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PSI Link-Seal® Modular Seals



Pipeline Accessories

Link-Seal® Modular Seals

General Information



Fields of Application

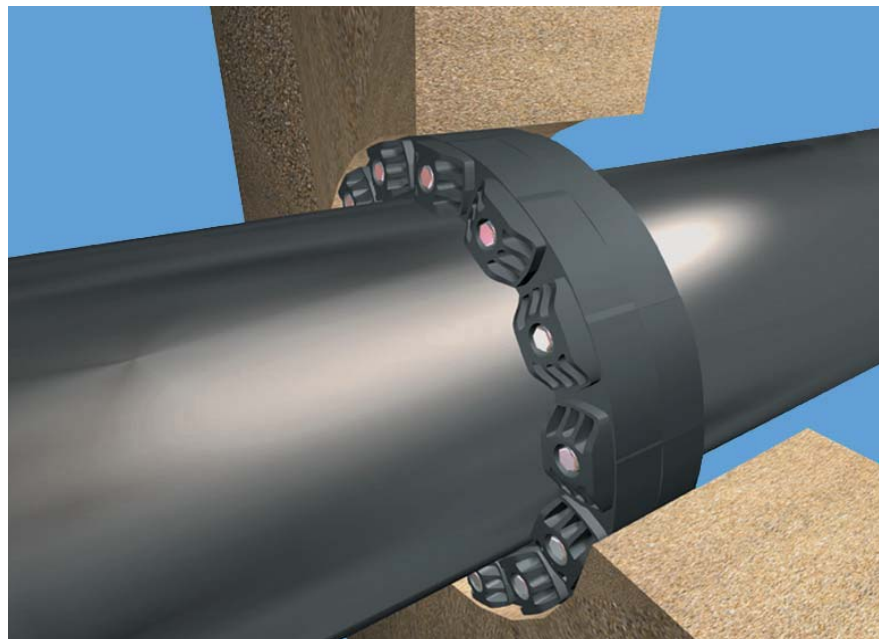
Link-Seal® Modular Seals are designed for multiple applications. Link-Seal® Modular Seals can be used wherever annular spaces must be sealed reliably. Main fields of application:

- Wall ducts
- Tank embedding
- Protective pipe seals

Advantages

- Solid rubber parts ensure a long life
- Oil-, fuel-, solvent-, and high temperature-resistant versions available on request
- Safe positioning inside walling
- Perfect even for retrofitting
- Easy and quick installation thanks to pre-assembled modules
- Choice of zinc-plated or V4A stainless steel screws
- Absorption of shock, noise and vibration stresses and strains
- Different colours for different rubber qualities
- Electrically isolating
- Hydrostatic sealing against pressing water

The principle



The radial expansion of the rubber ensures hydrostatic pressure tightness.

For very thin-wall plastic pipes e.g. flexible preinsulated- or wave-shaped pipes, a PSI Kompakt seal type FW is recommended.



Link-Seal® Modular Seals

Technical Data

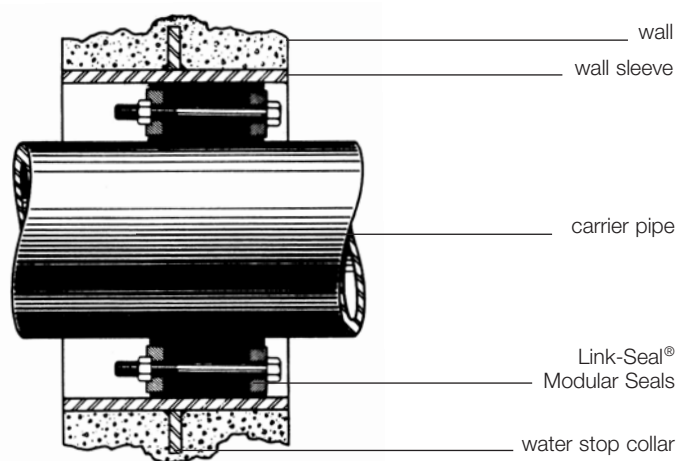


Material Properties

Temperature resistance	Standard version black Type T, grey Type O, green*	-40° C up to +80° C -55° C up to +204° C -40° C up to +70° C
Oil, jet fuel resistance	Type O (not UV-resistant)	
Special version for plastic pipes	blue EPDM extra soft	Shore 40 ± 5
Pressure tightness	up to 5 bar (TÜV and Lloyd's registered) Original Link-Seal® up to 3 bar (Lloyd's registered) Original Link-Seal® types BC and BS316	
Dielectric strength	500 V/mm	

*LS 440 and LS 650 Nitrile rubber black with green marking
The values specified for the pressure tightness are valid at 23°C.
For other, above all, higher permanent operating temperatures, an ejection safety device should, if necessary, be fitted.

Sectional drawing of a Link-Seal® Modular Seals



Wall sleeve

PSI offers wall sleeves in PVC, carbon steel galvanised, stainless steel or asbestos free fibre cement.



Link-Seal® Modular Seals

Technical Data



Type	Version	Sealing Element	Pressure Plates	Bolts and Nuts	Temperature Range	Application
C	Standard	EPDM-rubber black	Reinforced nylon polymer	Carbon steel zinc dichromated	-40° C to + 80° C	General application under normal atmosphere in water or a humid environment. Suitable for electrical insulation and cathodic protection.
S 316	Standard stainless steel	EPDM-rubber black	Reinforced Nylon Polymer	stainless steel	-40° C to + 80° C	High resistance against water, most other inorganic substances (acids and alkalis) and against most organic substances (e.g. acetic acid, acetone).
B	Shore 40±5	EPDM-rubber blue	Reinforced Nylon Polymer	Carbon steel zinc dichromated	-40° C to + 80° C	See type C, especially for plastic pipes
BS 316	Shore 40±5	EPDM-rubber blue	Reinforced Nylon Polymer	stainless steel	-40° C to + 80° C	See type S 316, especially for plastic pipes
O*	Oil resistant	NITRILE-rubber green	Reinforced Nylon Polymer	Carbon steel zinc dichromated	-40° C to + 70° C	Good resistance against oil, aromatic fuels, solvents and other mineral oil based products.
OS 316*	Oil resistant	NITRILE-rubber green	Reinforced Nylon Polymer	stainless steel	-40° C to + 70° C	Good resistance against oil, aromatic fuels, solvents and other mineral oil based products.
KTW/W270**	Shore 50±5	EPDM-rubber black incl. KTW-stamp	Reinforced Nylon Polymer blue	stainless steel	- 40° C to + 80° C	Appropriate for potable water applications
T***	High and low temperature	Silicone rubber grey	St 37 zinc dichromated	Carbon steel zinc dichromated	- 55° C to + 204° C	No insulating properties, especially suitable for extreme temperatures.

*LS 440 and LS 650 Nitrile rubber black with green marking

** Elastomer tested in accordance with KTW and W270

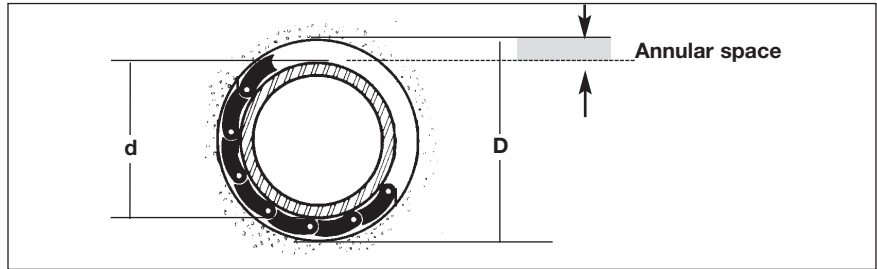
***on request

Link-Seal® Modular Seals Selection/Order Submittal Sheet



1. Which type is suitable?

Calculate the annular space. The annular space is half the difference between your pipe size and the wall opening diameter. Use the following formula:



Wall opening I.D. (D) - Actual Pipe O.D. (d) = Annular space

 2

From the adjacent chart, select the size closest to the annular space calculated in step 1. You have selected the correct size Link-Seal® modular seal if the free state thickness is less than the annular space and the expanded state thickness is greater than the annular space.

Type	Free state thickness	Annular space	Expanded state thickness	Necessary wall thickness
LS 200	12.7 mm		15.7 mm	75 mm
LS 265	16.0 mm		20.0 mm	75 mm
LS 275	16.0 mm		20.0 mm	75 mm
LS 300	18.0 mm		22.5 mm	100 mm
LS 310	18.0 mm		22.5 mm	100 mm
LS 315	21.1 mm		26.0 mm	100 mm
LS 325	23.2 mm		30.0 mm	120 mm
LS 340	25.5 mm		34.0 mm	120 mm
LS 360	32.0 mm		42.0 mm	120 mm
LS 400	36.3 mm		46.0 mm	140 mm
LS 410	37.0 mm		48.5 mm	140 mm
LS 425	28.4 mm		37.0 mm	140 mm
LS 440	44.0 mm		55.0 mm	140 mm
LS 475	41.3 mm		48.5 mm	140 mm
LS 500	60.3 mm		71.5 mm	150 mm
LS 525	55.4 mm		63.5 mm	150 mm
LS 575	48.0 mm		58.0 mm	150 mm
LS 615*	81.6 mm		98.0 mm	150 mm
LS 625	83.0 mm		98.0 mm	150 mm
LS 650	69.0 mm		84.0 mm	150 mm
LS 700	95.0 mm		110.0 mm	150 mm

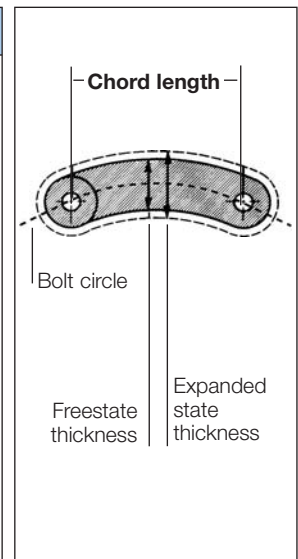
Type:

2. How many elements do you need?

Calculate the number of elements required to fit around the pipe and seal the annular space.

Determine the bolt circle for Link-Seal® modular seal assembly by using the formula below.

Type	Chord length	Carrier pipe O.D. min.	Carrier pipe O.D. max.	Min. no. of Segm.
LS 200	30.0 mm	from 21.3 mm	up to 323.9 mm [†]	4
LS 265	41.0 mm	from 50.0 mm	up to 406.4 mm [†]	5
LS 275	25.6 mm	from 0.0 mm	up to 90.0 mm	4
LS 300	41.0 mm	from 44.5 mm	up to 250.0 mm	5
LS 310	57.5 mm	from 60.3 mm	up to 406.4 mm [‡]	5
LS 315	38.4 mm	from 37.0 mm	up to 315.0 mm	5
LS 325	79.8 mm	from 133.0 mm	up to 711.0 mm	6
LS 340	41.4 mm	from 30.0 mm	up to 323.9 mm	4
LS 360	55.1 mm	from 40.0 mm	up to 406.4 mm	5
LS 400	93.1 mm	from 139.7 mm	up to 1220.0 mm	6
LS 410	67.6 mm	from 60.3 mm	up to 323.9 mm	5
LS 425	93.1 mm	from 144.0 mm	up to 1220.0 mm	6
LS 440	99.0 mm	from 139.7 mm	up to 1220.0 mm	6
LS 475	68.6 mm	from 60.3 mm	up to 1220.0 mm	5
LS 500	99.8 mm	from 100.0 mm	up to 1220.0 mm	5
LS 525	99.8 mm	from 133.0 mm	up to 1220.0 mm	6
LS 575	79.5 mm	from 130.0 mm	up to 1220.0 mm	5
LS 615*	155.5 mm	from 219.0 mm	up to 3000.0 mm	6
LS 625	106.7 mm	from 133.0 mm	up to 2000.0 mm	5
LS 650	106.7 mm	from 133.0 mm	up to 2000.0 mm	5
LS 700	155.5 mm	from 219.6 mm	up to 3000.0 mm	6



[†] As from O.D. 150 mm we recommend to enlarge your coredrill to install Link-Seal® type 310.
[‡] As from O.D. 300 mm we recommend to enlarge your coredrill to install Link-Seal® type 325.
[§] LS 615 NOT suitable for plastic pipes.

Wall Opening I.D. (D) + Pipe Diameter O.D. (d) x 3.14 = Bolt Circle : Chord length = Number
 + x 3.14 = : =

 2

Number:

Link-Seal® modular seal calculation online:
www.psi-products.de

Link-Seal® Modular Seals Selection/Order Submittal Sheet



3. Which version is suitable?

Please determine the rubber and bolt quality suitable for your application. The relevant abbreviations are shown in the following chart.

Rubber	Bolts/nuts	
	galvanised	stainless steel
Standard EPDM-rubber (black)	C	S 316
Oil resistant Nitrile rubber (green)*	O	OS 316
Temperature resistant Silicone rubber (grey)	FS	-
Temperature resistant Silicone-rubber (grey)	T	-
EPDM rubber (blue, Shore 40 ± 5)	B	BS 316

Version:

*LS 440 and LS 650 black nitrile rubber with green markings

4. Correct article number?

Please select the correct article number corresponding to your choice.



Type	C	B	S 316	O	BS 316	OS 316
LS 200	2-025-00001	2-025-00300	2-025-00139	2-025-00040	2-025-00340	2-025-00156
LS 265	2-025-00017	2-025-00309	2-025-00186	-	2-025-00349	-
LS 275	2-025-00010	2-025-00301	2-025-00140	2-025-00039	2-025-00341	2-025-00150
LS 300	2-025-00002	2-025-00302	2-025-00141	2-025-00041	2-025-00342	2-025-00151
LS 310	2-025-00018	2-025-00310	2-025-00187	-	2-025-00359	-
LS 315	2-025-00012	2-025-00303	2-025-00146	2-025-00049	2-025-00343	2-025-00157
LS 325	2-025-00003	2-025-00304	2-025-00142	2-025-00042	2-025-00344	2-025-00152
LS 340	2-025-00004	2-025-00058	2-025-00143	2-025-00050	2-025-00064	2-025-00055
LS 360	2-025-00008	2-025-00059	2-025-00144	2-025-00051	2-025-00065	2-025-00056
LS 400	2-025-00009	2-025-00305	2-025-00172	2-025-00043	2-025-00345	2-025-00153
LS 410	2-025-00011	2-025-00060	2-025-00173	2-025-00052	2-025-00066	2-025-00161
LS 425	2-025-00005	2-025-00306	2-025-00174	2-025-00044	2-025-00346	2-025-00154
LS 440	2-025-00015	-	2-025-00176	2-025-00257	-	2-025-00258
LS 475	2-025-00006	2-025-00307	2-025-00145	2-025-00045	2-025-00347	2-025-00155
LS 500	2-025-00007	2-025-00308	2-025-00147	2-025-00046	2-025-00348	2-025-00158
LS 525	2-025-00013	2-025-00061	2-025-00148	2-025-00047	2-025-00067	2-025-00159
LS 575	2-025-00014	2-025-00062	2-025-00149	2-025-00053	2-025-00068	2-025-00160
LS 615	2-025-00215	-	2-025-00185	2-025-00220	-	2-025-00265
LS 625	-	2-025-00260	-	-	2-025-00261	-
LS 650	2-025-00016	-	2-025-00177	2-025-00255	-	2-025-00259
LS 700	-	2-025-00470	-	-	2-025-00471	-

Article no.:

5. Order submittal sheet

Please copy the order sheet and fax it to PSI Products GmbH
Telefax +49(0)7473/3781-87

Link-Seal® modular seal calculation online:
www.psi-products.de

Quantity	Type	Version	Article no.	Total

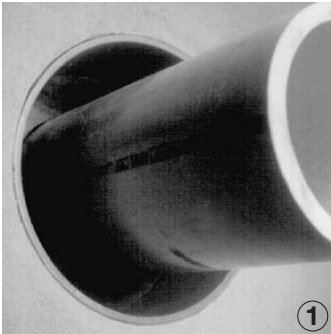
For further information please contact PSI GmbH. We apply our General Terms and Conditions to all orders. Subject to technical changes. The user must ensure that the chosen product is suitable for his application. Our warranty is limited to the replacement of defective material. For prices see our current price list.

Despatched by:

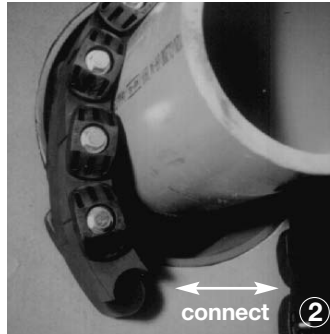
Date/signature

Link-Seal® Modular Seals

Installation Instruction



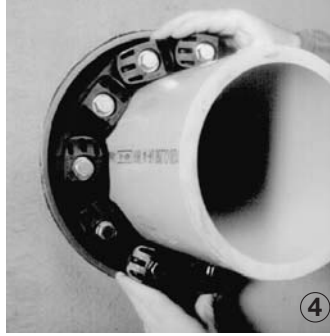
Centre the pipe, cable or conduit in wall opening or casing. Make sure the pipe is adequately supported at both ends. Link-Seal® modular seals are not intended to support the weight of the pipe.



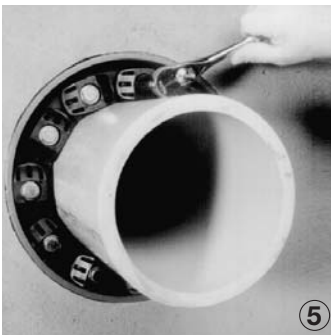
Loosen rear pressure plate with nut just enough so that the links move freely towards and away from each other. Connect both ends of the belt.



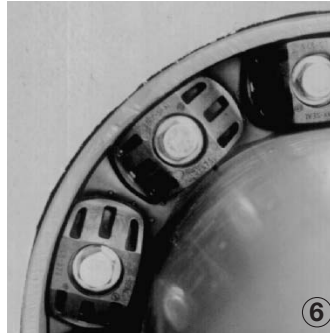
Check to be sure bolt heads are facing the installer. Sagging is normal. Do not remove links in case of sagging. It may be necessary for smaller pipes that the belt must be stretched when installing!



Slide belt assembly into annular space. For larger size belts, start inserting Link-Seal® modular seal assembly at the 6 o'clock position and work both sides up toward the 12 o'clock position in the annular space.



Start at 12 o'clock position. Tighten every bolt in a clockwise manner. Tighten only by hand!



Do not tighten any bolt more than 4 turns at a time. Continue in a clockwise manner. Make 2 or 3 more passes at 3 turns per bolt until links have been uniformly compressed and the max. torque (see table) is reached.



Repeat tightening after approx. 2 hours. Especially the Link-Seal® types LS 500 up to LS 700 have to be tightened several times depending on the installation conditions (annular space, temperature, etc.).

Max. torque at 23°C			Type
for types C, S316 rubber black O and OS316 rubber green type T rubber grey Shore 50°± 5°	for types BC and BS316 rubber blue, Shore 40°± 5°	for types LS version KTW/W270 Shore 50°± 5°	
2 Nm	2 Nm	2 Nm	LS 200 to LS 275
8 Nm	6 Nm	8 Nm	LS 300 to LS 360
27 Nm	20 Nm	27 Nm	LS 400 to LS 475
65 Nm	50 Nm	65 Nm	LS 500 to LS 575
110 Nm	65 Nm	–	LS 615
65 Nm	50 Nm	65 Nm	LS 625 to LS 700

Link-Seal® Modular Seals

Installation Instruction



Please consider the right equipment when you install Link-Seal®



Link-Seal® modular seals – Do's

1. Make sure pipe is centred.
2. Install the belt with the pressure plates evenly spaced.
3. Install the belt and pay attention to the fact that the pressure plates are evenly aligned.
4. Check to make sure pipe is supported properly during backfill operations.
5. Make sure seal assembly and pipe surfaces are free from dirt.



Link-Seal® modular seals – Don'ts

1. Do not fit the belt as long as the pressure plates are not aligned.
2. Don't install Link-Seal® modular seals with spiral pipes.
3. Don't torque each bolt completely before moving on to the next.
4. Do not use high speed power tools.
5. Please note that the Link-Seal® is not a fixing point.

PSI warranty is limited to the replacement of faulty material. The user himself is responsible for checking if the products he is using are suitable for his application.

Original Link-Seal® Selection Table

Selection for core drilled holes



core drilled holes	LS			Selected seal	
	Medium pipe Ø _a [mm]	from	- to	Quantity of elements	Type LS ...
50	10	-	18	4	275
80	40	-	48	8	275
	48	-	53	7	200
100	32	-	45	5	340
	48	-	57	6	315
	55	-	64	6	300
	62	-	68	6	265
	68	-	75	9	200
125	42	-	61	5	360
	58	-	74	7	340
	73	-	82	8	315
	80	-	89	8	300
	87	-	93	8	265
	95	-	100	12	200
150	53	-	67	5	475
	58	-	76	5	410
	66	-	82	6	360
	82	-	99	9	340
	105	-	114	7	310
	112	-	118	10	265
	118	-	125	14	200
200	90	-	104	6	575
	103	-	117	7	475
	103	-	124	7	410
	116	-	133	9	360
	132	-	149	13	340
	155	-	164	10	310
250	134	-	154	8	575
	140	-	160	6	440
	153	-	163	9	475
	158	-	177	7	400
	166	-	186	12	360
	178	-	192	7	425
	190	-	203	9	325
	206	-	212	12	310
300	157	-	173	7	500
	184	-	204	10	575
	190	-	210	8	440
	208	-	226	12	410
	216	-	236	15	360
	234	-	244	20	340
	240	-	253	11	325
	255	-	264	15	310
350	182	-	210	8	650
	207	-	229	9	500
	223	-	239	9	525
	234	-	254	12	575
	253	-	267	14	475
	253	-	274	14	410
	266	-	286	18	360
	258	-	274	10	400
	276	-	293	11	425
	286	-	296	24	340
	294	-	303	13	325
	307	-	314	18	310

Original Link-Seal® Selection Table

Selection for core drilled holes



core drilled holes	LS		Selected seal	
	Medium pipe from	Ø _a [mm] - to	Quantity of elements	Type LS ...
400	204	- 234	9	625
	234	- 255	9	650
	264	- 279	10	500
	273	- 289	11	525
	284	- 304	14	575
	292	- 310	11	440
	303	- 317	16	475
	308	- 327	12	400
	326	- 341	12	425
	340	- 353	15	325
450	230	- 260	7	700
	254	- 265	10	625
	266	- 286	7	615
	285	- 311	11	650
	307	- 329	12	500
	327	- 339	12	525
	335	- 354	16	575
	345	- 356	13	440
	355	- 367	19	475
	358	- 377	14	400
	376	- 393	14	425
	375	- 386	24	360
390	- 403	17	325	
500	280	- 310	8	700
	304	- 334	12	625
	335	- 359	12	650
	357	- 379	14	500
	373	- 389	14	525
	385	- 400	18	575
	390	- 410	14	440
	408	- 427	15	400
	426	- 443	16	425
	440	- 453	19	325
600	380	- 410	10	700
	404	- 434	15	625
	436	- 457	15	650
	457	- 479	17	500
	473	- 489	17	525
	490	- 503	17	440
	503	- 509	25	475
	508	- 527	19	400
	526	- 543	19	425
	540	- 553	23	325

All other sizes on request!


Available in these versions:

- Type C: Rubber EPDM (black standard), screws galvanized
- Type BC: Rubber EPDM (blue, extra soft for plastic pipe), screws galvanised
- Type S316: Rubber EPDM (black), screws V4A stainless steel
- Type BS316: Rubber EPDM (blue, extra soft for plastic pipe), screws V4A stainless steel
- Type O: Rubber Nitrile (green, oil-resistant), screws galvanized.
- Type OS316: Rubber Nitrile (green, oil-resistant), screws V4A-stainless steel.



Original Link-Seal® Modular Seals Certificates





DET NORSKE VERITAS

TYPE APPROVAL CERTIFICATE

CERTIFICATE NO. P-11685
This Certificate consists of 3 pages

This is to certify that the
Deck/Bulkhead Penetration
with type designation(s)
LINK-SEAL SYSTEM of the types LS 200, LS 275, LS 300, LS 315, LS 325 and LS 500.


Manufactured by
PSI Pipeline Seal & Insulator, Inc
Houston, United States

is found to comply with
Det Norske Veritas' Rules for Classification of Ships

Application
Pipe penetrations of watertight/gastight bulkheads and decks, except fire divisions


Temp. range: Type O, C, X: -40°C to +120°C
Max. work. press.: Type O: 7.0 bar; Type C and X: 5.0 bar
Sizes: See page 2

Place and date
Hovik, 2004-05-11
for DET NORSKE VERITAS AS




John Olav Nøkleby
Head of Section


This Certificate is valid until
2008-12-31



Tom Berg-Nielsen
Surveyor



Notice: This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid. The validity date relates to the Type Approval Certificate and not to the approval of equipment/system installed.



BESCHEINIGUNG

Prüfbericht: DDA4/118/94

Auftraggeber: PSI Products GmbH
Ulrichstraße 25
72116 Mössingen

Hersteller: PSI Pipeline Seal and Insulator, Inc.
6525 Gofoth Street
Houston, Texas 77021
U.S.A.

Gegenstand: Ringraum-Dichtung in Modul-Bauweise


Der o.g. Gegenstand wurde unter Berücksichtigung technischer Regeln geprüft und die qualitätssichernden Maßnahmen für die Fertigung begutachtet.

Der Geltungsbereich mit allen Einzelheiten ist in dem Prüfbericht enthalten.


Der Hersteller ist berechtigt, an dem o.g. Gegenstand das Bauteilkennzeichen
TÜV - SW 007 - 94
anzubringen.

Mannheim, den 24. September 2003
BB-DDB-MAN/jo

TÜV BAYERN HESSEN SACHSEN SÜDWEST E.V.
Bau und Betrieb
Dampf- und Drucktechnik
Kompetenzzentrum Druckbehälteranlagen
Die Sachverständige



Dipl.-Ing. John



Certificate

Project: -

Client: PSI Products GmbH
Ulrichstrasse 25
72116 Mössingen, Germany

Clients Order Number: -

Office: APELDOORN

Date: 06 September 2004

Order Status: vollständig

Inspection Dates
First: 18 August 2004
Final: 18 August 2004

This certificate is issued to den oben genannten Kunden, um hiermit zu bestätigen, dass der unterzeichnende Inspektor dieser Gesellschaft seine Fabrik in Zutphen an den oben genannten Daten besucht hat, um mehrere Druckversuche der folgenden Ringraumdichtungen zu beaufsichtigen.

Link-Seal® in Modulbauweise
Modell LS der Materialtypen C, O und BC
Modell S-LS des Materialtyps C


Diese Tests wurden entsprechend der Beschreibung von PSI Products GmbH "Druckprüfung für die Ringraumdichtung Typ Link-Seal® in Modulbauweise" durchgeführt. Das Datum der Prüfbeschreibung ist der 18. August 2004.

Die Ergebnisse werden in dem Bericht genannt.

Schlussfolgerung:

Die Schlussfolgerung der Prüfungen ist, dass die oben genannten Dichtungen für den tatsächlichen Druck, so als in der Tabelle angegeben, undurchlässig sind:

Link-Seal® Typ	Tatsächlicher Druck
LS 200-650 Type C	5 bar
LS 200-650 Type BC	3 bar
LS 200-650 Type O	5 bar
S-LS 300-650 Type C	2 bar



A.H. Zennipman
Surveyor to Lloyd's Register EMEA

A member of the Lloyd's Register Group