 6.3)
- I.D. 206.5 mm minus Carrier pipe O.D. 117.9 mm = 88.6
- 88,6 : 2 = 44.3 mm skid height
- Suitable type: PA/PE 4-38

After determining the skid height, the next lower height is selected from the table (e.g. 44.3 mm, ideal skid height = 38 mm).

The segments can be assembled with the corrosion protected steel bolts DIN 912 and nuts DIN 562 included.

Up to type PA/PE 4 the insulator rings have 4 skids; from type PA/PE 6 up to 6 skids are provided. The following table gives the technical details on available sizes, skid heights of the various types and carrier pipe diameters.

How to find the right type

Nom. width mm	Nom. width Inch	Pipe O.D. in mm min.	Pipe O.D. in mm max.	Type PA/PE	Skid height mm incl. basic element	Width mm	Number of Segments	Number of skids	Bolts DIN 912 number/size	Art. no.
20	0.75	25.0	32.0	PA/PE 0.75-12.5	12.5	80	2	4	4 M 4 x 30	3-001-02400
				PA/PE 0.75-21	21.0					3-001-01001
				PA/PE 0.75-25	25.0					3-001-01002
				PA/PE 0.75-36	36.0					3-001-01003
25	1.0	32.0	40.0	PA/PE 1-13	13.0	80	2	4	4 M 4 x 30	3-001-01004
				PA/PE 1-19	19.0					3-001-01005
				PA/PE 1-25	25..0					3-001-01006
				PA/PE 1-34	34.0					3-001-01007
32	1.25	42.0	48.3	PA/PE 1.25-11	11.0	80	2	4	4 M 4 x 30	3-001-01008
				PA/PE 1.25-17.6	17.6					3-001-01009
				PA/PE 1.25-29	29.0					3-001-01010
				PA/PE 1.25-40	40.0					3-001-01011
40	1.5	48.0	54.0	PA/PE 1.5-11	11.0	80	2	4	4 M 4 x 30	3-001-01069
				PA/PE 1.5-14.5	14.5					3-001-01012
				PA/PE 1.5-26.0	26.0					3-001-01013
				PA/PE 1.5-36	36.0					3-001-01014
				PA/PE 1.5-48	48.0					3-001-01015
				PA/PE 1.5-70	70.0					3-001-01039
50	2.0	60.0	67.0[1]	PA/PE 2-16	16.0	100	2	4	4 M 6 x 40	3-001-01016
				PA/PE 2-25	25.0					3-001-01017
				PA/PE 2-36	36.0					3-001-01018
				PA/PE 2-48	48.0					3-001-01019
				PA/PE 2-55	55.0					3-001-01085
				PA/PE 2-70	70.0					3-001-01086
				PA/PE 2-90	90.0					3-001-01087
				PA/PE 2-110	110.0					3-001-01088
65	2.5	76.1	82.5[2]	PA/PE 2.5-16	16.0	100	2	4	4 M 6 x 40	3-001-01020
				PA/PE 2.5-25	25.0					3-001-01021
				PA/PE 2.5-36	36.0					3-001-01022
				PA/PE 2.5-48	48.0					3-001-01023
				PA/PE 2.5-55	55.0					3-001-01095
				PA/PE 2.5-70	70.0					3-001-01096
				PA/PE 2.5-90	90.0					3-001-01097
				PA/PE 2.5-105	105.0					3-001-01098
80	3.0	88.9	96.0[3]	PA/PE 3-16	16.0	100	2	4	4 M 6 x 40	3-001-01024
				PA/PE 3-25	25.0					3-001-01025
				PA/PE 3-36	36.0					3-001-01026
				PA/PE 3-48	48.0					3-001-01027
				PA/PE 3-55	55.0					3-001-01100
				PA/PE 3-70	70.0					3-001-01101
				PA/PE 3-90	90.0					3-001-01102
100	4.0	106.6	120.0[4]	PA/PE 4-16	16.0	130	2	4	4 M 6 x 55	3-001-01028
				PA/PE 4-25	25.0					3-001-01029
				PA/PE 4-38	38.0					3-001-01030
				PA/PE 4-55	55.0					3-001-01031
				PA/PE 4-75	75.0					3-001-01032
				PA/PE 4-90	90.0					3-001-01033
125		See list for AZ/AC Ø 125 mm Type AZ/AC 1								

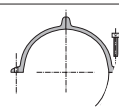
How to find the right type

Nom. width mm	Nom. width Inch	Pipe O.D. in mm min.	Pipe O.D. in mm max.	Type PA/PE	Skid height mm incl. basic element	Width mm	Number of Segments	Number of skids	Bolts DIN 912 number/size	Art. no.
150	6	160.0	178.0	PA/PE 6-16	16.0	130	2	6	4 M 6 x 70	3-001-01036
				PA/PE 6-25	25.0					3-001-01037
				PA/PE 6-36	36.0					3-001-01038
				PA/PE 6-55	55.0					3-001-01040
				PA/PE 6-75*	75.0			4		3-001-01041
				PA/PE 6-90*	90.0					3-001-01042
200		193.7	210.0	PA/PE 7-16	16.0	175	2	6	4 M 6 x 70	3-001-01110
				PA/PE 7-25	25.0					3-001-01111
				PA/PE 7-36	36.0					3-001-01112
				PA/PE 7-55	55.0					3-001-01113
				PA/PE 7-75	75.0					3-001-01114
				PA/PE 7-90	90.0					3-001-01115
				PA/PE 7-110	110.0					3-001-01116
200	8	221.0	239.0	PA/PE 8-16	16.0	130	2	6	4 M 6 x 70	3-001-01043
				PA/PE 8-25	25.0					3-001-01044
				PA/PE 8-36	36..0					3-001-01045
				PA/PE 8-55*	55.0			4		3-001-01046
				PA/PE 8-75*	75.0					3-001-01047
				PA/PE 8-90*	90.0					3-001-01048
250		244.5	260.0	PA/PE 9-16	16.0	175	2	6	4 M 6 x 70	3-001-01120
				PA/PE 9-25	25.0					3-001-01121
				PA/PE 9-36	36.0					3-001-01122
				PA/PE 9-55	55.0					3-001-01123
				PA/PE 9-75	75.0					3-001-01124
				PA/PE 9-90	90.0					3-001-01125
				PA/PE 9-110	110.0					3-001-01126
250	10	276.0	295. 0	PA/PE 10-16	16.0	130	2	6	4 M 6 x 70	3-001-01049
				PA/PE 10-25	25.0					3-001-01050
				PA/PE 10-36	36.0					3-001-01051
				PA/PE 10-55*	55.0			4		3-001-01052
				PA/PE 10-75*	75.0					3-001-01053
				PA/PE 10-90*	90.0					3-001-01054
315		298.5	315.0	PA/PE 11-16	16.0	175	2	6	4 M 6 x 70	3-001-01130
				PA/PE 11-25	25.0					3-001-01131
				PA/PE 11-36	36.0					3-001-01132
				PA/PE 11-55	55.0					3-001-01133
				PA/PE 11-75	75.0					3-001-01134
				PA/PE 11-90	90.0					3-001-01135
				PA/PE 11-110	110.0					3-001-01136
300	12	326.0	336.0	PA/PE 12-18	18.0	130	2	6	4 M 6 x 70	3-001-01055
				PA/PE 12-25	25.0					3-001-01056
				PA/PE 12-36	36.0					3-001-01057
				PA/PE 12-55*	55.0			4		3-001-01058
				PA/PE 12-75*	75.0					3-001-01059
				PA/PE 12-90*	90.0					3-001-01060

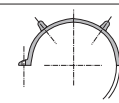
[1] up to Pipe O.D. 75.0 mm with 4 Bolts M 6 x 55
[2] up to Pipe O.D. 88.9 mm with 4 Bolts M 6 x 55
[3] up to Pipe O.D. 101.6 mm with 4 Bolts M 6 x 55
[4] up to Pipe O.D. 127.0 mm with 4 Bolts M 6 x 70

Shear-secure-tape against slipping of spacers see next page

* Plug in skid

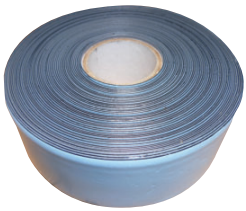


Sectional drawing
PA/PE 0.75 to PA/PE 4,
ring with 4 skids total



Sectional drawing
PA/PE 6 to PA/PE 12,
ring with 6 skids total

Accessories

	**Shear-Secure-Tape**
	Art.No. 4-002-S20088 = width 50 mm, length 15 m
	Art.No. 4-002-S20089 = width 100 mm, length 15 m

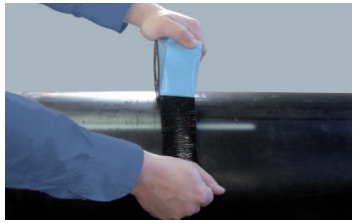
Material: PE-Tape with butyl rubber mixture



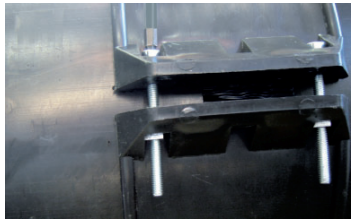
Application:
On smooth pipe surface which are in contact with the spacers (e.g. PE, PVC, steel/cast on PE-coated or stoneware) wrap a shear-secure-**tape** to guarantee an optimum security **against slipping**.

PSI Plastic Insulator Ring Type PA/PE PSI System DSI

Installation Instruction













An insulator ring always consists of two halves fitting the indicated pipe size. Four nuts and bolts per insulator ring are necessary.

Wrap smooth pipe surfaces (e.g. PE, PVC, PE coated steel/cast iron or vitrified clay) in the pipe/insulator contact area with shear-secure-tape to guarantee utmost safety against slipping.

Place the two halves around the pipe and join them with bolts. Then tighten the bolts evenly in order to get even distances between the insulator elements.

The square nuts have to be aligned in a way to fit in the corresponding recesses of the insulator segment.

Tighten the bolts so that the insulator ring is firmly attached to the pipe. It is not absolutely necessary to tighten the bolts completely.

Max. torques:
Insulator type PA/PE 0.75 - PA/PE 1.5 = 0.7 Nm
Insulator type PA/PE 2 - PA/PE 12 = 3 Nm

PSI Plastic Insulator Segments Type AZ/AC System DSI

General Information

Pipe O.D. from 98 mm to 385 mm



AZ/AC insulator rings are used for a pipe O.D. from 98 to 385 mm and consist of several segments. The number of segments depends on the carrier pipe's O.D.. The nuts and bolts required for assembly are included.

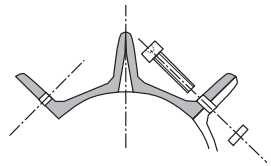
The universal applicability of type AZ/AC provides two special advantages:
- variable ring diameter, which is especially important for thick-walled pipes whose O.D. substantially deviates from the nominal size (e.g. AZ/AC pressure pipe ND 16, vitrified clay pipes);
- only two segment sizes are required to assemble ND 100 to ND 350 insulator rings - a decisive edge in stock-keeping.

The skid height is calculated from the difference in diameter of the carrier pipe and the casing. It is important to consider the actual dimensions, including coatings, rather than the nominal sizes.
For an example calculation refer to type PA/PE.

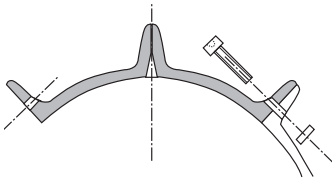
The segmenst can be assembled with the corrosion protected steel bolts DIN 912 and nuts DIN 562 included.

The following table gives the technical details on available sizes, skid heights of the various types and carrier pipe diameters.





Sectional drawing of AZ/AC 1 segment



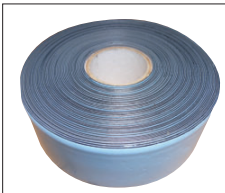
Sectional drawing of AZ/AC 2 segment

PSI Plastic Insulator Segments Type AZ/AC System DSI

How to find the right type

Type	Skid height	Width	Number of bolts per segment	Article no.
AZ/AC-1	16	130	2 M6 x 70	3-002-00085
AZ/AC-1	25	130	2 M6 x 70	3-002-00086
AZ/AC-1	36	130	2 M6 x 70	3-002-00087
AZ/AC-1	55	130	2 M6 x 70	3-002-00088
AZ/AC-1	75	130	2 M6 x 70	3-002-00089
AZ/AC-1	90	130	2 M6 x 70	3-002-00083
AZ/AC-1	110	130	2 M6 x 70	3-002-00097
AZ/AC-2	16	130	2 M6 x 70	3-002-00090
AZ/AC-2	25	130	2 M6 x 70	3-002-00091
AZ/AC-2	36	130	2 M6 x 70	3-002-00092
AZ/AC-2	55	130	2 M6 x 70	3-002-00093
AZ/AC-2	75	130	2 M6 x 70	3-002-00094
AZ/AC-2	90	130	2 M6 x 70	3-002-00095
AZ/AC-2	110	130	2 M6 x 70	3-002-00096
Shear-secure-tape, 15 m/roll, 50 mm width				4-002-S20088

Outer Ø of carrier pipe in mm		Number of segments per ring		Bolts number/size
min.	max.	AZ/AC 1	AZ/AC 2	
98	130	3		6 M 6x70
130	172	4		8 M 6x70
173	202	5		10 M 6x70
203	230		3	6 M 6x70
234	268	1	3	8 M 6x70
269	310		4	8 M 6x70
302	350	1	4	10 M 6x70
350	385		5	10 M 6x70



Shear-Secure-Tape
Art.No. 4-002-S20088 = width 50 mm, length 15 m
Art.No. 4-002-S20089 = width 100 mm, length 15 m

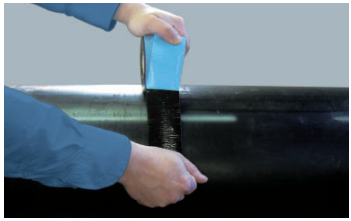
Material: PE-Tape with butyl rubber mixture



Application:
On smooth pipe surface which are in contact with the spacers (e.g. PE, PVC, steel/cast on PE-coated or stoneware) wrap a shear-secure-**tape** to guarantee an optimum security **against slipping**.

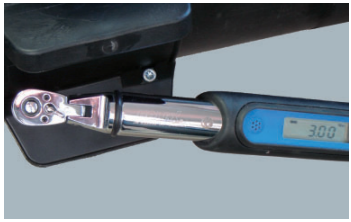
PSI Plastic Insulator Segments Type AZ/AC System DSI

Installation Instruction













Get insulator elements and bolts ready according to the selection table (see reverse).
Join the elements in a insulator band and tighten the nuts just a few turns on the bolts.

Wrap smooth pipe surfaces (e.g. PE, PVC, PE coated steel/cast iron or vitrified clay) in the pipe/ insulator contact area with shear-secure-tape to guarantee utmost safety against slipping.

Place pre-assembled elements around the carrier pipe and close the final segments.

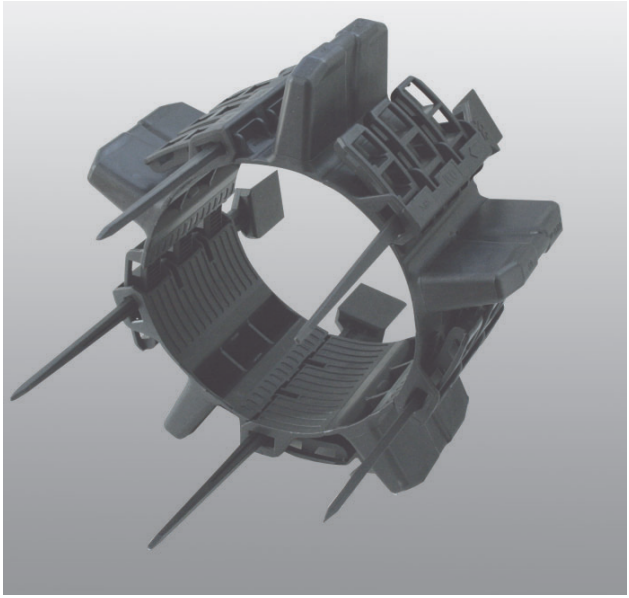
Then tighten the bolts evenly in order to get even distances between the insulator elements.

The square nuts have to be aligned in a way to fit in the corresponding recesses of the insulator segment.

Tighten the bolts with a torque of no more than 3 Nm so that the insulator ring is firmly attached to the pipe. It is not absolutely necessary to tighten the bolts completely.

PSI Plastic Insulator Type GKO-mk System

General Information



GKO-mk are the latest PSI Insulator generation. Due to the bolt less wedge system the installation can be achieved quick and easy. The flexible design ensures suitablity for all pipe diameters > 150 mm.
If required an additional support for cable ducts can be installed on the segment.

- **Flexible construction**
- **Non-metallic connection for simple and fast installation**
- **Connection technology by wedge system**

PSI shear-secure-tapes can be used to improve adhesion on smooth surfaces or to balance tolerances.

Subject to technical changes.

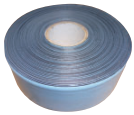
PSI Plastic Insulator Type GKO-mk System DSI

How to find the right type



Type	Skid height	Width	Article no.
GKO mk	25	130	3-002-04101
GKO mk	36	130	3-002-04102
GKO mk	50	130	3-002-04103
GKO mk	65	130	3-002-04104
GKO mk	75	130	3-002-04105
GKO mk	90	130	3-002-04106
GKO mk	110	130	3-002-04107
GKO mk	125	130	3-002-04108
Shear-secure-tape, 15 m/roll, 50 mm width			4-002-S20088

Outer Ø of carrier pipe in mm		Number of segments per ring
min.	max.	
150	180	4
181	230	5
231	280	6
281*	330*	7
331*	380*	8
381*	430*	9
* carrier pipe O.D. exceeding 281 mm only appropriate for plastic tubes		



Shear-Secure-Tape
Art.No. 4-002-S20088 = width 50 mm, length 15 m
Art.No. 4-002-S20089 = width 100 mm, length 15 m

Material: PE-Tape with butyl rubber mixture



Application:
On smooth pipe surface which are in contact with the spacers (e.g. PE, PVC, steel/cast on PE-coated or stoneware) wrap a shear-secure-**tape** to guarantee an optimum security **against slipping**.

PSI Plastic Insulator Type GKO-mk System

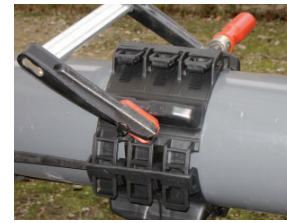
Installation Instruction















Put out **spacer elements** and wedges according to **selection table**.
Connect elements as a spacer band (for position of the wedges per spacer element see selection table on the backside), put the mounting link with grid into the entry of next element, be aware of **parallelism**. **Push wedges** into the lateral fixing slot until **top can be seen** on the other side of the spacer.
Mind the **direction of the arrows**.

On smooth pipe surface which are in contact with the spacers (e.g. PE, PVC, steel/cast on PE-coated or stoneware) wrap a shear-secure-**tape** to guarantee an optimum security **against slipping**.

Put pre-mounted **elements around** the medium pipe and close last joint. Shift the spacer ring **together by hand**.

Shift spacer elements **together with a screw clamp** as far that one or more **wedges can be put in the next fixing slot**.

Drive in all wedges with **hammer strokes parallel** to the pipe. The **wedges don't have to be in fully**.

When mounting more spacer rings please be aware that the **skids** of the single mounted rings **align together**.

We expressly exclude any other use of the material. The PSI guarantee is restricted to faulty material. The suitability of the product for a special purpose must be tested by the user on his own responsibility.

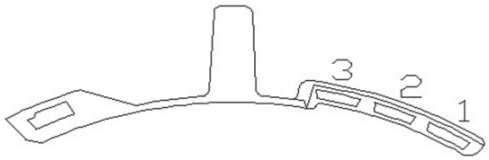
PSI Plastic Insulator Type GKO-mk System DSI

Installation Instruction

Pipe ND			Pipe O.D. in mm		number per segment	Position of wedges in connecting section		
PE	Steel	GGG	up	to	GKO mk	1	2	3
DN 150			160	164	4	0	2	2
DN 150			180	183	4	1	2	1
	DN 150		174	176	4	0	4	0
		DN 150	170	175	4	1	1	2
DN 200			200	204	5	0	2	3
DN 200			225	230	5	1	4	0
DN 200			250	255	6	0	4	2
	DN 200		224	227	5	1	3	1
		DN 200	222	226	5	1	3	1
DN 250			280	285	6	3	2	1
	DN 250		279	283	6	3	2	1
		DN 250	274	278	6	3	1	2
DN 300			315	318	7	1	5	1
DN 350			355	358	8	0	8	0
DN 400			400	405	9	0	9	0

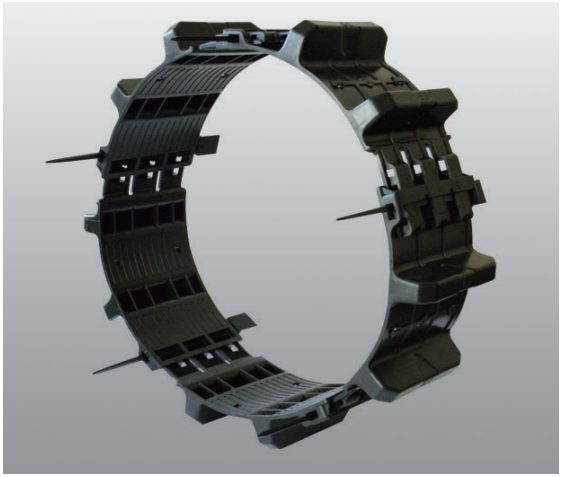
The recommended position of the wedges are experienced and can differ acc. to outside temperature.

GKO mounting example:
For a pipe OD 200 mm, use 5 elements per ring. Put 2 wedge in position 2 and 3 wedges in position 3.



PSI Plastic Insulator Type GKO-gl and GKO-gs System DSI

General Information





GKO gs and GKO gl are the latest PSI Insulator generation. Due to the bolt less wedge system and half segments GKO the installation can be achieved easily and quickly.
Owing to various diameter ranges and type GKO gh half segments, continnous use for an outer diameter exceeding 400 mm is possible.
If required an additional support for cable ducts can be with cable binders fixed on the segment.

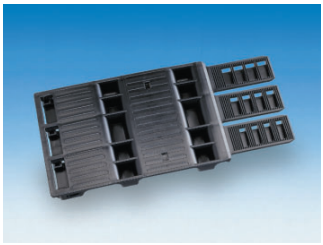
- **Flexible construction**
- **Non-metallic connection for simple and fast installation**
- **Connection technology by wedge system**

PSI shear-secure-tapes can be used to improve adhesion on smooth surfaces or to balance tolerances.

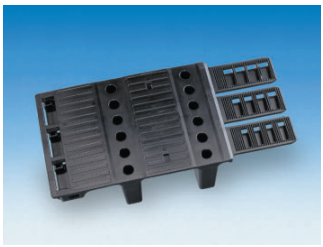
Subject to technical changes.

PSI Plastic Insulator Type GKO-gl and GKO-gs System DSI

How to find the right type



GKO-gl



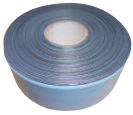
GKO-gs



GKO-gh

Type	Skid height	Width	Article no.
GKO gl	36	225	3-002-02200
GKO gl	50	225	3-002-02201
GKO gl	65	225	3-002-02202
GKO gl	75	225	3-002-02203
GKO gl	90	225	3-002-02204
GKO gl	110	225	3-002-02205
GKO gl	125	225	3-002-02206
GKO gs	36	225	3-003-03207
GKO gs	50	225	3-003-03208
GKO gs	65	225	3-003-03209
GKO gs	75	225	3-003-03210
GKO gs	90	225	3-003-03211
GKO gs	110	225	3-003-03212
GKO gs	125	225	3-003-03213
GKO gh	36	225	3-003-03200
GKO gh	50	225	3-003-03201
GKO gh	65	225	3-003-03202
GKO gh	75	225	3-003-03203
GKO gh	90	225	3-003-03204
GKO gh	110	225	3-003-03205
GKO gh	125	225	3-003-03206
Shear-Secure-Tape against slipping see below			

Outer Ø of carrier pipe in mm		Number of segments per ring	
min.	max.	GKO gl/gs	GKO gh
400	440	3	1
441	490	4	
491	540	4	1
541	625	5	
626	659	5	1
660	749	6	
750	854	7	
855	959	8	
960	1067	9	
1068	1199	10	
1200	1330	11	
1331	1440	12	
1441	1540	13	
1541	1660	14	
1661	1800	15	
1801	1910	16	
1911	2042	17	
2043	2150	18	
2151	2270	19	
2271	2400	20	
2401	2500	21	



Shear-Secure-Tape
Art.No. 4-002-S20088 = width 50 mm, length 15 m
Art.No. 4-002-S20089 = width 100 mm, length 15 m

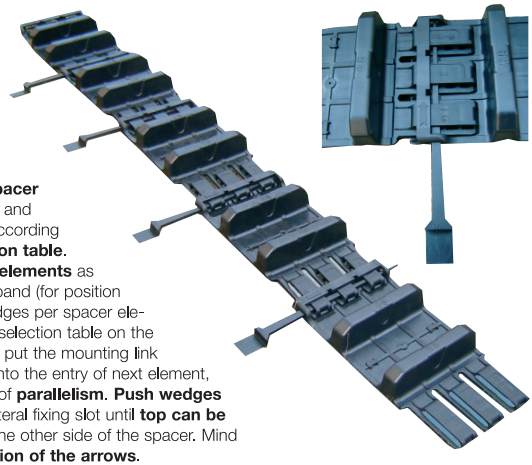
Material: PE-Tape with butyl rubber mixture



Application:
On smooth pipe surface which are in contact with the spacers (e.g. PE, PVC, steel/cast on PE-coated or stoneware) wrap a shear-secure-**tape** to guarantee an optimum security **against slipping**.

PSI Plastic Insulator Type GKO-gl and GKO-gs System DSI

Installation Instruction

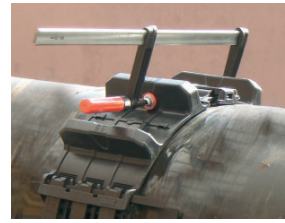


Put out **spacer elements** and wedges according to **selection table**. **Connect elements** as a spacer band (for position of the wedges per spacer element see selection table on the backside), put the mounting link with grid into the entry of next element, be aware of **parallelism**. **Push wedges** into the lateral fixing slot until **top can be seen** on the other side of the spacer. Mind the **direction of the arrows**.



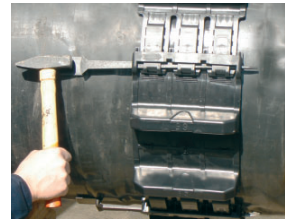


On smooth pipe surface which are in contact with the spacers (e.g. PE, PVC, steel/cast on PE-coated or stoneware) wrap a shear-secure-**tape** to guarantee an optimum security **against slipping**.



Put pre-mounted **elements around** the medium pipe and close last joint. Shift the spacer ring **together by hand**.

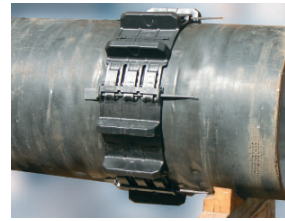
Shift spacer elements **together with a screw clamp** as far that one or more **wedges can be put in the next fixing slot**.



Drive in all wedges with **hammer strokes parallel** to the pipe. The **wedges don't have to be in fully**.

Attention:
The **lashes** of the smaller pipe diameters (ND400 – 600) **have to be slightly bent** downwards for an easier insertion.

When mounting more spacer rings please be aware that the **skids** of the single mounted rings **align together**.



We expressly exclude any other use of the material. The PSI guarantee is restricted to faulty material. The suitability of the product for a special purpose must be tested by the user on his own responsibility.

PSI Plastic Insulator Type GKO-gl and GKO-gs System DSI

Installation Instruction

Pipe ND			Pipe O.D. in mm		number of elements per ring		Position of wedges in connecting section			
PE	Steel	GGG	up	to	GKO	GKO half seg.	1	2	3	4
ND 400			397	402	3	1			3	1
	ND 400		406	411	3	1		1	3	
		ND 400	429	439	3	1	1	3		
ND 450			448	452	4				3	1
			456	462	4			1	3	
ND 500			498	504	4	1			2	3
	ND 500		508	513	4	1			4	1
		ND 500	532	542	4	1		3	2	
			538	542	5					5
			559	564	5				4	1
	ND 600		610	615	5		2	3		
ND 600			630	635	5	1			6	
		ND 600	635	645	5	1		1	5	
			660	665	6				3	3
	ND 700		711	716	6			5	1	
		ND 700	738	748	6		4	2		
			762	767	7				2	5
ND 800			796	802	7				7	
	ND 800		813	819	7			3	4	
		ND 800	842	852	7		1	6		
			864	870	8				1	7
	ND 900		914	920	8			1	7	
		ND 900	945	955	8			6	2	
	ND 1000		1016	1022	9				7	2
		ND 1000	1048	1058	9			4	5	
			1057	1063	9			6	3	
			1118	1125	10				6	4
	ND 1200		1219	1226	11				6	5
			1321	1328	11		1	10		
	ND 1400		1422	1430	12			9	3	
			1524	1532	13			7	6	
	ND 1600		1626	1634	14			5	9	
			1727	1736	15			3	12	
	ND 1800		1829	1838	16			1	15	
			1930	1939	17				16	1
	ND 2000		2032	2041	17			16	1	
			2134	2144	18			14	4	
	ND 2200		2235	2245	19			12	7	
			2337	2347	20			10	10	
	ND 2400		2438	2448	21			8	13	

The recommended position of the wedges are experienced and can differ according to outside temperature.

GKO mounting example:
For a pipe O.D. 429 mm, use 3 full and 1 half element per ring. Put 1 wedge in position 1 and 3 wedges in position 2.



General Information

Pipe O.D. from 402 mm up





Starting with a pipe O.D. of 402 mm, MA insulator rings consisting of two segment sizes (MA and MA2) and various skid heights are used to suit the respective pipe O.D.

The special advantage of these insulators is their universal applicability.
The following rule is used to determine the composition of suitable insulator rings:
– for every 100 mm of pipe O.D. = 1 MA segment
– for every 50 mm of pipe O.D. = 1 MA 2 segment
Example: Carrier pipe O.D. 559 = 5 MA segments + 1 MA 2 segment.

The segment's skid height is calculated from the difference in diameter of the carrier pipe and the casing.
For an example calculation refer to type PA/PE.

The nuts and bolts required for assembly are included.

The following table gives the technical details on available sizes, skid heights of the various types and carrier pipe diameters.

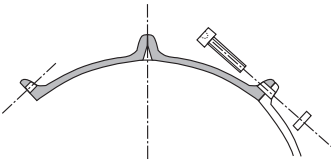
PSI Plastic Insulator Segment Type MA System DSI

How to find the right type

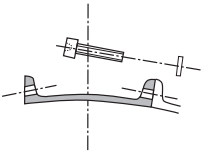
Type	Skid height mm	Width mm	Number of skids	Number of bolts per segment	Art. no.
MA 25	25	160	3	2 M 8 x 70	3-002-00050
MA 36	36	160	3	2 M 8 x 70	3-002-00051
MA 50	50	160	3	2 M 8 x 70	3-002-00053
MA 65	65	160	3	2 M 8 x 70	3-002-00064
MA 75	75	160	3	2 M 8 x 70	3-002-00054
MA 2/25	25	160	2	2 M 8 x 70	3-002-00055
MA 2/36	36	160	2	2 M 8 x 70	3-002-00056
MA 2/50	50	160	2	2 M 8 x 70	3-002-00057
MA 2/65	65	160	2	2 M 8 x 70	3-002-00063
MA 2/75	75	160	2	2 M 8 x 70	3-002-00058
MA 2 = half segment					
Shear-Secure-Tape against slipping see below					

Nominal diameter		Outer Ø of carrier pipe in mm		Number of segments per ring		Bolts number/size
ND	inch	min.	max.	MA 1	MA 2	
400	16	402	435	4		8 M 8x70
450	18	450	494	4	1	10 M 8x70
500	20	500	544	5		10 M 8x70
550	22	548	599	5	1	12 M 8x70
600	24	600	653	6		12 M 8x70
650	26	654	699	6	1	14 M 8x70
700	28	700	749	7		14 M 8x70
750	30	750	799	7	1	16 M 8x70
800	32	800	849	8		16 M 8x70
850	34	850	899	8	1	18 M 8x70
900	36	900	949	9		18 M 8x70
950	38	950	994	9	1	20 M 8x70
1000	40	995	1044	10		20 M 8x70
1050	42	1045	1097	10	1	22 M 8x70
1100	44	1098	1149	11		22 M 8x70
1150	46	1150	1199	11	1	24 M 8x70
1200	48	1200	1306	12		24 M 8x70

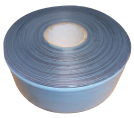
For larger nominal diameter on request.



Sectional drawing of MA segment



Sectional drawing of MA 2 segment



Shear-Secure-Tape
Art.No. 4-002-S20088 = width 50 mm, length 15 m
Art.No. 4-002-S20089 = width 100 mm, length 15 m

Material: PE-Tape with butyl rubber mixture



Application:
On smooth pipe surface which are in contact with the spacers (e.g. PE, PVC, steel/cast on PE-coated or stoneware) wrap a shear-secure-**tape** to guarantee an optimum security **against slipping**.

PSI Plastic Insulator Segment Type RGV System DSI

General Information

For heavy pipes from pipe O.D. 500 mm up





RGV insulator rings are used from a pipe O.D. of 500 mm. They differ from MA types in having two **reinforced load-carrying centre solid skids** per segment. The fastening skids (36 mm high) are for connection only. To obtain the required pipe O.D., RGV segments are combined with RGV 2 segments.

Special advantages of these insulator rings are their high static load-carrying capacity and their versatility. The following rule is used to determine the composition of suitable insulator rings:
– for every 100 mm of pipe O.D. = 1 RGV segment
– for every 50 mm of pipe O.D. = 1 RGV 2 segment
Example:
Carrier pipe O.D. 559 = 5 RGV segments RGV + 1 RGV 2 segment

The segment's skid height is calculated from the difference in diameter of the carrier pipe and the casing.
For an example calculation refer to type PA/PE.

The nuts and bolts required for assembly are included.

The following table gives the technical details on available sizes, skid heights of the various types and carrier pipe diameters.

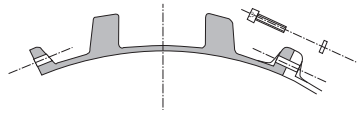
PSI Plastic Insulator Segment Type RGV System DSI

How to find the right type

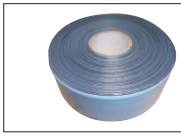
Type	Skid heigth mm	Width mm	Number of bolts	Art. no.
RGV	50	210	2 M 8x70	3-002-00074
RGV	75	210	2 M 8x70	3-002-00075
RGV	90	210	2 M 8x70	3-002-00076
RGV	125	210	2 M 8x70	3-002-00073
RGV half	50	210	2 M 8x70	3-002-00274
RGV half	75	210	2 M 8x70	3-002-00275
RGV half	90	210	2 M 8x70	3-002-00276
RGV half	125	210	2 M 8x70	3-002-00273
Shear-Secure-Tape against slipping see below				

Nominal diameter DN	Nominal diameter Zoll	Pipe O.D. in mm min.	Pipe O.D. in mm max.	Number of segments RGV	Number of segments RGV half	Bolts number/size
500	20	500	535	5		10 M 8 x 70
550	22	547	595	5	1	12 M 8 x 70
600	24	596	645	6		12 M 8 x 70
650	26	646	699	6	1	14 M 8 x 70
700	28	700	750	7		14 M 8 x 70
750	30	751	799	7	1	16 M 8 x 70
800	32	800	850	8		16 M 8 x 70
850	34	851	899	8	1	18 M 8 x 70
900	36	900	950	9		18 M 8 x 70
950	38	951	999	9	1	20 M 8 x 70
1000	40	1000	1075	10		20 M 8 x 70
1100	44	1090	1180	11		22 M 8 x 70
1200	48	1190	1290	12		24 M 8 x 70
1300	52	1291	1390	13		26 M 8 x 70
1400	56	1391	1490	14		28 M 8 x 70
1500	60	1491	1590	15		30 M 8 x 70
1600	64	1591	1690	16		32 M 8 x 70
1700	68	1691	1790	17		34 M 8 x 70
1800	72	1791	1890	18		36 M 8 x 70
1900	76	1891	1990	19		38 M 8 x 70
2000	80	1991	2100	20		40 M 8 x 70

For larger nominal diameter on request.



Sectional drawing of RGV segment



Shear-Secure-Tape
Art.No. 4-002-S20088 = width 50 mm, length 15 m
Art.No. 4-002-S20089 = width 100 mm, length 15 m

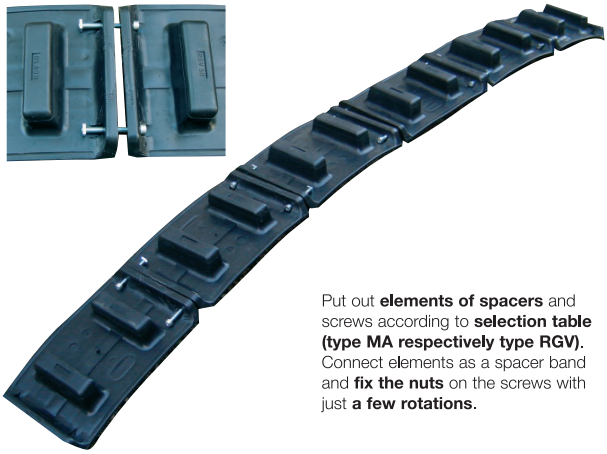
Material: PE-Tape with butyl rubber mixture



Application:
On smooth pipe surface which are in contact with the spacers (e.g. PE, PVC, steel/cast on PE-coated or stoneware) wrap a shear-secure-**tape** to guarantee an optimum security **against slipping**.

PSI Plastic Insulators Type MA and Type RGV System DSI

Installation Instructions



Put out **elements of spacers** and screws according to **selection table (type MA respectively type RGV)**. Connect elements as a spacer band and **fix the nuts** on the screws with just **a few rotations**.







On smooth pipe surfaces (e.g. PE, PVC, steel/cast on PE-coated or stoneware) wrap a shear-secure-**tape** to guarantee an optimum security against **slipping**.

Put pre-mounted elements around the medium pipe and close last joint.

Draw the **screws equally** tight to receive equal pitches between the spacer elements.

Square **nuts have to fit into the designed cavity** of the spacer segment.

Tighten screws with a **torque moment of max. 8 Nm** to fix the spacer ring irremovable on the pipe. Screws don't have to be necessarily completely contracted.





Outer diameter of the medium pipe in mm	Number of segments per ring	
from up	RGV	RGV half
500 - 535	5	
547 - 595	5	1
596 - 645	6	
646 - 699	6	1
700 - 750	7	
751 - 799	7	1
800 - 850	8	
851 - 899	8	1
900 - 950	9	
951 - 999	9	1
1000 - 1075	10	
1090 - 1180	11	
1190 - 1290	12	
1291 - 1390	13	
1391 - 1490	14	
1491 - 1590	15	
1591 - 1690	16	
1691 - 1790	17	
1791 - 1890	18	
1891 - 1990	19	
1991 - 2100	20	

Outer diameter of the medium pipe in mm	Number of segments per ring	
from up	MA	MA 2
402 - 435	4	
450 - 494	4	1
500 - 544	5	
548 - 599	5	1
600 - 653	6	
654 - 699	6	1
700 - 749	7	
750 - 799	7	1
800 - 849	8	
850 - 899	8	1
900 - 949	9	
950 - 994	9	1
995 -1044	10	
1045 - 1097	10	1
1098 - 1149	11	
1150 -1199	11	1
1200 - 1249	12	

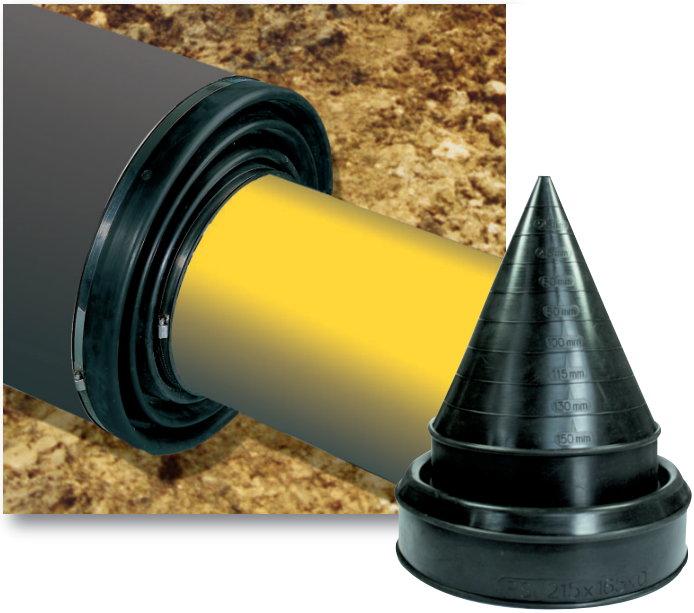
PSI-warranty is limited on the substitute of faulty material. The suitability of the product has to be tested for the special use by the user self dependent.

Pipeline Accessories

GPT

PSI Casing End Seals

For Carrier Pipe End Seal



General information • Technical data • Installation instruction

EXCLUSIVE AGENT:

中華五金有限公司
CHUNG WAH METAL CO., LTD.

PSI Casing End Seals

General Information

Pipes carrying media (e.g. gas pipe, water pipe, sewage pipe, …) below motorways, main roads, tracks etc. are often laid in casing pipes. Casing end seals serve to seal the annular space between carrier pipe and casing pipe moisture- and dirt-proof.

There are PSI casing end seals for relaying and for subsequent assembly.

Description/Technical Data

Type KT casing end seal (closed version only)
Advantages of the PSI type KT casing end seals are, in particular, low storage costs because of merely five types of casing pipe sizes from ND 100 to ND 600. Two casing pipe sizes per type are moulded as a collar. The stainless steel straps included in the delivery can be used for all diameters.



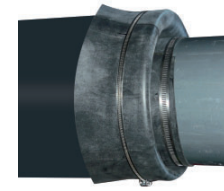
Material:	EPDM
Thickness:	about 3 to 4mm
Shore A:	60 ± 5
Carrier pipe sizes:	10 mm to 508 mm (see current price list for exact dimensions)
Casing pipe sizes:	110 mm to 610 mm (see current price list for exact dimensions)
Compensation in case of eccentric laying of carrier pipe:	Yes
Special sizes:	not available
Strap material:	stainless steel

Type DU casing end seal (closed version only)
Type DU casing end seals are always supplied in the appropriate size for the carrier pipe/casing pipe combination. Further adjustment on site is not necessary.



Material:	EPDM
Thickness:	about 5 to 6mm
Shore A:	50 ± 5
Carrier pipe sizes:	20 mm to 762 mm (see current price list for exact dimensions)
Casing pipe sizes:	90 mm to 965 mm (see current price list for exact dimensions)
Compensation in case of eccentric laying of carrier pipe:	Yes
Special sizes:	not available
Strap material:	stainless steel

Type KG/KO casing end seal (KG closed version only, KO for subsequent assembly)
Type KG/KO casing end seals are manufactured with a conical form. Owing to the individual sleeve production, they are available for nearly all pipe sizes and carrier pipe/casing pipe combinations. If the opening is a bit too small for the carrier pipe, it can be adjusted on site (see installation instruction).



Standard material:	neoprene rubber,
Material on request:	silicone (only KG type) and NBR
Thickness:	about 2 to 3mm
Shore A:	65 ± 5
Carrier pipe sizes:	32 mm to 1,320 mm (see current price list for exact dimensions)
Casing pipe sizes:	48.3 mm to 2,000 mm (see current price list for exact dimensions)
Compensation in case of eccentric laying of carrier pipe:	up to about 500mm, large deviations on request
Special sizes:	on request
Strap material:	stainless steel

PSI Casing End Seals

General Information

Type HA casing end seals (**closed version only)** are exclusively used for the relaying of small pipes for house service connections.



Material:	EPDM
Thickness:	about 2 to 3mm
Shore A:	50 ± 5
Carrier pipe sizes:	25 mm to 50 mm (see current price list for exact dimensions)
Casing pipe sizes:	50 mm to 90 mm (see current price list for exact dimensions)
Compensation in case of eccentric laying of carrier pipe:	No
Special sizes:	not available
Strap material:	stainless steel

Type STM casing end seal (closed version only)

Seamless STM sleeves are manufactured according to your special requirements. They are available for nearly all pipe sizes. This sleeve is the appropriate type especially for extreme eccentricities or if several openings are required, e.g. for further cable ducts. This sleeve is also available in reinforced version (type STMV) for higher mechanical loads.

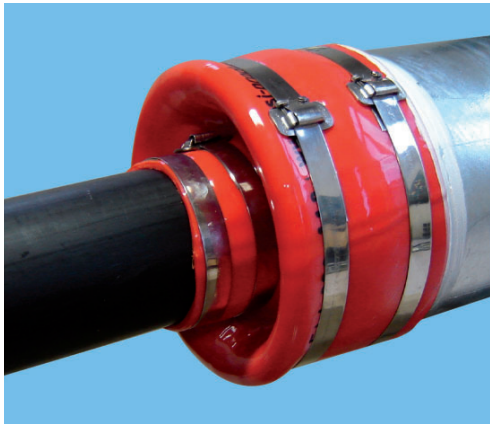


Material:	Rottolin
Thickness:	STM about 6 to 8 mm, STMV about 9 to 11 mm.
Shore A:	about 50 ± 5
Carrier pipe sizes:	50 mm to 1,200 mm (s. current price list for exact dimensions)
Casing pipe sizes:	200 mm to 1,600 mm (s. current price list for exact dimensions)
Compensation in case of eccentric laying of carrier pipe:	Yes
Special sizes:	on request
Strap material:	stainless steel



PSI End Seal Type FW

General Information



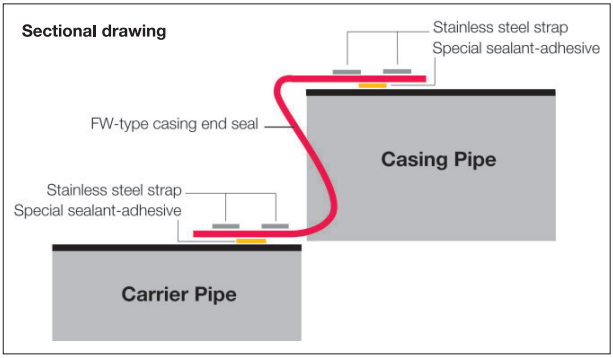
PSI end seals type FW were specially developed to provide a pressure-tight seal between pipes carrying media and casing pipes. The seals consist of high-quality Rottolin and, thanks to their 9-11 mm thickness, are particularly dimensionally stable and pressure-tight up to 0.5 bar. As a result of their exceptional flexibility, they can accommodate axial and radial movements between the casing and carrier pipe. To guarantee the integrity of the seal, the annular space* should not exceed 70 mm. A special, permanently elastic sealant-adhesive is sprayed from a cartridge on to the underside of the collar of the seal, which is then secured over the casing and carrier pipe by means of stainless steel straps.

Before backfilling, the seal must be covered with an expanding-type padding.

Technical data:

Material:	Rottolin
Material thickness:	9 -11 mm
Colour:	Red
Shore hardness:	approx. 50°
Tensile strength:	11 N/mm²
Breaking elongation:	400 %
Initial tear resistance:	27 N/mm
Max. continuous operating temperature:	55°C

Sectional drawing



*Annular space = O.D. wallsleeve/casing ./. O.D. carrier pipe/PIP-Casing ÷2.

PSI Casing End Seals Type KT

Installation Instruction

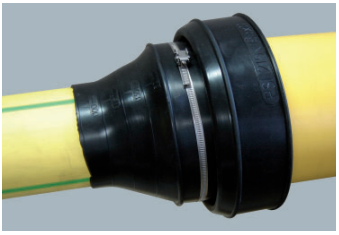


1. Pull sleeve tightly over the carrier pipe until the carrier pipe stands out clearly against the sleeve.

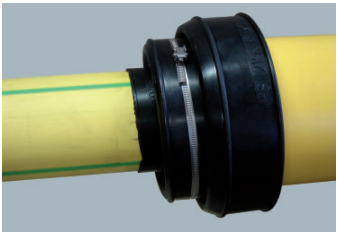


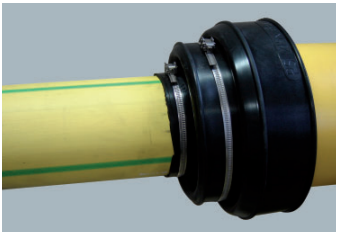
2. Cut off sleeve in front of the carrier pipe with a sharp knife. Then pull sleeve over the carrier pipe up to the casing pipe (sleeve can be stretched about 10 %).





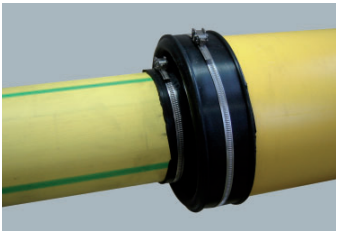
3. Pull integrally moulded sleeve collar over the casing pipe (sleeve can be stretched about 10 %) and attach the sleeve to the casing pipe with the larger of the straps included in the delivery.





4. Wrap the annular space with the conical part of the S-shaped sleeve and attach it to the carrier pipe with the second strap.

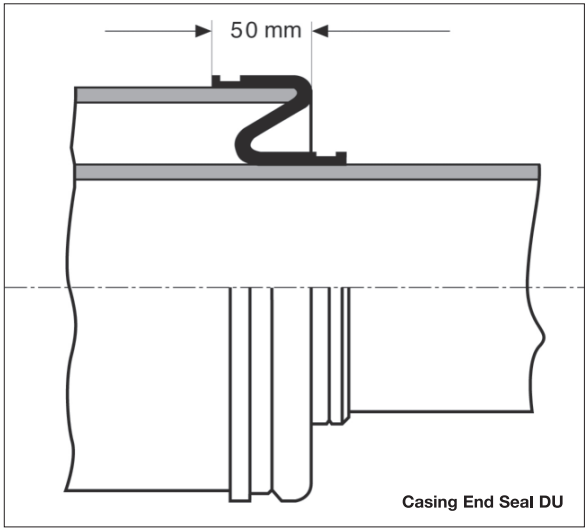




5. If only the smaller collar is used, the larger one can be cut, if necessary.

PSI Casing End Seals Type DU, STM

Installation Instruction



Casing End Seal DU

- Pull small end of the seal over the carrier pipe
- Pull the large end of the seal over the casing pipe as far as possible
  The fitting position of DU and STM seals is determined by their design.
- Place stainless steel straps around the small and large diameters.
  Pull the free end of the strap at least 50 mm through the square opening in the clamp and then fold it. The folded end must be placed under the fastening strap. Tighten the clamp as far as possible using a screw driver.

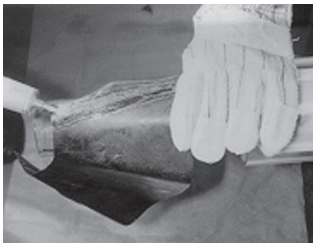
Technical changes reserved.

PSI Casing End Seals Type KG/KO

Installation Instruction

KO sleeve

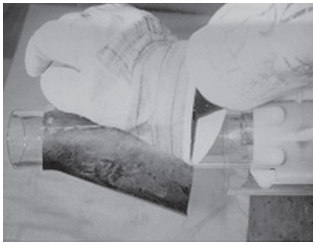
1. The roughened adhesive seam must always be cleaned and dried prior to closing.

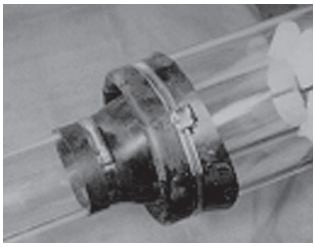


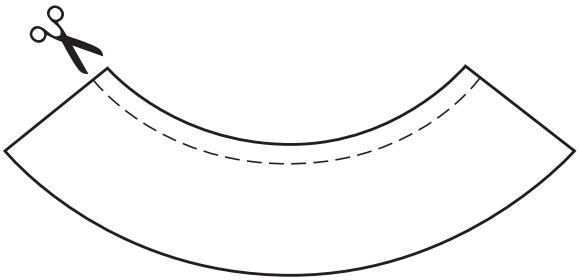
2. The KO sleeve is placed around the carrier pipe and glued with the contact adhesive included as follows:
   Brush glue slightly onto both sides of the adhesive area and let dry for about 15 to 25 min. After drying, brush glue again slightly onto both sides and let dry one more time. Then compress seam under high pressure.

KG/KO sleeve

3. Pull the large end of the sleeve over the casing pipe until it fits tightly, then fold over the sleeve and fasten the ends of the sleeve with stainless steel straps.







KG/KO sleeve

If the sleeve diameter is too small for the carrier pipe, the KG or KO sleeve can be cut off on site with **scissors** (20mm result in a Ø increase of about 13mm to 20mm). In doing so, make sure that the sleeve is 2-5 % smaller than the outer pipe diameter in the area of the carrier pipe so that the sleeve adheres crease-free.

PSI Casing End Seals Type FW

Installation Instruction

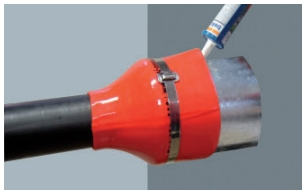
Sleeve tube:

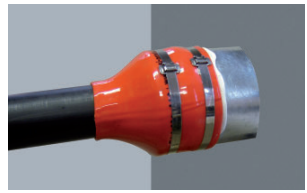


1. Pull sleeve over the carrier pipe and the casing pipe.



2. Install the first strap about 15mm in front of the end of the casing pipe.

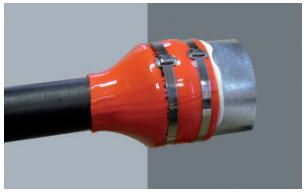


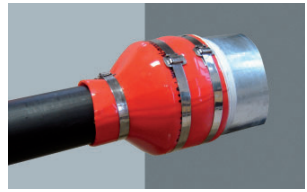


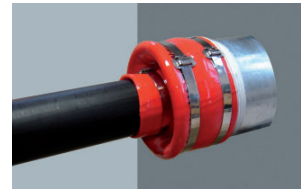


3. Inject the adhesive included in the delivery all round underneath the sleeve. Then install the second strap. Spread leaking adhesive, if necessary.

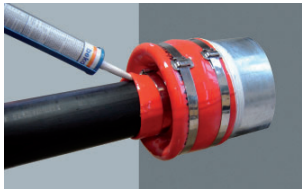
Carrier pipe:

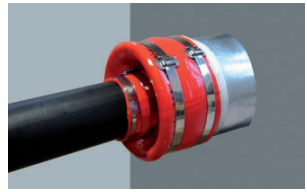






4. Align the sleeve on the carrier pipe elongated (figure a) or S-shaped (figure b) depending on the extension direction. Then install the first strap about 15mm away from the rear end.





5. Inject the adhesive underneath the sleeve the way you did with the casing pipe side and install the second strap. Spread leaking adhesive, if necessary.

6. Finally, the sleeve has to be protected by means of an expansion pad.

PSI stainless steel strap 19 mm

Installation Instruction









1. Push the stainless steel loop onto the strap; make sure that the barbs point to the end of the strap. Bend over the end of the strap about 3 to 4 cm and strike it with a hammer. Then place the strap around the sleeve and pull it through the loop.







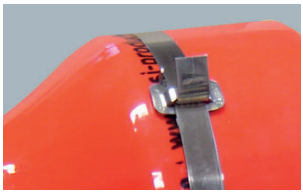
2. Introduce the strap laterally in the clamping tool, push the clamping tool up to the loop, press the holding lever and tighten the strap by turning the crank.







3. When reaching maximum stress, slowly bend over the strap about half a turn while releasing the crank.



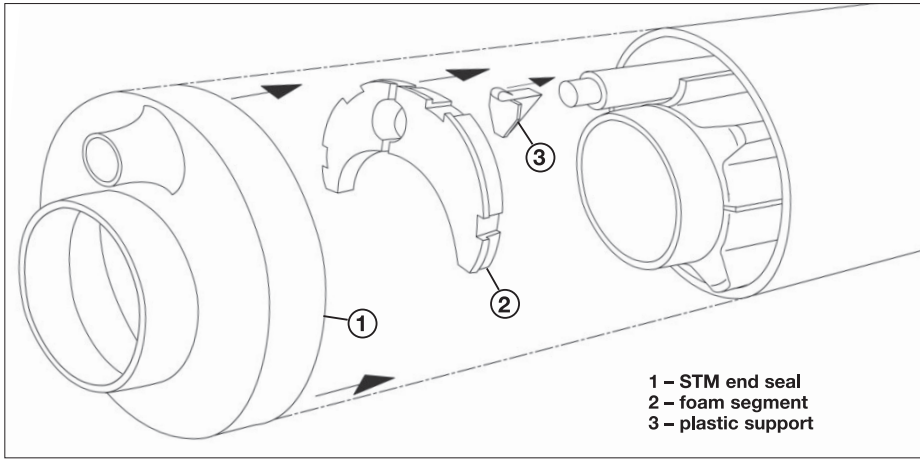


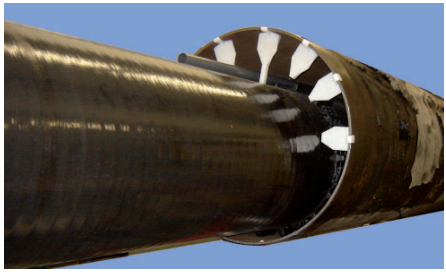


4. Cut off the steel strap with the clamping tool cutting lever to immediately obtain the correct length.
Immediately strike the cut off end on the stainless steel loop with a hammer.
Then bend over both barbs of the loop to protect the strap.

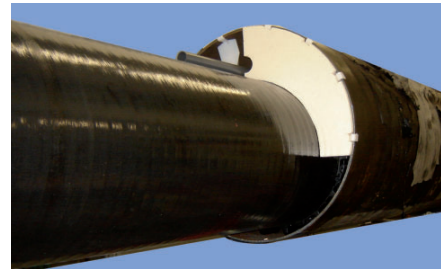
PSI Supporting Elements for Type STM

Installation Instruction

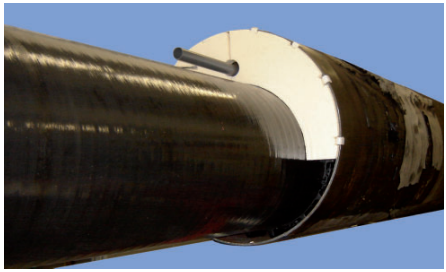




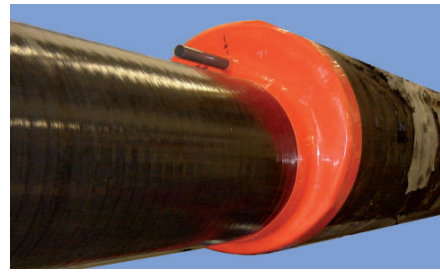
Fix plastic support with included clip at the inner wall of the casing pipe. Cut into suitable length if necessary. Space has to chosen suitable according to the cavity in the support segments.



Attach foam segments on the carrier pipe and insert into casing pipe. At this the heightend collar lays on the outside of the face side of the casing pipe. Therefore a secure support is guaranteed.

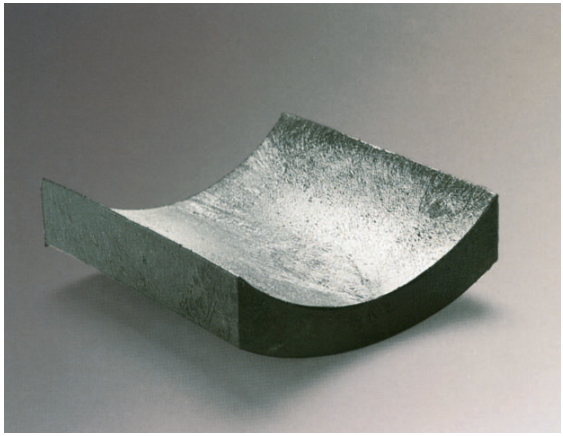


The cable casing pipe has to be pushed between the semi-circular cavities. If the cavities are too small they can be slightly enlarged by cutting-out with a knife.



Pull casing end seal over the pipe and mount steel straps (included in the delivery).

General Information

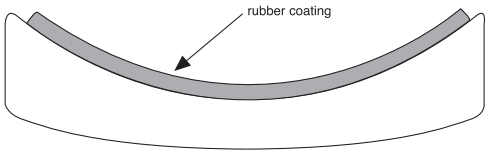


To support very heavy carrier pipes
Extremely long carrier pipes can be supported with these polyethylene components. PSI pipe supports are adapted to DSI plastic insulators and reliably prevent contact between the carrier pipe and the casing - even when there is an extreme load of soil on the pipe.

Material
Black polyethylene has the same resistance as the polyethylene coating of steel pipes, thus preventing damage to insulation.
Compressive strength: 1,000 N/cm^2
Density: 0.85 g/cm^3
Modulus of elasticity: 270,000 N/cm^2

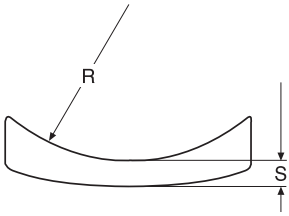
Special version rubber coated
Material and dimensions as described above, with additional high quality rubber coating. Coating thickness as per agreement.
Prices and delivery time on request.

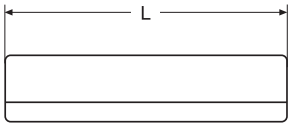
Technical changes reserved.

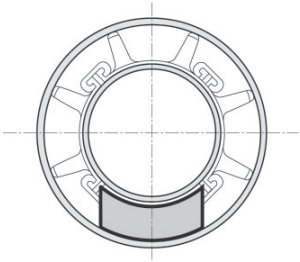


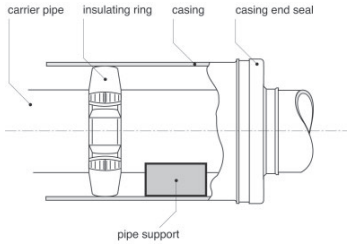
PSI Pipe Support

Dimensions





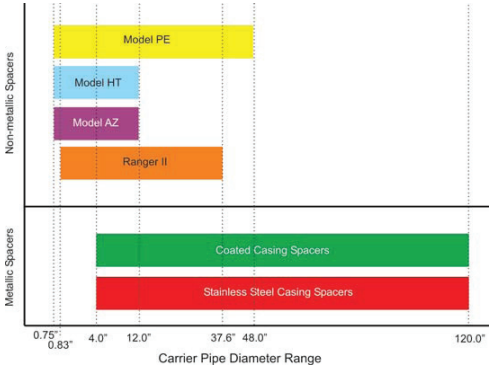




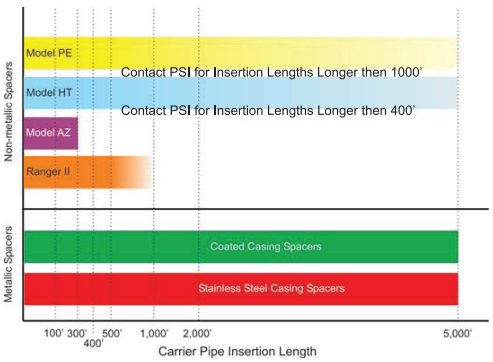
Carrier Pipe O.D. in mm	Pipe Support Dimension in mm R	s	L	Weight approx. in kg	Art. no.
up to 150	90	16	130	0,1	3-007-01100
		25		0,2	3-007-01101
		36		0,3	3-007-01102
175 - 300	160	16	250	1,1	3-007-01006
		25		1,3	3-007-01000
		35		1,8	3-007-01001
		55		2,5	3-007-01002
		75		3,5	3-007-01003
		90		4,0	3-007-01004
		110		5,0	3-007-01005
350 - 500	260	25	300	2,2	3-007-01010
		35		3,0	3-007-01011
		42		3,5	3-007-01009
		50		4,0	3-007-01012
		65		5,5	3-007-01013
		75		6,5	3-007-01014
		90		8,0	3-007-01015
550 - 700	360	25	300	3,0	3-007-01020
		35		4,0	3-007-01021
		42		4,5	3-007-01019
		50		5,5	3-007-01022
		65		7,0	3-007-01023
		75		7,5	3-007-01024
		90		10,5	3-007-01025
750 - 900	460	25	500	5,9	3-007-01030
		35		8,0	3-007-01031
		42		9,3	3-007-01029
		50		11,0	3-007-01032
		65		13,5	3-007-01033
		75		14,7	3-007-01034
		90		18,5	3-007-01035
950 - 1100	570	25	500	7,6	3-007-01040
		35		9,5	3-007-01041
		42		11,8	3-007-01039
		50		13,0	3-007-01042
		65		17,0	3-007-01043
		75		19,0	3-007-01044
		90		26,0	3-007-01045
1150 - 1400	710	25	600	12,0	3-007-01050
		35		18,0	3-007-01051
		42		19,2	3-007-01049
		50		21,0	3-007-01052
		65		26,7	3-007-01053
		75		29,0	3-007-01054
		90		37,0	3-007-01055

PSI Casing Spacer Standard Model Guidelines

Carrier Pipe Diameter Range Options



Carrier Pipe Insertion Length



Carrier Pipe Compatibility with Spacer Model - Guidelines

	Non-metallic Casing Spacers				Metallic Casing Spacers	
	Model PE	Model HT	Model AZ	Ranger II®	Models C & S with 8" Band	Models C & S with 12" Band
Steel	E	E	S	E	E	E
Steel (Mortar Coated)	U	U	U	U	NR	E
Ductile Iron	U	U	U	G	G	E
Cement	U	U	U	U	E	E
Profile Pipe	U	U	U	S	E	E
Clay	NR	NR	U	U	E	E
HDPE	NR	NR	S	E	E	E
PVC Water Pipe	NR	NR	G	E	E	E
PVC Sewer Pipe	NR	NR	G	E	E	E

E = Excellent
NR = Not Recommended
G = Good
F = Fair
S = Satisfactory
U = Unsatisfactory

General Notes:The foregoing performance data are intended as guidelines only. Performance suitability for specific applications should be determined by the user. Variation in carrier pipe type, carrier pipe diameter, casing length, casing condition, and position may predude suggested service use. Casing Spacer selection is at the sole risk of the user. Consult with a specialist or PSI factory for specific applications. PSI's responsibilities will be limited to those listed in the PSI standard warranties. **Consult with a specialist or PSI factory for specific applications.**

Standard Material Property Comparison - PSI Casing Spacers

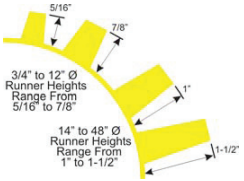
For detailed information and higher/lower metallic temp. range please view specific Model pages.

	Non-metallic Casing Spacers				Metallic Casing Spacers		
	Model PE	Model HT	Model AZ	Ranger II®	Models C8 - C12	Models S8 - S12	Models SL8
Band Material	Polyethylene	Poly-carbonate	Polypropylene	Polypropylene	14 Gauge PVC Coated Steel	14 Gauge 304 Stainless Steel	16 Gauge 304 Stainless Steel
Runner Material	Polyethylene	Poly-carbonate	Polypropylene	Polypropylene	Glass Reinforced Nylon	Glass Reinforced Nylon	Glass Reinforced Nylon
Riser Material	None	None	None	None	10 Gauge Coated Steel	10 Gauge Stainless Steel	12 Gauge Stainless Steel
Liner Material	None	HighTemp Plastic	None	None	Polyvinyl Chloride	Polyvinyl Chloride	Polyvinyl Chloride
Hardware	Plated Steel	Plated Steel	Plated Steel	None	Plated or 304 Stainless Steel	304 Stainless Steel	304 Stainless Steel
Compressive Strength	3,200 psi	12,500 psi	3,000 psi	3,000 psi	18,000 psi	18,000 psi	18,000 psi
Temperature Range	180ºF. Max	280ºF. Max	-40ºF to +180º F	-22ºF to +212º F	-40ºF to +170º F	-40ºF to +170º F	-40ºF to +170º F

General Runner Height Options - PSI Casing Spacers

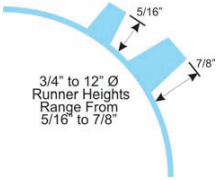
Model PE Non-metallic Casing Spacers*

- Model PE runners are molded as an integral part of each segment.
- Runner heights range from 5/16" (7.94mm) to 1-1/2" (38.1mm) depending on model dimensions.
- Runner height is symmetrical around spacer.
- Runner/Band width for PE spacers is 3.0" (76.19mm) through 6.25" (158.75mm).
- Refer to pages 4 - 5 for detailed information on PE Casing Spacers.



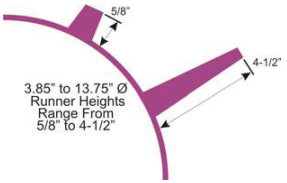
Model HT (High Temp) Non-metallic Casing Spacers*

- Model HT runners are molded as an integral part of each segment.
- Runner height range from 5/16" (8.0mm) to 7/8" (48.5mm) depending on model dimensions.
- Runner height is symmetrical around spacer.
- Runner/Band width for HT spacers is 3.0" (7.94mm) through 5.0" (127.0mm).
- Refer to pages 6 - 7 for detailed information on HT Casing Spacers.



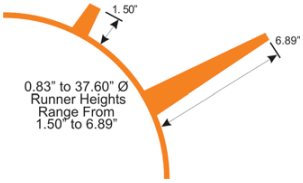
Model AZ Non-metallic Casing Spacers*

- Model AZ runners are molded as an integral part of each segment.
- Runner height range from 5/8" (15.9mm) to 4-1/2" (114.3mm).
- Runner height is symmetrical around spacer.
- Runner/Band width for AZ spacers is 5.2" (132.0mm).
- Refer to pages 8 - 9 for detailed information on AZ Casing Spacers.



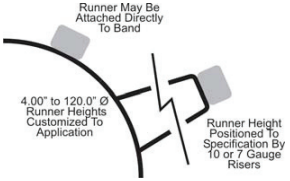
Ranger II® Non-metallic Casing Spacers*

- Ranger II runners are molded as an integral part of each segment.
- Runner height range from 1.50" (38.1mm) to 6.89" (175.0mm).
- Runners may be placed asymmetrically around spacer.
- Runner/Segment widths for Ranger II spacers is 2.13" (54.1mm) through 8.86" (225.04mm).
- Refer to pages 10 - 13 for detailed information on Ranger II Casing Spacers.



Metallic Casing Spacers Coated (C) & Stainless Steel (S)

- 2" (50.8mm) wide nylon or polyester glass reinforced runners.
- Effective runner height = 1.07" (27.2mm) or 1.70" (43.2mm).
- Runners may be attached directly to spacer band.
- Runners may be attached on top of 10 or 7 gauge risers to accommodate any runner height configuration.
- Metallic spacers available in 8.0" (203.2mm) or 12.0" (304.79mm) wide bands.
- Refer to page 14 - 19 for detailed information on coated or stainless steel casing spacers.

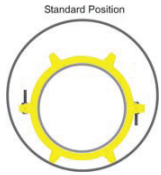


***Caution Note**
If casing pipe has offsets or weld beads in excess of 1/8", consider using a metallic casing spacer.

Position Within Casing Options

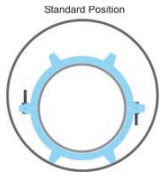
Model PE Non-metallic Casing Spacers

- Standard position within casing.
- Runner height must be symmetrical around spacer.
- Refer to pages 4 - 5 for detailed information on PE Casing Spacers.



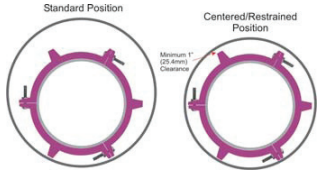
Model HT (High Temp) Non-metallic Casing Spacers

- Standard position within casing.
- Runner height must be symmetrical around spacer.
- Refer to pages 6 - 7 for detailed information on PE Casing Spacers.



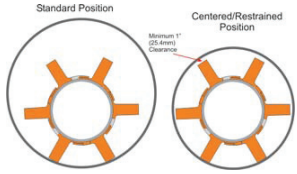
Model AZ Non-metallic Casing Spacers

- Two positions within casing possible - standard (clear bell) and centered-restrained.
- Runner height must be symmetrical around spacer.
- Refer to page 8 - 9 for detailed information on PE Casing Spacers.



Ranger II® Non-metallic Casing Spacers

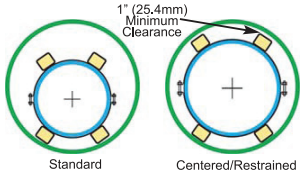
- Multiple positions within casing possible.
- Different height runner segments may be mixed around carrier pipe.
- Runner height may be asymmetrical around carrier pipe.
- Positioning options include: standard (clear bell), centered, centered-restrained and non-centered-restrained
- Refer to page 10 - 13 for detailed information on Ranger II® Casing Spacers.



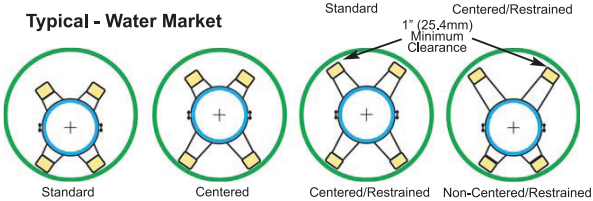
Metallic Casing Spacers Coated (C) & Stainless Steel (S)

- Multiple positions within casing possible.
- Runner height may be asymmetrical around carrier pipe.
- Positioning options include: standard (clear bell), centered, centered/restrained and non-centered/restrained
- Refer to pages 14-19 for detailed information on Metallic Casing Spacers.

Typical - Energy Market



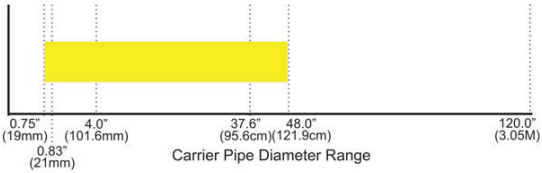
Typical - Water Market

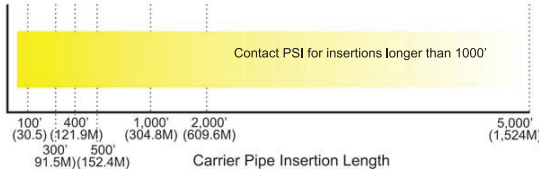


Model PE

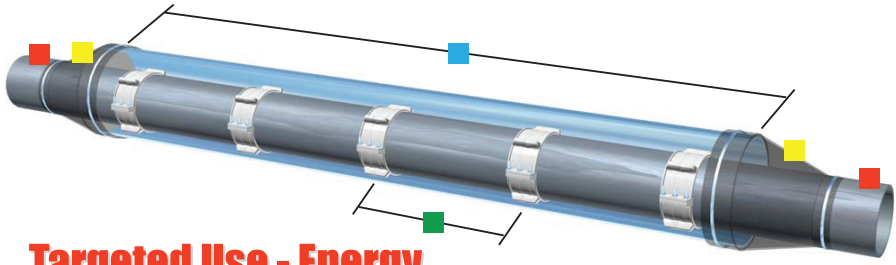
Non-metallic Casing Spacers

PSI Model PE Non-metallic Casing Spacers









Targeted Use - Energy

- For carrier pipe diameters (Nominal Steel & IPS) ranging from 3/4" (19.1mm) to 48" (121.92cm)
- For carrier pipe insertion lengths up to 1,000 feet.* (304.8M)
- Spacing Recommendation: Max 8' (243.8cm) between spacers, Max 2' (61.0cm) from casing pipe end.
- Recommended End Seals: Model C, S, W, R and FW.

*Model PE Casing Spacers are designed primarily for smaller diameter steel or polyethylene carrier pipes (ANSI O.D. pipe without a bell or mechanical joint). We do not recommend that they be used on any carrier pipe over 24" (61.0cm) in diameter or for installations over 400 feet (121.9M) long without consulting with PSI. PE Isolators should **not** be used on concrete carrier pipe.

Benefits/Features

- Ribbed inner surface prevents slippage & guards against coating damage.
- Molded from virgin polyethylene material.
- Lightweight for ease of handling and installation.
- Screwdriver is only tool needed for installation.
- Model available with non-metallic hardware.
- Eliminates the need for grout, blown sand or pea gravel.

High density (linear), injection molded virgin Polyethylene casing isolators/spacers provide positive electrical isolation, high abrasion resistance and low coefficient of friction for a wide variety of double containment carrier/casing pipe applications. They are extremely light in weight and easy to handle during installation. A ribbed inner surface prevents slippage and guards against carrier pipe coating damage while the outer surface may include any one of several molded runners to accommodate 2" (50.8mm) x 4" (101.6mm) or larger carrier/casing differentials.
One piece solid molded segments provide for maximum load bearing. Hardware includes cadmium plated steel bolts and nuts. A screwdriver is the only tool needed for installation.



PSI Model PE Non-metallic Casing Spacers

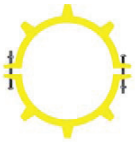
Material Specifications

SPECIFICATION	ASTM TEST	VALUE
Band/Runner Segments		Injection Molded Virgin Polyethylene
Tensile Strength	D638, D651	3,100 - 5,500 psi 218 - 387 kg/cm^2
Compressive Strength	D693	3,200 psi (225kg/cm^2)
Water Absorption	D570	0.1%
Temperature		180ºF. Max. (82ºC.)
Impact Strength	D256	1.5-2.0 ft lb/in. (0.8-1.07 newton-meters/cm)
Dielectric Strength	D149	450 Volts/Mil.
Color		White

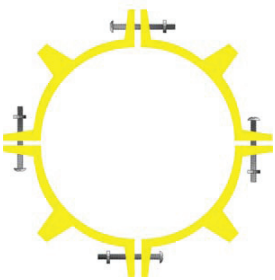
Liner - None

Runners - Sizes and Configurations
3/4" (19mm) through 12" (305mm) = 2-piece with molded-in runners
14" (356mm) and larger = Multiple segments with molded-in runners.

Hardware
Metallic - Bolts and Square Nuts = Plated Steel
Non-metallic - Bolts and Nuts = High Temp Plastic



2-Piece
For 3/4" to 12" (1.9 to 30.48cm).



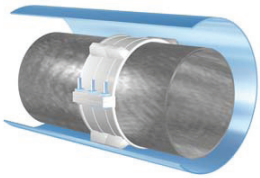
Multi-Segment
For 14" (35.56cm) and above.

Model PE Band Width and Runner Height

Model Size	Band Width	Runner Height
3/4 X 2	3.0" (76.19mm)	5/16" (7.94mm)
1 X 3	3.0" (76.19mm)	1/2" (12.7mm)
1-1/4 X 3	3.0" (76.19mm)	1/2" (12.7mm)
1-1/2 X 3	3.0" (76.19mm)	1/2" (12.7mm)
2 x 4	4.0" (101.6mm)	5/8" (15.88mm)
2-1/2 X 5	4.0 (101.6mm)	5/8" (15.88mm)
3 x 6	4.0" (101.6mm)	5/8" (15.88mm)
4 X 6	4.0" (101.6mm)	9/16" (14.29mm)
4 X 8	4.0" (101.6mm)	1" (25.4mm)
6 x 8	4.0" (101.6mm)	9/16" (14.29mm)
6 X 10	4.0" (101.6mm)	1" (25.4mm)
6 X 10(S)	4.0" (101.6mm)	9/16" (14.29mm)
8 x 10	4.0" (101.6mm)	9/16" (14.29mm)
8 x 12	5.0" (127.0mm)	1" (25.4mm)
8 X 12(S)	5.0" (127.0mm)	7/8" (22.23mm)
10 X 14	5.0" (127.0mm)	7/8" (22.23mm)
10 X 16(S)	5.0" (127.0mm)	7/8" (22.23mm)
12 X 16	5.0" (127.0mm)	7/8" (22.23mm)
All Multiple Segments* (4" Differential)	6.25" (158.75mm)	1" (25.4mm)
All Multiple Segments* (6" Differential)	6.25" (158.75mm)	1-1/2" (38.1mm)

(S) = Somastic Coated Pipe
Note: Model PE Sized for Nominal Steel and IPS Pipe.
* = Download Model Size information from www.pipelineseal.com

Position In Casing



Model PE Standard
S = Standard

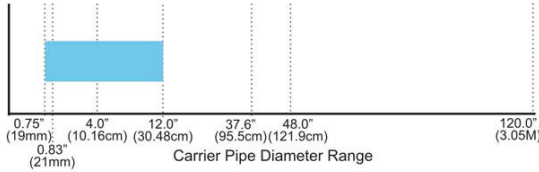


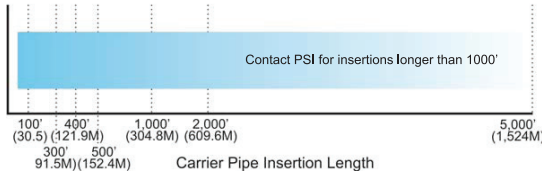
Circa. 1979, Model PE installed on steel pipe.
Experience and today's application would target a steel casing spacer, or more PE's spaced at 6 ft. (1.83M).

Model HT

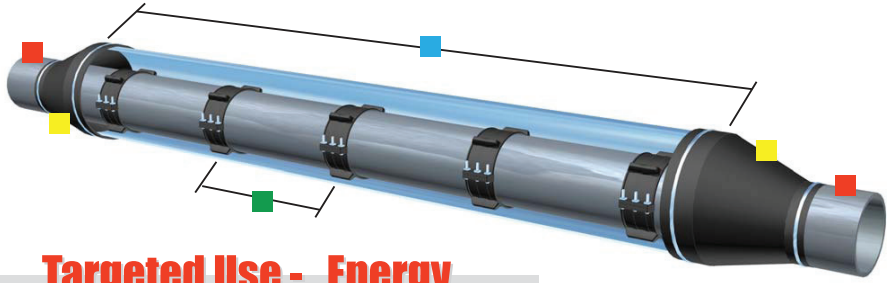
Non-metallic Casing Spacers

PSI Model HT Non-metallic Casing Spacers









Targeted Use - Energy

- For carrier pipe diameters (Nominal Steel & IPS) ranging from 3/4" (19.1mm) to 12" (304.8mm)
- For carrier pipe insertion lengths up to 400 feet.* (121.9M)
- Spacing Recommendation: Max 8' (243.8cm) between spacers, Max 2' (61.0cm) from casing pipe end.
- Recommended End Seals: Model C, S, W, R and FW.

*Model HT Casing Isolators are designed primarily for smaller diameter steel or polyethylene carrier pipes (ANSI O.D. pipe without a bell or mechanical joint). We do not recommend that they be used on any carrier pipe over 12" (30.5cm) in diameter or for installations over 400 feet (121.9M) long without consulting with PSI. HT Isolators should **not** be used on concrete carrier pipe.

Benefits/Features

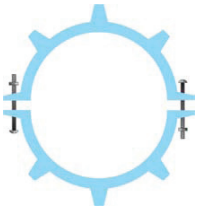
- May be used for high-temperature applications.
- Unique formulation of polymers allows isolator/spacer to be used in applications where temperatures may reach 280-degrees F. (138-degrees C.)
- Ribbed inner surface prevents slippage and guards against coating damage.
- Lightweight for ease of handling and installation.
- Screwdriver is only tool needed for installation.
- Model available with non-metallic hardware.
- Eliminates the need for grout, blown sand or pea gravel.

Polycarbonate is used in the manufacture of the Hi-Temp isolators/spacers giving them the ability to be used for applications that may reach 280-degrees F. (138°-degrees C.). In addition to heat resistance, they also offer excellent electrical isolation, high abrasion resistance and low coefficient of friction for a wide variety of double containment carrier/casing pipe applications. Light in weight and easy to handle during installation, Model HT casing isolators also feature ribbed inner surface that prevents slippage and guards against carrier pipe coating damage. The outer surface may include any one of several molded runners to accommodate 2" (50.8mm) x 4" (101.6mm) or larger carrier/casing differentials.

PSI Model HT Non-metallic Casing Spacers

Material Specifications

SPECIFICATION	ASTM TEST	VALUE
Band/Runner Segments		Injected Molded Virgin Polycarbonate
Tensile Strength	D790	8,100 - 9,000 psi
Compressive Strength	D695	12,500 psi
Water Absorption	D570	0.1%
Temperature		280ºF. Max. (138ºC.)
Impact Strength	D256	1.5 - 2.0 ft lb/in. (0.8 - 1.07 newton-meters/cm)
Dielectric Strength	D149	450 Volts/Mil.
Color		Black



2-Piece
For 3/4" to 12" (1.9 to 30.48cm).



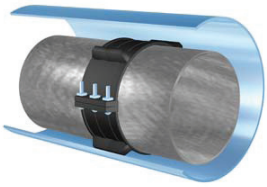
Liner - T.P.E. Liner (HT Models 6x10 through 12x16)

Thickness	0.118" (3.0mm)
Hardness	Shore "A" 73
Dielectric Strength	
1/8" (3.18mm) Surge Test	60,000 V min.
Step-by-step Test	58,000 V min.
Water Absorption	1% max.

Runners - Sizes and Configurations
3/4" (19mm) through 12" (305mm) = 2-piece with molded-in runners

Hardware
Metallic - Bolts and Square Nuts = Plated Steel
Non-metallic - Bolts and Nuts = High Temp Plastic

Position In Casing



Model HT Standard
S = Standard

Model HT Band Width and Runner Height

Model Size	Band Width	Runner Height
3/4 X 2	3.0" (76.19mm)	5/16" (7.94mm)
1 X 3	3.0" (76.19mm)	1/2" (12.7mm)
1-1/4 X 3	3.0" (76.19mm)	1/2" (12.7mm)
1-1/2 X 3	3.0" (76.19mm)	1/2" (12.7mm)
2 x 4	4.0" (101.6mm)	5/8" (15.88mm)
3 x 6	4.0" (101.6mm)	5/8" (15.88mm)
4 X 8	4.0" (101.6mm)	1" (25.4mm)
6 X 10*	4.0" (101.6mm)	1" (25.4mm)
8 x 12*	5.0" (127.0mm)	1" (25.4mm)
10 X 14*	5.0" (127.0mm)	7/8" (22.23mm)
12 X 16*	5.0" (127.0mm)	7/8" (22.23mm)

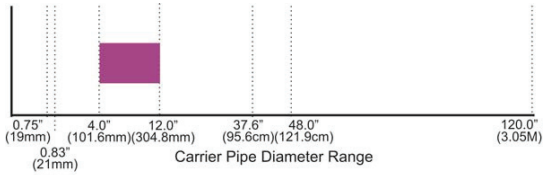
* = Sold with Liner.
Note: Model HT Sized for Nominal Steel and IPS Pipe.

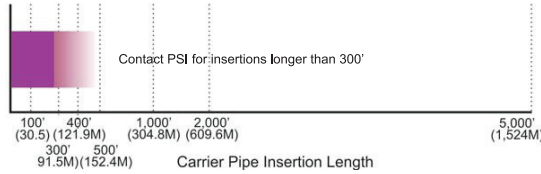


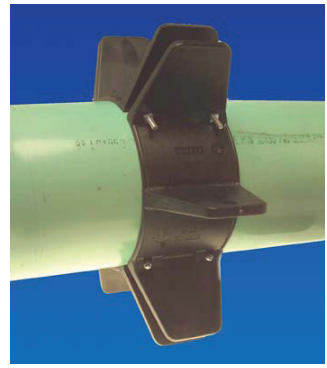
For Hi-Temp Applications over 12" Nominal O.D. Use Metallic Casing Spacers with T.P.E Liner. Model A Spacers used on an insulated steel pipe.

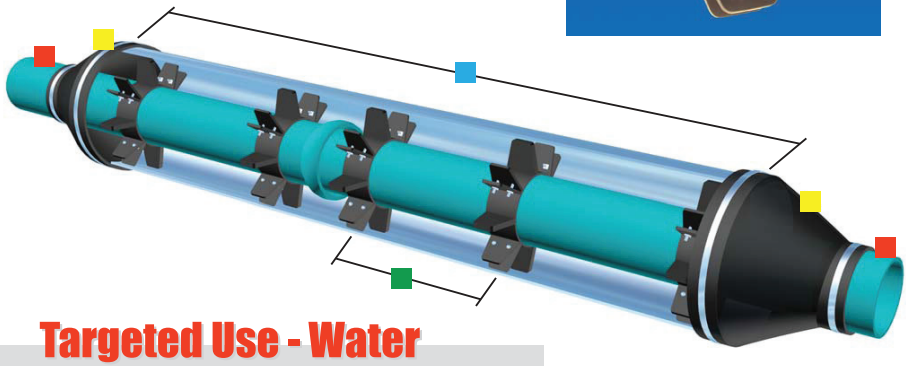
Model AZ
Non-metallic Casing Spacers

PSI Model AZ Non-metallic Casing Spacers







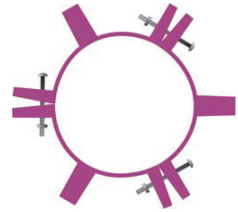


Targeted Use - Water

- For carrier pipe diameters ranging from 3.85" (9.78cm) to 13.75" (34.9cm).
- For carrier pipe insertion lengths up to 300 feet.* (91.5M)
- Spacing Recommendation: Max 8' (243.8cm) between spacers, Max 2' (61.0cm) from casing pipe end, Max 2' (61.0cm) on each side of bell or mechanical joint.
- Recommended End Seals: Model C, S, W, and R.

*Model AZ Casing Isolators are designed primarily for smaller diameter steel or polyethylene carrier pipes (ANSI O.D. pipe without a bell or mechanical joint). We do not recommend that they be used on any carrier pipe over 12" (30.5cm) in diameter or for installations over 400 feet (121.9M) long without consulting with PSI. AZ Isolators should **not** be used on concrete carrier pipe or heavy type pipe.

Model AZ non-metallic casing spacers are designed for use with water and sewer pipes 3.85" (9.78cm) to 13.75" 34.9cm) in diameter. They are an economical alternative to banded wood skids and stainless steel bands for inserting pipes into casings. AZ spacers also eliminate the need for sand or grout filling of the annular space in the casing. All are adaptable to a wide variety of carrier pipe O.D.'s found on PVC Pressure/Sewer Pipe, DI-Ductile Iron, C-900, P.E., and IPS-Steel Pipes



Benefits/Features

- Variable O.D.'s of casing spacer to fit multiple sized space.
- Manufactured from UV resistant polypropylene.
- Runner heights may be interchanged or field cut to adjust for grade.
- Corrosion protection - only metal components are steel bolts/nuts.
- One piece molded construction for maximum load bearing.
- Allen head bolts for improved spacer tightening.

PSI Model AZ Non-metallic Casing Spacers

Material Specifications

SPECIFICATION	ASTM TEST	VALUE
Band/Runner Segments		Injection molded virgin polypropylene
Tensile Strength	D790	8,100 - 9,000 psi
Compressive Strength	D695	3,000 psi (211 kg/sq. cm.)
Water Absorption	D570	0.1%
Temperature		-40°F. to +180°F. (-40°C. to +82°C.)
Impact Strength	D256	1.5 ft lb/in. (0.8 joules/cm)
Dielectric Strength	D149	800 Volts/Mil. Min.
Color		Black

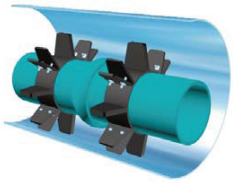
Liner - None

Runners - Sizes and Configurations
4" (101.6mm) through 12" (305mm) = 3 to 5 segments/spacer. (See chart below.)

Hardware - Metallic - Allen Head Bolts and Square Nuts = Plated Steel

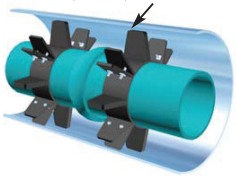


Position In Casing



Model AZ Standard
S = Standard

1" (25.4cm) Minimum Clearance



Model AZ Centered/Restrained
CR = Centered/Restrained

Nominal Pipe Diameter	O.D.Range	Segments Per Spacer	AZ1 Model Number	Runner Height (Inches)
4.0"	3.86" - 5.12" (98 - 130mm)	3 - AZ1	AZ1-16	5/8" (16mm)
			AZ1-25	1.0" (25mm)
6.0"	5.12" - 6.77" (130 - 172mm)	4 - AZ1	AZ1-36	1-1/2" (36mm)
			AZ1-55	2-1/4" (55mm)
6.0"	6.81" - 7.95" (173 - 202mm)	5 - AZ1	AZ1-75	3.0" (75mm)
			AZ1-90	3-1/2" (90mm)
			AZ1-110	4-1/2" (110mm)

Nominal Pipe Diameter	O.D.Range	Segments Per Spacer	AZ2 Model Number	Runner Height (Inches)
8.0"	7.99" - 9.05" (203 - 230mm)	3 - AZ2	AZ2-16	5/8" (16mm)
			AZ2-25	1.0" (25mm)
8.0" - 10.0"	9.21" - 10.75" (234 - 273mm)	3 - AZ2 & 1 - AZ1	AZ2-36	1-1/2" (36mm)
			AZ2-55	2-1/4" (55mm)
10"	10.75" - 11.85" (273 - 301mm)	4 - AZ2	AZ2-75	3.0" (75mm)
			AZ2-90	3-1/2" (90mm)
12"	11.89" - 13.78" (302 - 350mm)	4 - AZ2 & 1 - AZ1	AZ2-110	4-1/2" (110mm)

How to Size AZ Casing Spacer Applications with Examples

Centered and Restrained Application with Equal Length Runners

Following is an example on how to size AZ casing spacers for centered/restrained applications. For applications requiring adjusting for grade elevation changes, contact PSI.

Initial Specifications: 9.05"Ø C-900 pipe (9.05" O.D. barrel with 11.5" O.D. bell) inside a 18"Ø casing with a 0.375" wall thickness.

Step A. With carrier pipe O.D. (9.05"), from chart above, choose the proper size and number of AZ segments. One spacer would require 3-AZ2 segments.

Step B. Determine maximum runner height with equal length runners.

Casing I.D.	17.25" (18.0 - 0.750 [0.375x2] = 17.25)
Less Carrier Pipe O.D.	-9.05"
	8.20"
Less Annular space Clearance	-1.00"
	7.20"

Divide this number (7.20") by 2 to obtain the total allowable runner height = 3.60"

Step C. Choose a runner height of this value or less but no smaller than a height to clear bell. (smallest runner height = 1-1/2" to clear bell)
Solution: Use 3-AZ2-90 segments per spacer (Runner Height = 3-1/2")
Bell clearance = 1.225"

Step D. Determine length of pull. Use spacing specifications above to determine number of spacers required for each pipe segment and total pull.

Application with Equal Length Runners to Clear Bell

Following is an example on how to size AZ casing spacers for applications just to clear bell. (Suggested minimum clearance is at least 0.8" [0.4" on both sides]).

Initial Specifications: 9.05"Ø C-900 pipe (9.05" O.D. barrel with 11.5" O.D. bell) inside a 18"Ø casing with a 0.375" wall thickness.

Step A. With carrier pipe O.D. (9.05"), from chart above, choose the proper size and number of AZ segments. One spacer would require 3-AZ2 segments.

Step B. Determine minimum runner height just to clear bell.

Bell O.D.	11.50"
Add 0.8" Clearance	+0.80"
	12.30"
Less Barrel O.D.	-9.05"
	3.25"

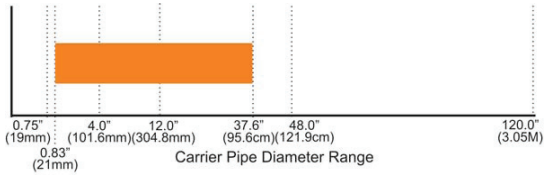
Divide this number (3.25") by 2 to obtain minimum runner height just to clear bell = 1.62"

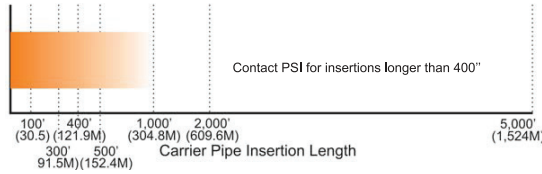
Step C. Choose a runner height between 1.62" and the maximum allowable runner height (3.60") determined in the example on the left.
Solution: Use 3-AZ2-55 segments per spacer (Runner Height = 2-1/4")

Step D. Determine length of pull. Use recommended spacing specifications above to determine number of spacers required for each pipe segment and total pull.

Ranger II®
Non-metallic Casing Spacers

PSI Ranger II® Non-metallic Casing Spacers

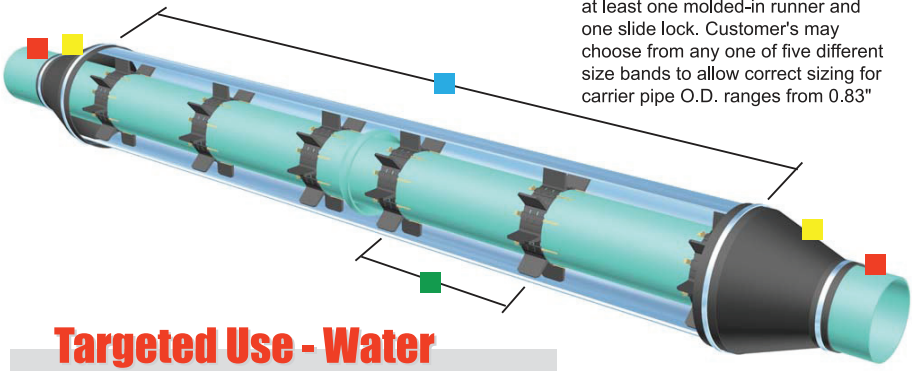






The Ranger II® is an all non-metallic casing isolator/spacer system that uses molded segments to encircle the carrier pipe. Each segment includes at least one molded-in runner and one slide lock. Customer's may choose from any one of five different size bands to allow correct sizing for carrier pipe O.D. ranges from 0.83" (21.1mm) up to 37.60" (95.5cm) in diameter.

Once sized, the segments are placed around the carrier pipe and cinched together via non-metallic slide-locks. Installation is quick and easy while only a small inventory of segments may be used to accommodate a large variety of pipe styles, types and diameters.



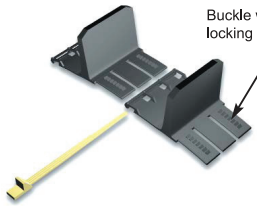
Targeted Use - Water

- For carrier pipe diameters ranging from 0.83" (21mm) to 37.60" (955mm).
- For carrier pipe insertion lengths up to 400 feet.* (121.9M)
- Spacing Recommendation: Max 8' (243.8cm) between spacers, Max 2' (61.0cm) from casing pipe end, Max 2' (61.0cm) on each side of bell or mechanical joint.
- Recommended End Seals: Model C, S, W, and R.

Ranger II® spacers should **not** be used on concrete carrier pipe. Engineered equal to 304 Stainless Steel Metallic Casing Spacers. Excellent for the Stocking Distributor.

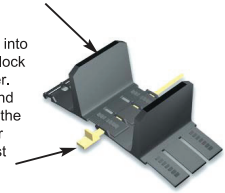
Separate segments are connected by inserting the buckles into slots on the adjacent segment. Slot accepts Slide-Lock. Arrow molded on segment indicates correct insertion direction.

Slide-Lock is used to tension the segments together after installation on pipe. Channels face up during insertion while the correct size Slide-Lock (micro, mini, midi, medi, maxi) is molded on the flat (bottom) side.



Runners are available in a variety of heights to allow for desired carrier pipe placement in casing.

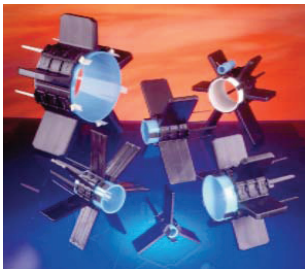
Slide-Lock is inserted into channel to close and lock the segments together. Slide-Lock removal and re-insertion will cinch the segments together for final tightening against carrier pipe.



PSI Ranger II® Non-metallic Casing Spacers

Material Specifications

SPECIFICATION	ASTM TEST	VALUE
Band/Runner Segments		Injection molded virgin polypropylene
Tensile Strength	D790	8,100 - 9,000 psi
Compressive Strength	D695	3,000 psi (211 kg/sq. cm)
Water Absorption	D570	0.1%
Temperature		-22°F. to +212°F. (-30°C. to +100°C.)
Impact Strength	D256	1.5 ft lb/in. (0.8 joules/cm)
Dielectric Strength	D149	800 Volts/Mil. Min.
Color		Black
Liner - None		
Runners - Sizes and Configurations 1.5" (38mm) through 6.89" (175mm)		1 Runner Per Segment (Micro, Mini, Midi) 2 Runners Per Segment (Medi, Maxi)
Hardware Non-metallic - Slide-Locks - No Metallic Parts		



Features

- All non-metallic. No nuts, bolts, washers or any other metal parts to corrode or degrade over time.
- Designed for carrier pipe diameters from 0.83" (21mm) to 37.60" (955mm) in diameter.
- Segmented pieces - small inventory may be used to accommodate a large variety of pipe styles, types and diameters. No extra trips from job site to warehouse for additional parts.
- Easy assembly. Simply slide the segments together and cinch tight with the patented Slide-Lock connecting system.
- Wide variety of runner heights to allow numerous options for pipe positioning within the casing.
- Runner variations may be used to adjust for grade.
- Will accommodate small conduit attachment for communications or electrical cable.
- Medi and Maxi segments, 2 molded runners per segment.
- Segment band and runners molded as one piece.
- Manufactured from UV resistant polypropylene.
- High impact strength, 1.5 ft. lbs./inch (0.8 joules/cm)
- Excellent compressive strength, 3,000 psi (211 kg/square cm)
- 800 Volts/Mil. Dielectric Strength.
- Wide temperature range, -22º to +212º F. (-30º to +100º C.)
- Eliminates sand or grout fill.
- No special tools required for installation.
- Low coefficient of friction for ease of installation.

Weight Comparison
9.05" x 17.25" CR Application

Ranger II Non-Metallic	Model S8GN2 Stainless Steel
2.79 lbs.	15 lbs.

Ranger II® Advantage
Installer and Shipping Costs

Weight and Spacing Guidelines

Ranger II® Casing Spacers Skid Height Spacing:
(Maximum Distance Between Casing Spacer.)

Skid Height 1.50" (38mm) to 1.97" (50mm)	8' (Feet)
Skid Height 2.56" (65mm) to 3.54" (90mm)	6' (Feet)
Skid Height 3.94" (100mm) and up	5' (Feet)

Installed On Various Pipe Types, Such As:
PVC Water, PVC Sewer, HDPE
Steel, Ductile Iron...etc.

Ranger II Casing Spacers Skid Height Max Load Per Spacer:

	MICRO	MINI	MIDI	MEDI	MAXI
Skid Height 1.50" (38mm) to 1.97" (50mm)	175 lb.	500 lb.	1,250 lb.	3,300 lb.	5,000 lb.
Skid Height 2.56" (65mm) to 2.95" (75mm)	135 lb.	400 lb.	1,000 lb.	2,600 lb.	4,000 lb.
Skid Height 3.54"(90mm) to 3.94" (100mm)	120 lb.	350 lb.	875 lb.	2,300 lb.	3,500 lb.
Skid Height 4.92" (125mm) to 5.91" (150mm)		250 lb.	625 lb.	1,650 lb.	2,500 lb.
Skid Height 6.89" (175mm)			550 lb.	1,400 lb.	2,300 lb.



PSI Ranger II® Non-metallic Casing Spacers

Ranger II - Micro for 0.83 to 3.07" (21 to 78mm) Diameter Carrier Pipe
Band Width = 2.13" (54mm)

Carrier Pipe O.D. Range Inches (mm)	No. of Segments	Runner Height Options Inches (mm)
0.83 to 1.14 (21 to 29)	3	Verify that Slide-Locks match segment size: Make sure (Mini) matches name molded on the bottom of the Slide-Lock. Note: Micro & Mini segments both use the Mini Slide-Lock.
1.14 to 1.54 (29 to 39)	4	
1.54 to 1.85 (39 to 47)	5	
1.85 to 2.24 (47 to 57)	6	
2.24 to 2.48 (57 to 63)	7	
2.48 to 3.07 (63 to 78)	8	



Ranger II - Mini for 2.48 to 5.51" (63 to 140mm) Diameter Carrier Pipe
Band Width = 3.15" (80mm)

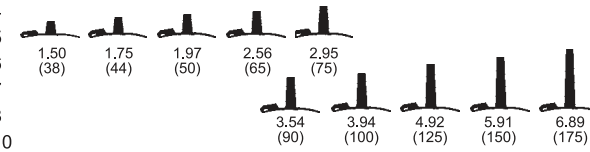
Carrier Pipe O.D. Range Inches (mm)	No. of Segments	Runner Height Options Inches (mm)
2.48 to 3.07 (63 to 78)	4	
3.07 to 3.86 (78 to 98)	5	
3.86 to 4.49 (98 to 114)	6	
4.49 to 5.51 (114 to 140)	7	



Verify that Slide-Locks match segment size by checking to ensure the segment name (Mini) matches the name molded on bottom of the Slide-Lock. Note: Micro & Mini segments both use the Mini Slide-Lock.

Ranger II - Midi for 5.51 to 16.65" (140 to 423mm) Diameter Carrier Pipe
Band Width = 5.12" (130mm)

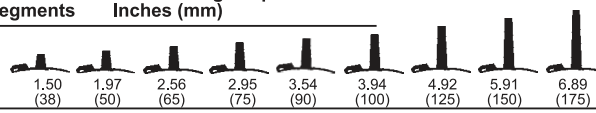
Carrier Pipe O.D. Range Inches (mm)	No. of Segments	Runner Height Options Inches (mm)
5.51 to 6.89 (140 to 175)	4	
6.89 to 8.70 (175 to 221)	5	
8.70 to 10.31 (221 to 262)	6	
10.31 to 12.87 (262 to 327)	7	
12.87 to 14.41 (327 to 366)	8	
14.41 to 16.65 (366 to 423)	10	



Verify that Slide-Locks match segment size by checking to ensure the segment name (Midi) matches the name molded on the bottom of the Slide-Lock.

Ranger II - Medi for 16.77 to 25.98" (426 to 660mm) Diameter Carrier Pipe
Band Width = 6.87" (174 mm)

Carrier Pipe O.D. Range Inches (mm)	No. of Segments	Runner Height Options Inches (mm)
16.77 to 21.22 (426 to 539)	4	
21.22 to 25.98 (539 to 660)	5	



Verify that Slide-Locks match segment size by checking to ensure the segment name (Maxi) matches the name molded on the bottom of the Slide-Lock. Note: Medi & Maxi segments both use the Maxi Slide-Lock.

Ranger II - Maxi for 25.98 to 37.60" (660 to 955mm) Diameter Carrier Pipe
Band Width = 8.86" (225mm)

Carrier Pipe O.D. Range Inches (mm)	No. of Segments	Runner Height Options Inches (mm)
25.98 to 30.79 (660 to 782)	6	
30.79 to 37.60 (782 to 955)	7	



Verify that Slide-Locks match segment size by checking to ensure the segment name (Maxi) matches the name molded on the bottom of the Slide-Lock. Note: Medi & Maxi segments both use the Maxi Slide-Lock.

PSI Ranger II® Non-metallic Casing Spacers

Size your Installation Application

All Ranger II® Casing Spacers require more than one segment to complete a spacer. In addition, all Ranger II Casing Spacers are available with a number of different runner height options which are used to guarantee clearance of the mechanical joint, provide for options in carrier pipe positioning within the casing or to compensate for grade elevation adjustments. Following are examples on how to size Ranger II Casing Spacers for various applications.
Detailed Ranger II casing spacers weight & spacing guidelines on page 11. For exact centering and adjusting for grade elevation changes contact PSI.

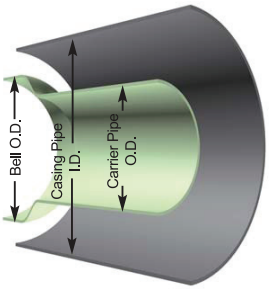
Examples

Centered & Restrained with Equal Length Runners

20" Ductile Iron pipe (21.60" O.D. barrel & 28.63" O.D. bell) inside a 36" casing with a 0.375" wall thickness.
A. Find carrier pipe O.D. (21.60") from adjacent chart and choose the proper size and number of segments. One spacer would require 5 - Medi segments.
B. Determine maximum runner height with equal length runners.

Casing I.D.	35.25"
Less Carrier Pipe O.D.	-21.60"
	13.65"
Less Space Allowance	-1.00"
	12.65"

Divide this number (12.65") by 2 to obtain the total maximum runner height = 6.325
C. Choose a runner height of this value or less.
Solution: Use 5 - Medi (150) segments with runner heights of 5.91".



Note: This combination will restrain the pipe from flotation within the casing pipe by allowing only about 1.8" of clearance between the top runners and the casing I.D. This will center the carrier pipe within approximately 0.9" of exact center.

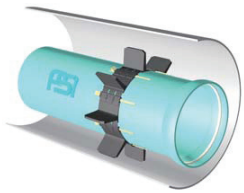
To Clear the Bell **(suggested minimum clearance is at least 0.8" (0.4" on both sides)**

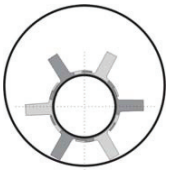
20" Ductile Iron pipe (21.60" O.D. barrel & 28.63" O.D. bell) inside a 36" casing with a 0.375" wall thickness.

Determine runner height.

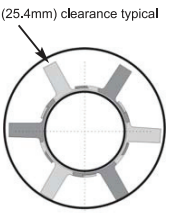
(Clear Bell)	Bell O.D.	28.63"
	Add 0.8" Clearance	+0.80"
		29.43"
	Less Barrel O.D.	-21.60"
		7.83"

Divide this number (7.83") by 2 to obtain the minimum runner height to clear the bell = 3.92"
Choose a runner height between 3.92" and the maximum allowable runner height (6.32") determined in the above example.
Solution: Use 5 - Medi (100) segments with runner heights of 3.94".

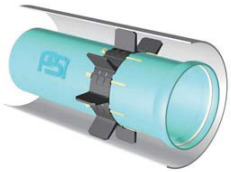




Standard To Clear Bell

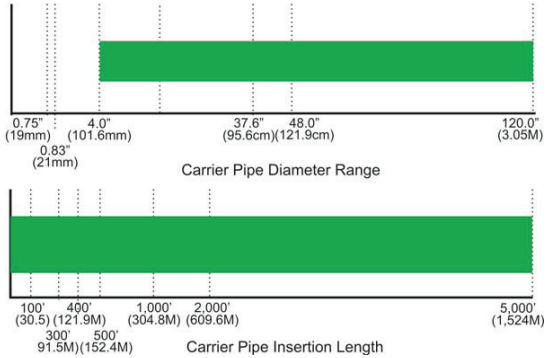


Centered/Restrained



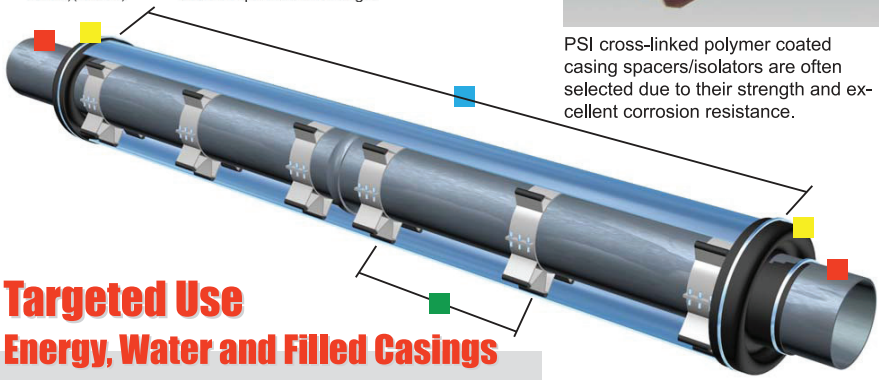
Model C
Coated Metallic Casing Spacers

PSI Model C Metallic Casing Spacers





PSI cross-linked polymer coated casing spacers/isolators are often selected due to their strength and excellent corrosion resistance.



Targeted Use
Energy, Water and Filled Casings

- For carrier pipe diameters ranging from 4" (101.6mm) to 120" (304.8cm)
- For carrier pipe insertion lengths up to 5,000 feet.* (1,524M)
- Spacing Recommendation: Max 8' (243.8cm) between spacers, Max 2' (61.0cm) from casing pipe end, Max 2' (61.0cm) on each side of bell or mechanical joint.
- Recommended End Seals: Model C, S, W, R and FW.

* Pipe insertion lengths may vary depending on type of casing pipe, condition of casing pipe, misaligned casing joint or other factors that may cause excessive abrasion to runner materials.

Model Options:

Model C8G2 or C8GN2

Coated Steel casing isolator with an 8" (203mm) wide steel band and 2" (50.8mm) wide glass reinforced polymer runners.

Model C12G2 or C12GN2

Coated Steel casing isolator with a 12" (305mm) wide steel band and 2" (50.8mm) wide glass reinforced polymer runners.

An extremely tough and durable heat fused fluid bed thermo set cross-linked polymer coating is offered on steel casing spacers/isolators 4" and larger, with 8" and 12" band widths. The cold formed steel casing spacer/isolator band (risers where applicable) and studs for runner mounting are grit blasted, heated and fusion coated with a cross-linked epoxy polymer formulation, providing a minimum 0.010 (0.254mm) thick coating over the entire metallic surface. A post cured cycle strengthens the bond and provides an even more uniform coating. Other heat fused formulations are also available for custom orders and applications.

The runners are attached with 3/8" diameter studs, which are fusion welded to the band before it is powder coated. They are recessed far below the wearing surface of the runner. After the runner is anchored to the band, the stud counter-bore is filled with specially formulated caulk to assure a water tight seal for the stud and the locking fastener.

PSI Model C Metallic Casing Spacers

Material Specifications
Coated Metallic Casing Spacers/Isolators

Band

14 Gauge (0.074" [1.88mm]) hot rolled and pickled mild steel.
12 Gauge (0.105" [2.66mm]) hot rolled and pickled mild steel. (40" Ø & up.)
Flanges of the spacer are deep embossed and the corners are chamfered.

Configurations - Band

4" (101.6mm) through 36" (914mm) = 2 Piece
36" (914mm) through 48" (1,219mm) = 3 Piece
48" (1,219mm) and over = Consult Factory

Finish - 10 to 16 mil. fusion bonded cross-linked Epoxy coating (others available)

Durometer - shore D (10 sec.) (ASTM D2240-74)	86
Max. Operating Temp. (constant)	225° F. (107° C.)
Aging Properties	Excellent
Electrical Properties (ASTM D149-97) (short time .010")	1,500 V/mil.
Resistance:	
Salt Spray (ASTM B117)	Excellent
Acids	Good
Alkalies	Good

Liner - Polyvinyl Chloride Liner (Standard)

Thickness	0.090" (2.29mm) minimum
Hardness	Durometer "A" 85-90
Dielectric Strength	
1/8" (3.18mm) Surge Test	60,000 V min.
Step-by-step Test	58,000 V min.
Water Absorption	1% max.
Temperature	-40 to 170ºF(-40 to 76ºC)

Liner - T.P.E. Liner (Temperature Extremes) Model C12 Only

Thickness	0.118" (3.0mm)
Hardness	Shore "A" 73
Dielectric Strength	
1/8" (3.18mm) Surge Test	60,000 V min.
Step-by-step Test	58,000 V min.
Water Absorption	1% max.
Temperature	-50 to 270ºF(-45 to 132ºC)

Risers

10 gauge (0.135" [3.43mm]) steel MIG welded to band. (Standard)
7 gauge (0.179" [4.55mm]) steel MIG welded to band. (Contact PSI)

Runners (G and GN) Note: GN Material is the PSI Standard Material

Sizes and Configurations

2" (51mm) Wide Glass Reinforced Polyester (G) or Nylon Runners (GN)
4" (101.6mm) thru 12" (305mm) = 2 top & 2 bottom
14" (356mm) thru 36" (914mm) = 2 top & 4 bottom
38" (965.2mm) and over = Consult Factory

Runner Specifications (G and GN)

Tensile Strength, (ASTM D638)	17,600 psi (1,237 kg/cm²)
Flexural Strength, (ASTM D790)	25,300 psi (1,779 kg/cm²)
Compression Strength, (ASTM D695)	18,000 psi (1,266 kg/cm²) (10% Deformation)
Deflection Temp. @ 264 psi - (ASTM D648)	405°F (205°C)

Hardware (Threaded Studs, Nuts and Washers)

Threaded Studs = 5/16" - 18 x 2 1/2" 304 stainless steel or plated
Hex Nuts = 5/16"
Washers = 5/16" SAE 2330

Configurations - Threaded Studs, Nuts and Washers

8" (203.2mm) Band = 6 studs, 12 nuts and washers
12" (305mm) Band = 8 studs, 16 nuts and washers





Effective Runner Heights and Lengths - G and GN

Sizing carrier pipe O.D. and casing I.D. can be misleading at times due to a difference between nominal and effective dimensions. When sizing, make sure to consider effective runner height. Two heights are available/used; custom positioning in the casing can be achieved with riser heights.

Heights - Nominal versus Effective
2" Wide Glass Reinforced Nylon or Polyester Runners

Nominal 1.0" (25.4mm) - 1.5" (38.1mm)
Effective 1.07" (27.2mm) - 1.70" (43.2mm)

Lengths - Effective
2" Wide Glass Reinforced Nylon or Polyester Runners

7.0" (177.8mm) - 11.0" (279.4mm)

Glass reinforced polymer runners are standard in 2" (50.8mm) widths for Model C (coated).

PSI GN glass reinforced nylon runners have 5 times the compressive strength of polyethylene runners. Our Model G polyester 2" wide runners are particularly designed for heavier pipes and longer pulls.



Model C12GN2 used on D.I Pipe, for 1,800 ft crossing under airport runway.

Applications

Rugged, heavy duty steel casing spacers with tough glass reinforced polymer insulating runners are designed for ease of installation on:

- Concrete Pipe • Ductile Iron Pipe
- Plastic Pipe • Steel Pipe

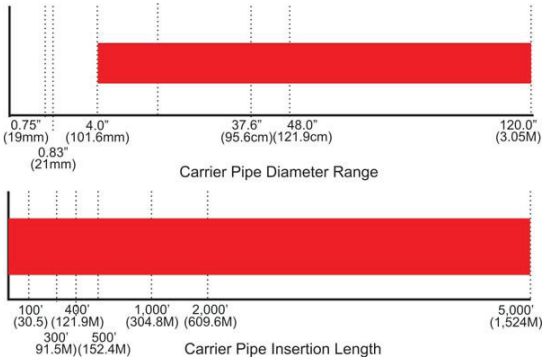
Spacers Accommodate

- Mechanical Joints • Push-on
- Restrained • Welded Joint Pipe
- Small or large carrier/casing differentials.
- Electrical isolation of carrier pipe from casing for corrosion protection.

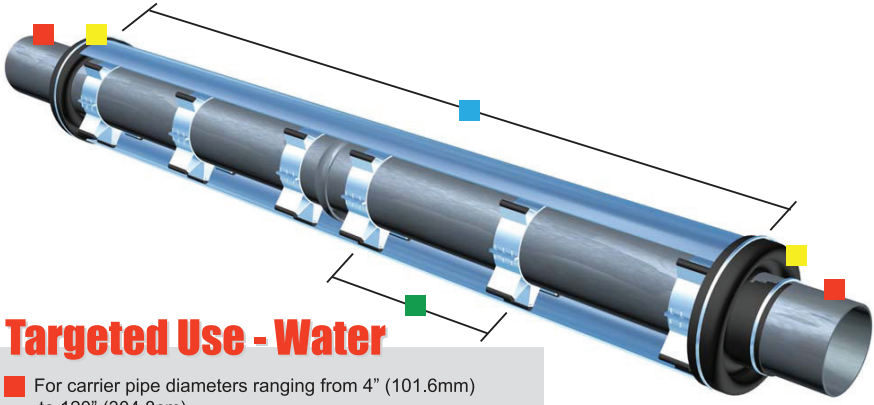
Model S

Stainless Metallic Casing Spacers

PSI Model S Metallic Casing Spacers







Targeted Use - Water

- For carrier pipe diameters ranging from 4" (101.6mm) to 120" (304.8cm).
- For carrier pipe insertion lengths up to 5,000 feet.* (1,524M)
- Spacing Recommendation: Max 8' (243.8cm) between spacers, Max 2' (61.0cm) from casing pipe end, Max 2' (61.2cm) on each side of bell or mechanical joint.
- Recommended End Seals: Model C, S, W, R and FW.

* Pipe insertion lengths may vary depending on type of casing pipe, condition of casing pipe, misaligned casing joint or other factors that may cause excessive abrasion to runner materials.

Model Options:

Model S8G2 or S8GN2
Stainless Steel casing isolator with an 8" (203mm) wide steel band and 2" (50.8mm) wide glass reinforced polymer runners.

Model S12G2 or S12GN2
Stainless Steel casing isolator with a 12" (305mm) wide steel band and 2" (50.8mm) wide glass reinforced polymer runners.

Model SL8GN2 (Cost Effective Stainless Option.)
Stainless Steel casing isolator with a 8" (203mm) wide steel band and 2" (50.8mm) wide glass reinforced polymer runners. Designed for carrier pipe O.D's under 13.8" (35.0cm), targeting PVC pipe types for water market.

Tough, heavy duty 14 gauge (0.74"/1.88mm) 304 stainless steel isolators/spacers are available for use in highly corrosive environments. They offer maximum corrosion resistance while providing support for large diameter pipe, unusually heavy pipe or for long casing pulls.

The flanges of the spacer are deep embossed and the corners are chamfered.

The runners are attached with 3/8" (9.5mm) diameter studs, which are fusion welded to the band. The studs are recessed far below the wearing surface of the runner and, after the runner is anchored to the band or riser, the stud counter-bore is filled to insure a water tight seal for the stud and the lock fastener.

PSI Model S Metallic Casing Spacers

Material Specifications
Stainless Steel Casing Spacers/Isolators

Band

14 Gauge (0.074" [1.88mm]) 304 stainless steel. (S8 and S12)
12 Gauge (0.105" [2.66mm]) 304 stainless steel. (S12 40" Ø & up.) Engineer/Contractor must specify.
16 Gauge (0.061" [1.56mm]) 304 stainless steel. (Model SL8)
Flanges of the spacer are deep embossed and the corners are chamfered.

Configurations - Band

4" (101.6mm) through 36" (914mm) = 2 Piece
36" (914mm) through 48" (1,219mm) = 3 Piece
48" (1,219mm) and over = Consult Factory

Finish

None

Liner - Polyvinyl Chloride Liner (Standard)

Thickness	0.090" (2.29mm) minimum
Hardness	Durometer "A" 85-90
Dielectric Strength	
1/8" (3.18mm) Surge Test	60,000 V min.
Step-by-step Test	58,000 V min.
Water Absorption	1% max.
Temperature	-40 to 170°F(-40 to 76°C)

Liner - T.P.E. Liner (Temperature Extremes) Model S12 Only

Thickness	0.118" (3.0mm)
Hardness	Shore "A" 73
Dielectric Strength	
1/8" (3.18mm) Surge Test	60,000 V min.
Step-by-step Test	58,000 V min.
Water Absorption	1% max.
Temperature	-50 to 270°F(-45 to 132°C)

Risers

10 gauge (0.135" [3.43mm]) 304 stainless steel MIG welded to band. (Standard S8 and S12)
7 gauge (0.179" [4.55mm]) steel MIG welded to band. (Contact PSI)
12 gauge (0.105" [2.667mm]) steel MIG welded to band. (Model SL8)

Runners (G and GN) Note: GN Material is the PSI Standard Material

Sizes and Configurations

2" (51mm) Wide Glass Reinforced Polyester (G) or Nylon Runners (GN)
4" (101.6mm) thru 12" (305mm) = 2 top & 2 bottom
14" (356mm) thru 36" (914mm) = 2 top & 4 bottom
38" (965.2mm) and over = Consult Factory

Runner Specifications (G and GN)

Tensile Strength, (ASTM D638)	17,600 psi (1,237 kg/cm²)
Flexural Strength, (ASTM D790)	25,300 psi (1,779 kg/cm²)
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Hardware (Threaded Studs, Nuts and Washers)

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Hex Nuts = 5/16"
Washers = 5/16" SAE 2330

Configurations - Threaded Studs, Nuts and Washers

8" (203.2mm) Band = 6 studs, 12 nuts and washers
12" (305mm) Band = 8 studs, 16 nuts and washers





Effective Runner Heights and Lengths - G and GN
Sizing carrier pipe O.D. and casing I.D. can be misleading at times due to a difference between nominal and effective dimensions. When sizing, make sure to consider effective runner height. Two heights are available/used; custom positioning in the casing can be achieved with riser heights.

Heights - Nominal versus Effective
2" Wide Glass Reinforced Nylon or Polyester Runners
Nominal 1.0" (25.4mm) - 1.5" (38.1mm)
Effective 1.07" (27.2mm) - 1.70" (43.2mm)

Lengths - Effective
2" Wide Glass Reinforced Nylon or Polyester Runners
7.0" (177.8mm) - 11.0" (279.4mm)

Glass reinforced polymer runners are standard in 2" (50.8mm) widths for Model S (stainless).
PSI GN glass reinforced nylon runners have 5 times the compressive strength of polyethylene runners. Our Model G polyester 2" wide runners are particularly designed for heavier pipes and longer pulls.



Applications
Rugged, heavy duty steel casing spacers with tough glass reinforced polymer insulating runners are designed for ease of installation on:
- Concrete Pipe • Ductile Iron Pipe
- Plastic Pipe • Steel Pipe

Spacers Accommodate
- Mechanical Joints • Push-on
- Restrained • Welded Joint Pipe
- Small or large carrier/casing differentials.
- Electrical isolation of carrier pipe from casing for corrosion protection.

Multiple Carrier Pipe

Metallic Casing Spacers

PSI Multiple Casing Spacers - Engineered Custom Fabrication

Multiple Casing Spacers - Engineered

PSI - Pipeline Seal and Insulator, Inc. is the industry leader in the design and fabrication of multiple carrier spacers used for inserting different size pipes, conduits and wires into casings. Projects have ranged from simple dual pipe configurations to complex pipe/conduit arrangements, designed for maximum strength and efficiency within all pipe specifications.

Customized spacers are also available with electrically isolated rollers to ease installation of unusually heavy carrier pipes or for extremely long casing pipe runs.

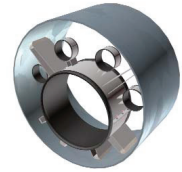


PSI Models C (coated) and S (stainless steel) may be designed and fabricated to meet the needs of your custom project.

All custom multiple carrier spacers share the same features as our single carrier spacers described throughout this brochure. However, the multiple carrier spacers are considerably more complex and therefore require more detailed design considerations.

Please contact PSI during your design phase. We have over forty years experience with custom casing spacers and can provide you with insights into design criteria based on “real world” applications in all industries.



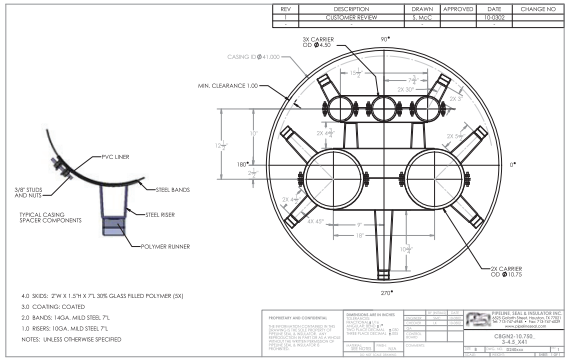


Benefits/Features

- Customized To Customer Specifications
- Design Assistance If Needed
- Same High Quality As Standard Isolators
- May be Specified with Heavy Duty PVC Inner Liner Provides Protection For Pipe and/or Coating
- Rollers may be used for long pulls and/or heavy pipe installations
- Designed to last for the life of the piping system
- Eliminates the Need for Grout, Blown Sand or Pea Gravel



Model C12GN2 used on (2) 24” C-905 Chilled Water Lines going through a 60” casing.





Ordering Procedure - Metallic Casing Spacers

How to Order Metal Casing Isolators/Spacers

1. Quantity
2. Type Finish
3. Band Width
4. Runner Width
5. Carrier Pipe O.D. (Type and coating thickness if applicable)
6. Casing Pipe I.D. (Type and coating thickness if applicable)
7. Carrier Pipe Joint O.D. (If applicable)
8. Carrier pipe position within casing
9. Length of crossing
10. Contact your local distributor or Pipeline Seal and Insulator, Inc.

Example

Coated 12" (305mm) wide steel band casing spacer with 2" (50.8mm) wide glass reinforced nylon runners for a 16" (400mm) ductile iron pipe with a 17.40" (400mm) outside diameter within a casing pipe with a 23.25" (590mm) inside diameter, carrier pipe joint O.D. 20.00" (508mm), standard position.

Type Finish
C = Coated
S = 304 Stainless Steel
SL8 = Light Gauge 304 Stainless Steel

Band Width
8 = 8" Band
12 = 12" Band

Runner Width
G2 = 2" Wide Glass Reinforced Polyester Runners
GN2 = 2" Wide Glass Reinforced Nylon Runners

Carrier Pipe O.D.
Indicate actual O.D. including coating.

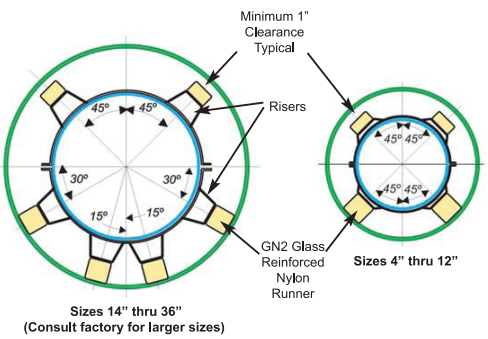
Casing Pipe I.D.
Indicate actual I.D. including coating.

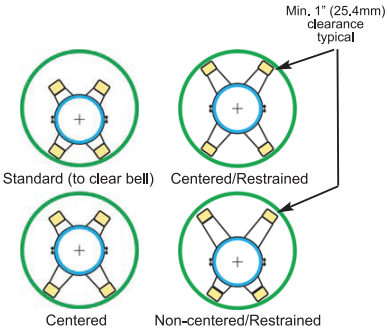
Carrier Pipe Joint/Bell O.D. (if applicable)
Indicate actual O.D. including coating.

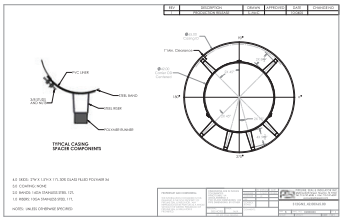
Position within Casing
S = Standard
C = Centered
CR = Centered/Restrained
NCR = Non-centered/Restrained

C 12 GN2 17.40 x 23.25 - 20.00" - S

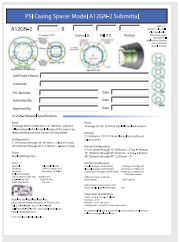
Typical Configuration Examples







CAD - Drawings
Metallic Casing Spacers are engineered, and CAD drawings are available for design discussions upon request. Detailed CAD drawings are provided upon order placement. For standard CAD casing/carrier pipe applications, drawings are available online at www.pipelineseal.com.

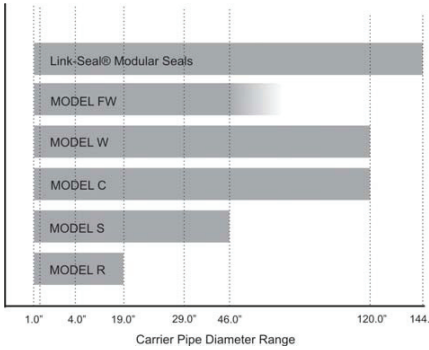


Casing Spacer Submittal Sheets
are available online at www.pipelineseal.com.

Ordering Procedure
Metallic Casing Spacers

Casing End Seals
Models C and R

Casing End Seals

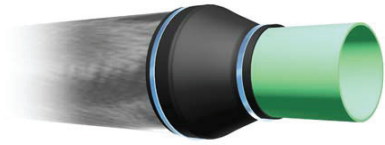


Material	Endseal Model						Material Specifications
	C	R	S	W	FW	LS	
EPDM 60	X	X	X	X	*		Thickness = 1/8" (3.18mm) Color = Black Temperature = 250° F. (121° C.)
BUNA-N[1]	X			X	*		Thickness = 1/8" (3.18mm) Color = Black Temperature = 212° F. (100° C.)
NEOPRENE	X			X	*		Thickness = 1/8" (3.18mm)* Color = Black Temperature = 170° F. (77° C.)
NITRILE						X	Color = Green Temperature = 210° F. (99° C.)
SILICONE						X	Color = Grey Temperature = 400° F. (204° C.)
EPDM						X	Color = Black Temperature = 250° F. (121° C.)

NOTES:
Standard casing end seals are designed for below grade applications. For above grade applications please contact PSI.
LS = Link-Seal® Modular Seals.
* = Contact PSI For Material Specifications.
1. High grade Buna-N material available for oil/gas run off.

Model "C" End Seals (For New Installations) Water/Energy Market

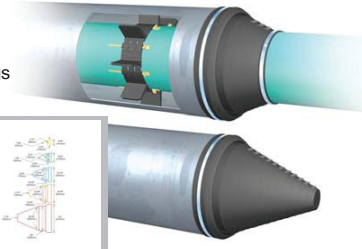
Model "C" Custom Pull-on End Seals are designed to accommodate custom carrier/casing diameter combinations. They are made to customer supplied specifications so they may be used for any size casing/carrier differential. Manufactured from 1/8" thick specially compounded synthetic rubber, PSI Model "C" end seals are extremely robust, resistant to wide variations in environmental conditions while eliminating the possibility of foreign material entering the opening between carrier and casing pipes.



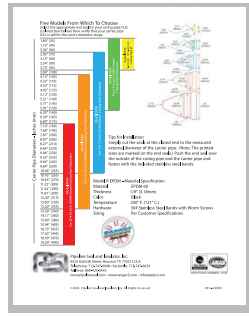
Benefits/Features
- Custom Made to Order
- Quick and Easy Installation
- Carrier Pipe Does Not Need To Be Centered Within Casing
- Screwdriver Is Only Tool Required for Installation
- Designed To Last for the Life of the Piping System
- Heavy Duty Stainless Steel Hose Clamps Supplied

Model "R" End Seals and Night Caps (For New Installations) Water/Energy Market

Model "R" End Seals are available in five (5) different sizes to accommodate a wide range of carrier/casing diameter combinations. A unique "cone" design, with molded-in dimensions, are easily cut to size for a correct fit on the carrier pipe.



Benefits/Features
- Low storage costs, only five end seal sizes to accommodate casings from 4" (10.2cm) to 24" (61.0cm) in diameter with all applicable carrier pipe sizes
- May be easily stocked in 5 model sizes
- Quick and Easy Installation
- Manufactured from 1/8" (3.18mm) thick high quality EPDM rubber
- Casing night cap prevents entry of debris and animals during install
- Sizes are clearly printed on sleeve to simplify cutting to the correct size
- Designed to last for the life of the piping system
- Stainless steel bands for clamping both ends of end seal provided
- May be used for new installations



For Model R End Seal sizing, download Model R literature.
www.pipelineseal.com

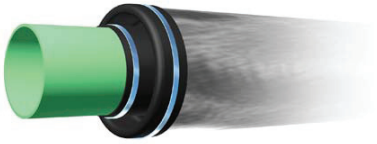
Casing End Seals

Model "S" Standard Pull-on End Seals (For New Installations) **Energy Market**

Model "S" Standard Pull-on End Seals are flexible and easily installed on Nominal Steel & IPS casing/carrier pipe combinations. PSI Model "S" end seals are extremely robust, resistant to wide variations in environmental conditions while eliminating the possibility of foreign material entering the opening between carrier and casing pipes.

Benefits/Features

- Quick and Easy Installation
- May be stocked
- Screwdriver Is Only Tool Required for Installation
- Designed To Last for the Life of the Piping System
- Heavy Duty Stainless Steel Hose Clamps Supplied.



Model "W" Wrap Around End Seals (For New and Existing Installations) **Water/Energy Market**

Model "W" Wrap Around End Seals are designed to accommodate customer supplied specifications so they may be used for any size casing/carrier differential. PSI Model "W" end seals are extremely robust, resistant to wide variations in environmental conditions while eliminating the possibility of foreign material entering the opening between carrier and casing pipes.

Benefits/Features

- Custom Made to Order
- Quick and Easy Installation
- Carrier Pipe Does Not Need To Be Centered Within Casing
- Can Be Installed on Existing Casing Installations
- Screwdriver Is Only Tool Required for Installation
- Designed To Last for the Life of the Piping System
- Heavy Duty Stainless Steel Hose Clamps Supplied
- Self-Curing Seam - Simply Remove Plastic Backing and Press Together



Model "FW" Fire Resistant End Seals (For New and Existing Installations) **Energy Market**

Model "FW" Fire Resistant End Seals have been developed for applications identified as fire prone areas such as tank farms or pipes passing through fire walls. They are ordered to customer supplied specifications so they may be used for any size casing/carrier differential. These seals are excellent for eliminating the possibility of foreign material entering the opening between carrier and casing pipes.

Benefits/Features

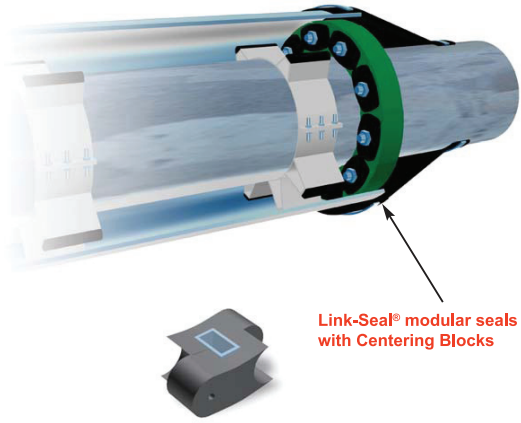
- Custom Made to Order
- Quick and Easy Installation
- Carrier Pipe Does Not Need To Be Centered Within Casing
- Screwdriver Is Only Tool Required for Installation
- Designed To Last for the Life of the Piping System
- Heavy Duty Hose Clamps Supplied



Standard casing end seals are designed for below grade applications.
For above grade applications please contact PSI.

Casing End Seals - Link-Seal® Modular Seals

For Double Sealing Pipeline Casing Ends when Carrier Pipe is Centered in Casing



Link-Seal® modular seals with Centering Blocks

Link-Seal® Modular Seals with Reinforced Centering Blocks.

A Link-Seal® modular seal assembly installed at each end of pipeline casings provides positive, hydrostatic protection against the entry of water, soil or other backfill materials and reduces corrosion and ice damage.

If casing isolators are not used, starting with 14" diameter assemblies, we suggest Link-Seal® modular seals with "centering blocks" in 25% of the links. These centering blocks fit into molded openings in the Link-Seal® modular seals and are positioned in the lower 90° of each assembly. PSI centered casing isolators should also be placed within two feet of casing ends.

400 Series

For Casings Two Pipe Sizes Larger than Carrier Pipe

CARRIER X CASING PIPE *IPS Nominal*	COMPLETE CASING SEAL ASSEMBLY CONSISTS OF: PLAIN LINKS	LINKS WITH CENTERING BLOCKS	TOTAL LINKS	BASIC LINK-SEAL SIZE USED	COMPLETE ASSEMBLY ORDER NO
2" X 6"	5	0	5	LS-410	26*
3" X 6"	7	0	7	LS-360	36*
4" X 8"	7	0	7	LS-475	48*
6" X 10"	10	0	10	LS-475	610*
8" X 12"	12	0	12	LS-475	812*
10" X 14"	10	0	10	LS-425	1014*
12" X 16"	12	0	12	LS-425	1216*
14" X 18"	9	4	13	LS-400	1418
16" X 20"	11	4	15	LS-400	1620
18" X 22"	13	4	17	LS-400	1822
20" X 24"	13	5	18	LS-400	2024
22" X 26"	16	5	20	LS-400	2226
24" X 28"	17	5	22	LS-400	2428
26" X 30"	17	6	23	LS-400	2630
28" X 32"	18	7	25	LS-400	2832
30" X 34"	20	7	27	LS-400	3034
32" X 36"	21	8	29	LS-400	3236
34" X 38"	22	8	30	LS-400	3438
36" X 40"	24	8	32	LS-400	3640

* = Centering Blocks are not required and not available for these models. (Maximum coating 3/16" thick - Casing pipe walls should not exceed 0.500" except for casing sizes 12", 14" and 16", which should not have a wall thickness greater than 0.312")

500 Series

For Casings Three Pipe Sizes Larger than Carrier Pipe

CARRIER X CASING PIPE *IPS Nominal*	COMPLETE CASING SEAL ASSEMBLY CONSISTS OF: PLAIN LINKS	LINKS WITH CENTERING BLOCKS	TOTAL LINKS	BASIC LINK-SEAL SIZE USED	COMPLETE ASSEMBLY ORDER NO.
4" X 10"	6	0	6	LS-500	410**
6" X 12"	7	0	7	LS-500	612**
8" X 14"	11	0	11	LS-575	814**
10" X 16"	7	3	10	LS-525	1016
12" X 18"	9	3	12	LS-525	1218
14" X 20"	9	4	13	LS-500	1420
16" X 22"	11	4	15	LS-500	1622
18" X 24"	12	4	16	LS-500	1824
20" X 26"	13	5	18	LS-500	2026
22" X 28"	14	6	20	LS-500	2228
24" X 30"	15	6	21	LS-500	2430
26" X 32"	17	6	23	LS-500	2632
28" X 34"	18	6	24	LS-500	2834
30" X 36"	19	7	26	LS-500	3036
32" X 38"	21	7	28	LS-500	3238
34" X 40"	21	8	29	LS-500	3440
36" X 42"	23	8	31	LS-500	3642
42" X 48"	27	9	36	LS-500	4248
48" X 54"	30	11	41	LS-500	4854
54" X 60"	34	12	46	LS-500	5460

** = Centering Blocks are not required for these applications. (Maximum coating 3/16" thick - Casing pipe walls should not exceed 0.500" except for casing sizes 16" and 18" which should not have a wall thickness greater than 0.312")

Typical Specification - Non-Metallic for Energy Market

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Model PE Non-Metallic Casing Spacers/Isolators

1. Energy Market
2. Nominal Steel & IPS Pipe
3. Suggested Max. Casing Length = 1,000 ft.
4. Max. Carrier Pipe O.D. = 48.0" Ø
5. Position Within Casing = Standard

Casing spacers/isolators shall be PSI Model PE molded from high density virgin polyethylene plastic in two segments for applications on carrier pipe diameters of 12" and under. Model PE isolator/spacers will be provided in multiple segments for applications on carrier pipe diameters of over 12". Each spacer segment shall be a solid, non-welded molded piece designed for accommodating a specific size carrier pipe O.D.
The casing spacers shall be the PSI Model PE as manufactured by PSI - Pipeline Seal and Insulator, Inc., Houston, Texas or engineered approved equal. Alternate considerations shall be submitted to Engineer 10 days prior to bid opening.

Considerations
The above specification is considered sufficient for most nominal pipe sizes and types up to 36-inches and casing lengths up to 1,000 feet. For larger size pipes, exact pipe O.D.'s, longer or unusual casings, consider Metallic Casing spacers/isolators or please contact Pipeline Seal and Insulator, Inc.

End Seal Specification for Application
After insertion of the carrier pipe in the casing, the ends of the casing shall be closed by installing a PSI Model "C", Model "S", Model R or Model "FW" casing end seal as manufactured by Pipeline Seal and Insulator, Inc., Houston, TX.

Quality Assurance
Each casing spacer and end seal shall be manufactured at a facility that has a Registered ISO 9001:2008 Quality Management System. A copy of the current ISO 9001:2008 registration shall be provided with material submittal.

Model HT Non-Metallic Casing Spacers/Isolators

1. Energy Market (Hi Temp)
2. Nominal Steel & IPS Pipe
3. Suggested Max. Casing Length = 1,000 ft.
4, Max. Carrier Pipe O.D. = 12.0" Ø
5. Position Within Casing = Standard

Casing spacers/isolators for applications that may reach 280º F shall be PSI Model HT molded from virgin polycarbonate in two segments for applications on carrier pipe diameters of 12" and under. Each spacer segment shall be a solid, non-welded molded piece designed for accommodating a specific size carrier pipe O.D.
The casing spacers shall be the PSI Model HT as manufactured by PSI - Pipeline Seal and Insulator, Inc., Houston, Texas or engineered approved equal. Alternate considerations shall be submitted to Engineer 10 days prior to bid opening.

Considerations
The above specification is considered sufficient for most nominal pipe sizes and types up to 12 inches and casing lengths up to 1,000 feet. For larger size pipes, exact pipe O.D.'s, longer or unusual casings, consider Metallic Casing spacers/isolators with T.P.E liners or please contact Pipeline Seal and Insulator, Inc.

End Seal Specification for Application
After insertion of the carrier pipe in the casing, the ends of the casing shall be closed by installing a PSI Model "C", Model "S", Model R or Model "FW" casing end seal as manufactured by Pipeline Seal and Insulator, Inc., Houston, TX.

Quality Assurance
Each casing spacer and end seal shall be manufactured at a facility that has a Registered ISO 9001:2008 Quality Management System. A copy of the current ISO 9001:2008 registration shall be provided with material submittal.

Typical Specification
Non-Metallic Casing Spacers for the Water Market

Typical Specification - Non-Metallic for Water Market

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Model Ranger II® Non-Metallic Casing Spacers
1. **Water Market**
2. **Pressure and Gravity Pipe**
3. **Suggested Max. Casing Length = 400 ft.**
4. **Max. Carrier Pipe O.D. = 37.60" Ø**
5. **Position Within Casing = Standard, Centered, Centered/Restrained**

A. Casing Spacers
Upon completion of the installation of the steel pipe encasement, the contractor shall furnish and install a Ranger II® boltless casing spacer on the carrier pipe as described below.
Casing spacers shall be spaced a maximum of eight (8) feet apart along the length of the carrier pipe with one casing spacer within two (2) feet of each side of a pipe joint and the rest evenly spaced. Wood skids are not an acceptable method of supporting the carrier pipe.

1. Casing spacers shall be all non-metallic virgin polypropylene, molded in segments for field assembly without any special tools. Spacer segments shall be secured around carrier pipe by insertion of a Slide-Lock. The casing spacer polymer shall contain ultraviolet inhibitors and shall have a minimum compressive strength of 3,000 psi, an 800 Volts/mil dielectric strength and impact strength of 1.5 ft-lbs./inch. Each casing spacer shall have full length, integrally molded skids extending beyond the bell or mechanical joint of the carrier pipe.

2. The casing spacers shall be the PSI Ranger II® Casing Spacers as manufactured by Pipeline Seal and Insulator, Inc., Houston, Texas or engineered approved equal.

Alternate considerations shall be submitted to Engineer 10 days prior to bid opening

3. Spacers shall be at least as wide as listed below.

Carrier Pipe Diameter Inches (mm)	Ranger II Model	Width In. (mm)
0.83 to 3.07" (21 to 78)	Micro	2.13" (54)
2.48 to 5.51" (63 to 140)	Mini	3.15" (80)
5.51 to 16.65" (140 to 423)	Midi	5.12" (130)
16.77 to 25.98" (426 to 660)	Medi	6.87" (174)
25.98 to 37.60" (660 to 955)	Maxi	8.86" (225)

B. End Seals
After insertion of the carrier pipe into the casing, the ends of the casing shall be closed by installing 1/8" thick synthetic rubber end seals equal to the PSI Model "C" or Model "R" end seal as manufactured by Pipeline Seal and Insulator, Inc., Houston, Texas.

Considerations
The above specification is considered sufficient for most pipe sizes and types up to 36-inches and casing lengths up to 400 feet. For larger size pipes, heavy pipe types, and longer or unusual casings, use metallic casing spacers or please contact Pipeline Seal and Insulator, Inc.

Quality Assurance
Each casing spacer and end seal shall be manufactured at a facility that has a Registered ISO 9001:2008 Quality Management System. Copy of current ISO 9001:2008 Registration shall be provided with material submittal.

Typical Specification - Metallic for Energy/Water Markets

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Metallic Casing Spacers

1. Energy/Water Markets
2. All Pipe Types
3. Suggested Max. Casing Length = 5,000 ft.
4. Suggested Max. Carrier Pipe O.D. = 120.0" Ø
5. Position Within Casing = Standard, Centered, Centered/Restrained, Non-centered/Restrained and More
6. Model C Metallic Casing Spacers/Isolators

Factory made casing spacers/isolators of the following description shall be installed on any carrier pipe passing through a pipe casing. They are designed to protect the carrier pipe corrosion coating and electrically isolate the carrier pipe from the casing.

Casing spacers/isolators shall be PSI Model C8GN-2 for carrier pipes up to 24-inch diameters and Model C12GN2 for larger pipe sizes as manufactured by Pipeline Seal and Insulator, Inc., Houston, TX. Casing spacers/isolators shall have a minimum 14 gauge steel band and where required, 10 gauge risers. The band, risers and connecting studs shall be welded and grit blasted at the factory before the application of a heat fused fluidized bed thermo set crossed-linked Epoxy coating of between 10-16 mils thickness. The cross-linked Epoxy coating shall provide good resistance to acids and alkalies and excellent resistance under ASTM B117 salt spray tests.

The spacers/isolators shall have a flexible PVC inner liner of 0.09 inch thickness with a durometer "A" 85-90 hardness and a minimum 58,000 volt dielectric strength. The runners shall be high pressure molded glass reinforced nylon with a minimum compressive strength of 18,000 psi per ASTM D638. The runners shall be 2.0 inch in width and a minimum of 7.0 inches long for C8GN2 models and 11" for C12GN2 models (polyethylene runners are not an acceptable alternative). The runners shall be attached to the band or riser by 3/8" welded steel studs and lock nuts which shall be recessed far below the wearing surface on the runner. The recess shall be filled with a corrosion inhibiting filler. The band section shall be bolted together with cadmium plated threaded studs, nuts and washers.
The casing spacers shall be PSI Model C Metallic Casing Spacers as manufactured by Pipeline Seal and Insulator, Inc., Houston, Texas or engineered approved equal. Alternate considerations shall be submitted to Engineer 10 days prior to bid opening.

Considerations
The above specification is considered sufficient for most pipe sizes and types up to 36-inches and casing lengths up to 1,000 feet. For larger size pipes or longer or unusual casings, please contact Pipeline Seal and Insulator, Inc. Heavy Gauge Steel Bands and Steel Risers may be required.

End Seal Specification
After insertion of the carrier pipe in the casing, the ends of the casing shall be closed by installing a PSI Model "C", Model "S", Model "W" or Model "R" casing end seal as manufactured by Pipeline Seal and Insulator, Inc., Houston, TX.
Energy Market Note: For Tank Farm Applications and Fire Resistant applications, specify Model "FW" casing end seal as manufactured by Pipeline Seal and Insulator, Inc., Houston, TX.

Link-Seal® End Seal Specification (Carrier Pipe Must Be Centered Within Casing)
After insertion of the carrier pipe in the casing, the ends of the casing shall be closed by installing the Link-Seal® end seals and 1/8" thick synthetic rubber end seals equal to the PSI Model "C" or Model "W" end seal. Both as manufactured by Pipeline Seal and Insulator, Inc., Houston, TX.

Quality Assurance
Each spacer/isolator and end seal shall be manufactured at a facility that has a Registered ISO 9001:2008 Quality Management System. Copy of current ISO 9001:2008 registration shall be provided with material submittal.

Specification 60" Ø & Up - Metallic for Water Market

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Metallic Casing Spacers

1. **Water Market - Large Diameter, 60" Ø +**
2. **All Pipe Types**
3. **Suggested Max. Casing Length = 1,000 ft.**
4. **Suggested Max. Carrier Pipe O.D. = 84.0" Ø**
5. **Position Within Casing = Standard, Centered, Centered/Restrained, Non-centered/Restrained and More**
6. **Model C Metallic Casing Spacers/Isolators**

Factory made casing spacers/isolators of the following description shall be installed on any carrier pipe passing through a pipe casing. They are designed to protect the carrier pipe corrosion coating and electrically isolate the carrier pipe from the casing.

Casing spacers/isolators shall be PSI Model C12GN2 for carrier pipes 60-inch diameters and up as manufactured by Pipeline Seal and Insulator, Inc., Houston, TX. Casing spacers/isolators shall have a minimum 12 gauge steel band and where required, 7 gauge risers. The band, risers and connecting studs shall be welded and grit blasted at the factory before the application of a heat fused fluidized bed thermo set crossed-linked Epoxy coating of between 10-16 mils thickness. The cross-linked Epoxy coating shall provide good resistance to acids and alkalies and excellent resistance under ASTM B117 salt spray tests.

The spacers/isolators shall have a flexible PVC inner liner of 0.09 inch thickness with a durometer "A" 85-90 hardness and a minimum 58,000 volt dielectric strength. The runners shall be high pressure molded glass reinforced nylon with a minimum compressive strength of 18,000 psi per ASTM D638. The runners shall be 2.0 inch in width and a minium 11" long for C12GN2 models (polyethylene runners are not an acceptable alternative). The runners shall be attached to the band or riser by 3/8" welded steel studs and lock nuts which shall be recessed far below the wearing surface on the runner. The recess shall be filled with a corrosion inhibiting filler. The band section shall be bolted together with cadmium plated threaded studs, nuts and washers.
The casing spacers shall be PSI Model C Metallic Casing Spacers as manufactured by Pipeline Seal and Insulator, Inc., Houston, Texas or engineered approved equal. Alternate considerations shall be submitted to Engineer 10 days prior to bid opening

Considerations
The above specification is considered sufficient for most pipe sizes and types 60 to 84-inches and casing lengths up to 300 feet. For lengths 300 to 1,000 feet, a symmetrical runner design should be considered. For larger size pipes or longer or unusual casings, please contact Pipeline Seal and Insulator, Inc.

End Seal Specification
After insertion of the carrier pipe in the casing, the ends of the casing shall be closed by installing a PSI Model "C" or Model "W" casing end seal as manufactured by Pipeline Seal and Insulator, Inc., Houston, TX.

Link-Seal® End Seal Specification (Carrier Pipe Must Be Centered Within Casing)
After insertion of the carrier pipe in the casing, the ends of the casing shall be closed by installing the Link-Seal® end seals and 1/8" thick synthetic rubber end seals equal to the PSI Model "C" or Model "W" end seal. Both as manufactured by Pipeline Seal and Insulator, Inc., Houston, TX.

Quality Assurance
Each spacer/isolator and end seal shall be manufactured at a facility that has a Registered ISO 9001:2008 Quality Management System. Copy of current ISO 9001:2008 registration shall be provided with material submittal.

Specification Wax Filled Casing - Metallic for Energy Market

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Metallic Casing Spacers

1. Energy Market - Wax Filled Casings
2. All Pipe types
3. Suggested Max. Casing Length = 1,000 ft.
4. Suggested Max. Carrier Pipe O.D. = 48" Ø
5. Position Within Casing = Centered/Restrained
6. Model C Metallic Casing Spacers/Isolators

Factory made casing spacers/isolators of the following description shall be installed on any carrier pipe passing through a pipe casing. They are designed to protect the carrier pipe corrosion coating and electrically isolate the carrier pipe from the casing.

Casing spacers/isolators shall be PSI Model C12GN2 for all diameter carrier pipes as manufactured by Pipeline Seal and Insulator, Inc., Houston, TX. Casing spacers/isolators shall have a minimum 14 gauge steel band and where required, 10 gauge risers. The band, risers and connecting studs shall be welded and grit blasted at the factory before the application of a heat fused fluidized bed thermo set crossed-linked Epoxy coating of between 10-16 mils thickness. The cross-linked Epoxy coating shall provide good resistance to acids and alkalies and excellent resistance under ASTM B117 salt spray tests.

The spacers/isolators shall have a flexible T.P.E Hi-Temp inner liner of 0.118" inch thickness, a durometer "A" 73 hardness, a temperature range of -50 to 270º F and a minimum 58,000 volt dielectric strength. The runners shall be high pressure molded glass reinforced nylon with a minimum compressive strength of 18,000 psi per ASTM D638. The runners shall be 2.0 inch in width and a minimum of 11" long for C12GN2 models (polyethylene runners are not an acceptable alternative). The runners shall be attached to the band or riser by 3/8" welded steel studs and lock nuts which shall be recessed far below the wearing surface on the runner. The recess shall be filled with a corrosion inhibiting filler. The band section shall be bolted together with cadmium plated threaded studs, nuts and washers.

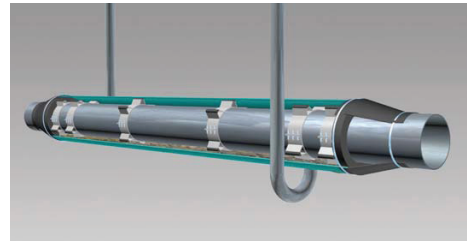
The casing spacers shall be PSI Model C Metallic Casing Spacers as manufactured by Pipeline Seal and Insulator, Inc., Houston, Texas or engineered approved equal. Alternate considerations shall be submitted to Engineer 10 days prior to bid opening.

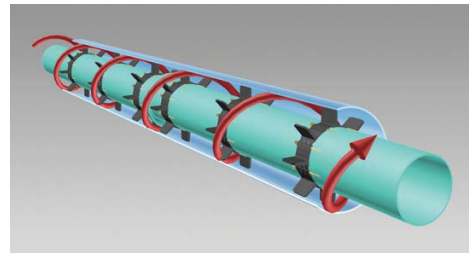
Considerations
The above specification is considered sufficient for most pipe sizes and types up to 48-inches and casing lengths up to 1,000 feet. Casing Spacer Runner Configuration should be symmetrical - Near C/R position for the *body* and the Runner Configuration for the *ends* of the casing should be a 2 Top/4 Bottom - C/R for use with Link-Seal® modular seals; 2 casing spacers on each end of the casing are needed for a total of 4. (Consult PSI for spacing.) For larger size pipes or longer or unusual casings, please contact Pipeline Seal and Insulator, Inc.

End Seal Specification
After insertion of the carrier pipe in the casing, the ends of the casing shall be closed by installing PSI Link-Seal® modular seals (Model C) and Model "W" EPDM casing end seal as manufactured by Pipeline Seal and Insulator, Inc., Houston, TX. or engineered approved equal. Alternate considerations shall be submitted to Engineer 10 days prior to bid opening.
Wax Note: Both end seal types must be installed, wax can reach temperatures of 250º F during filling process.

Quality Assurance
Each spacer/isolator and end seal shall be manufactured at a facility that has a Registered ISO 9001:2008 Quality Management System. Copy of current ISO 9001:2008 registration shall be provided with material submittal.

Casing Spacer Field Terminology





Casing Fill – Casing fill materials may include sand, gravel, cement or wax. Under normal circumstances Model C coated Spacers are provide excellent support and durability for these applications, therefore it is not necessary to use stainless steel casing spacers for filled applications. Casing fill material encapsulates the spacers and carrier pipe, supports both, and provides an additional non-conductive barrier between casing and carrier pipes.
For wax filling application, please specify the TPE Liner and use Link-Seal® Modular Seals in combination with Model W end seals.

Rifling – Rifling occurs when the carrier pipe rotates or turns, as much as 360-degrees, inside the casing as the push or pull progresses. Casing spacers with a symmetrical design are used to allow for rotation. Runner/Riser configurations are made to equal heights and uniform position to allow for uniform loading and equal carrier pipe support to accommodate rifling. The chance your carrier pipe will rifle during the push or pull will depend on a number of factors. Best engineering practice is to order casing spacers with a symmetrical runner configuration to accommodate the possibility of rifling in the first place.

Condition of Casing – It's important to determine the condition of the inside surface of the casing pipe prior to installation. Rough, corroded and/or uneven surfaces - "high and low" weld beads and other anomalies on the interior pipe surface can drastically reduce the effectiveness of any casing spacer. PSI metallic casing spacers are suggested, when surface conditions are marginal, because runners on metallic casing spacers are much more resistant to abrasion then runners on plastic spacers. If you are unsure of the casing condition, pipe inspection services using cameras to analyze the interior of a pipe may be used or you may also simply pull a 20 ft section of pipe through the casing as a test or field trial .



7-Gauge vs. 10-Gauge Riser Material – An increase in applications requiring heavier, larger diameter pipes has initiated the need for more robust casing spacers. To meet this need, PSI offers 7-gauge riser material as a substitute for 10-gauge risers. 7-gauge risers provide additional strength and stability when supporting large diameter Steel ML&C (Mortar Lined and Coated) or Concrete pipe that may be carrying heavier, higher density fluids.

Wood Skids vs. Casing Spacers - Wood skids are a poor substitute for casing spacers. A casing spacer is an engineered product that has been used for decades to ease carrier pipe insertion, protect both casing and carrier pipes and maintain physical and electrical separation to preserve the corrosion mitigation (protection) program designed for the piping system.

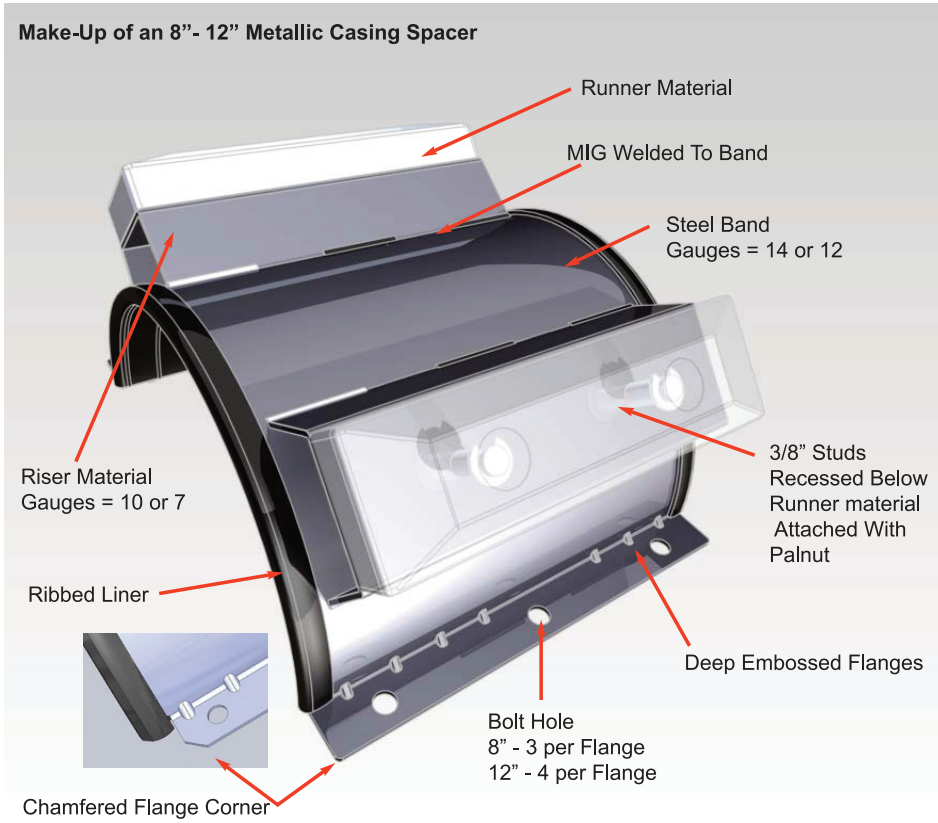
A comparison...PSI casing spacers versus banded wood skids

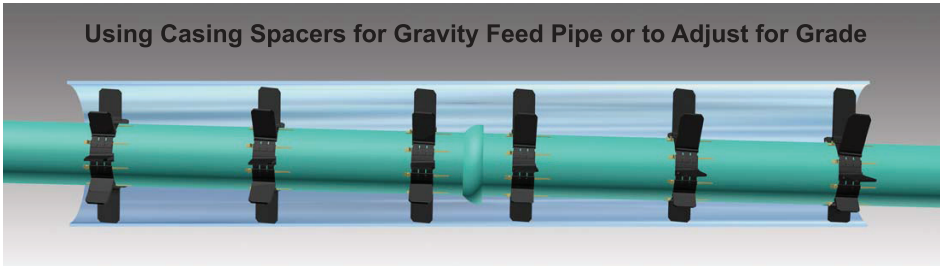
PSI Casing Spacer	Banded Wood Skids
Low Labor Cost - Installed By One Person	Labor Intensive, High Labor Costs
Easily Secured In Place	Easily Dislodged
Quick Installation	Hard to Field Construct
Supports Pipe and Protects Coating	Rots and Allows Settlement
Assured Electrical Insulation	Non-Insulating - Allows Corrosion
Resists Weight of Pipe and Product	Uneven Load on Pipe
Long Term Corrosion Protection	Allows Bacteria & Differential Oxygen Concentration Corrosion
Eliminates Grout, Blown Sand or Pea Gravel	Requires Annulus Space Filler
Engineered for the Project	At Discretion of Job Site Laborer



Wood Lagging Corrosion Issue:
Wood should not be used in a cased crossing. It has the potential to accelerate corrosion concerns. When dry, wood has good dielectric resistance. When wet (as is likely in a buried casing) it has a dielectric resistance than can be magnitudes lower; allowing corrosion on metallic (Steel, D.I) carrier pipes. This presents concerns if wood were used in a casing to isolate or support the carrier pipe within the casing. Furthermore, when wood rots, the bacteria will attack metallic pipe in form of Microbiologicall Influenced Corrosion.

Casing Spacer Field Terminology



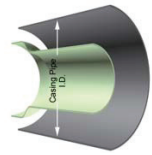


Both metallic and non-metallic casing spacers may be used to create a sloped carrier pipe (i.e. gravity feed sewer pipe) within a level casing or to compensate for a non-level casing pipe by using spacers with varying height runners to level the carrier pipe.

Please contact PSI for more information on how to order casing spacers for these types of applications.

Casing - Steel Pipe Reference Schedules

The following wall thickness chart has been provided to help size C/R casing spacers in steel pipe sleeves of various wall thicknesses. To determine the Inside Diameter (I.D.) of the proposed steel wall sleeve subtract **2 times** the selected Wall Thickness (W.T.) from the actual Outside Diameter (O.D.) of the pipe.



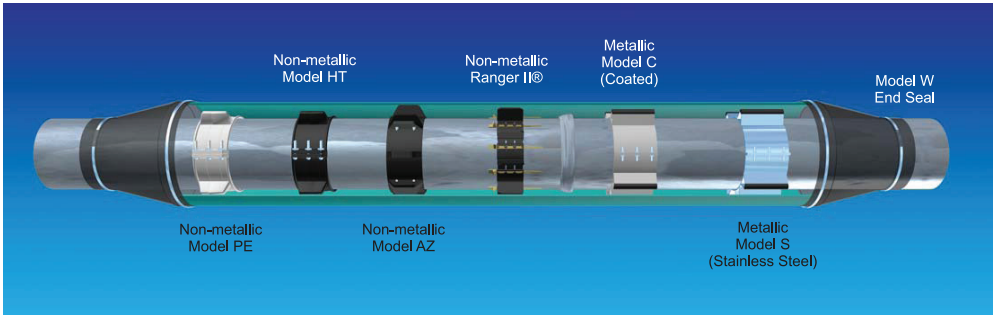
Example: Find the I.D. for a 24" (INCH) Schedule 40 Pipe.
Use Chart Below:
O.D. of a 24" Schedule 40 Pipe = **24.00" (INCHES)**
Wall Thickness of 5" Schedule 40 Pipe = **.688"**
Wall Thickness multiplied by 2 (.688 x 2) = **1.376"**
I.D. of 24" Schedule 40 Pipe (24.00 - 1.376) = **"22.624**

Non Bold = Wall Tickness (Inches) **STD = Standard** **E.H. = Extra Heavy**

Pipe Size	O.D. Inches	SCHEDULE 5	10	20	30	40	STD	SCHEDULE 60	80	E.H.	SCHEDULE 100	120	140	160	DBLE. E.H.
4"	4.500	.083	.120	–	--	.237	.237	.281	.337	.337	--	.438	–	.531	.674
4 1/2"	5.000	–	–	–	–	.247	.247	–	.355	.355	--	–	–	–	.710
5"	5.563	.109	.134	–	--	.258	.258	–	.375	.375	--	.500	–	.625	.750
6"	6.625	.109	.134	–	--	.280	.280	–	.432	.432	--	.562	–	.719	.864
7"	7.625	--	–	–	–	–	.301	–	–	.500	--	–	–	–	.875
8"	8.625	.109	.148	.250	.277	.322	.322	.406	.500	.500	.594	.719	.812	.906	.875
9"	9.625	--	–	–	–	–	.342	–	–	.500	--	–	–	–	–
10"	10.750	.134	.165	.250	.307	.365	.365	.500	.594	.500	.719	.844	1.000	1.125	1.000
11"	11.750	–	–	–	–	–	.375	–	–	.500	--	–	–	–	–
12"	12.750	.165	.180	.250	.330	.406	.375	.562	.688	.500	.844	1.000	1.125	1.312	1.000
14"	14.000	--	.250	.312	.375	.438	.375	.594	.750	.500	.938	1.094	1.250	1.406	–
16"	16.000	--	.250	.312	.375	.500	.375	.656	.844	.500	1.031	1.219	1.438	1.594	–
18"	18.000	--	.250	.312	.438	.562	.375	.750	.938	.500	1.156	1.375	1.562	1.781	–
20"	20.000	--	.250	.375	.500	.594	.375	.812	1.031	.500	1.281	1.500	1.750	1.969	–
22"	22.000	--	.250	.375	.500	–	.375	.875	1.125	.500	1.375	1.625	1.875	2.125	–
24"	24.000	--	.250	.375	.562	.688	.375	.969	1.219	.500	1.531	1.812	2.062	2.344	–
26"	26.000	--	.312	.500	--	–	.375	–	–	.500	--	–	–	–	–
28"	28.000	--	.312	.500	.625	–	.375	–	–	.500	--	–	–	–	–
30"	30.000	--	.312	.500	.625	–	.375	–	–	.500	--	–	–	–	–
32"	32.000	--	.312	.500	.625	.688	.375	–	–	.500	--	–	–	–	–
34"	34.000	--	.312	.500	.625	.688	.375	–	–	.500	--	–	–	–	–
36"	36.000	--	.312	.500	.625	.750	.375	–	–	.500	--	–	–	–	–
38"	38.000	--	–	–	–	–	.375	–	–	.500	--	–	–	–	–
40"	40.000	--	–	–	–	–	.375	–	–	.500	–	--	–	--	–
42"	42.000	--	–	–	–	–	.375	–	–	.500	--	–	–	–	–
48"	48.000	--	–	–	–	–	.375	–	–	.500	--	–	–	–	–
54"	54.000	--	–	–	–	–	.375	–	–	.500	--	–	–	–	–
60"	60.000	--	–	–	–	–	.375	–	–	.500	--	–	–	–	–

Disclaimer Note: The above steel pipe O.D.'s are generic, Pipeline Seal and Insulator, Inc. is not a pipe manufacturer. Please always refer to the pipe manufacturer's published/actual values.

Wall Thickness Note: It's suggested casings be be installed with standard (STD) wall thickness.



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