

Trelleborg Offshore Products

Diaphragm Closures, Grout Packers & Grout Seals



About Trelleborg

Trelleborg specializes in high quality polymer solutions for the infrastructure, construction and offshore oil & gas markets. We design and manufacture an extensive range of engineered rubber products and solutions that meet your needs. For these range of offshore products, the Trelleborg group of companies have technical design and production centers in Singapore, Holland & Norway. We have a combined experience of more than 50 years in this area and are ISO 9001 & 14001 certified.

Diaphragm Closure

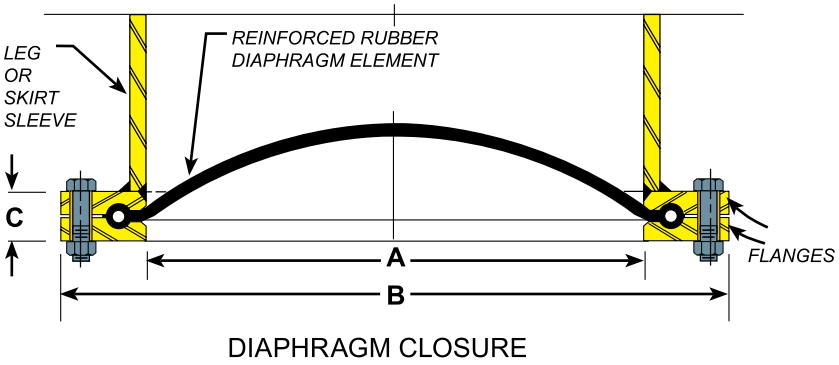
Diaphragm closures seal the platform legs and skirt sleeves to provide buoyancy during the installation of substructures. These closures are attached to the legs and skirt sleeves by means of fastening ring/ flanges that also hold the rubber diaphragms. They are made from highly reinforced rubber and are designed to withstand the hydrostatic pressure during jacket flooding operations.

They are pierced by a pile or sometimes by a cutting device. Diaphragms are sometimes used together with inflatable grout packers and mud wipers / grout seal in a legcan. Please refer to our diagram. Attached is also a chart of the normal sizes of our diaphragm closures & retaining rings/ flanges. These dimensions can be varied to match specific leg / skirt sizes.

All diaphragms are usually tested up to 1.5 times the operating pressure. We normally use ASTM A36 or equivalent material for the retaining rings/ flanges. Our team can design diaphragm closures to your specification and to suit special operating conditions. We offer cost effective solutions with superior performance.



Diaphragm Closure Testing



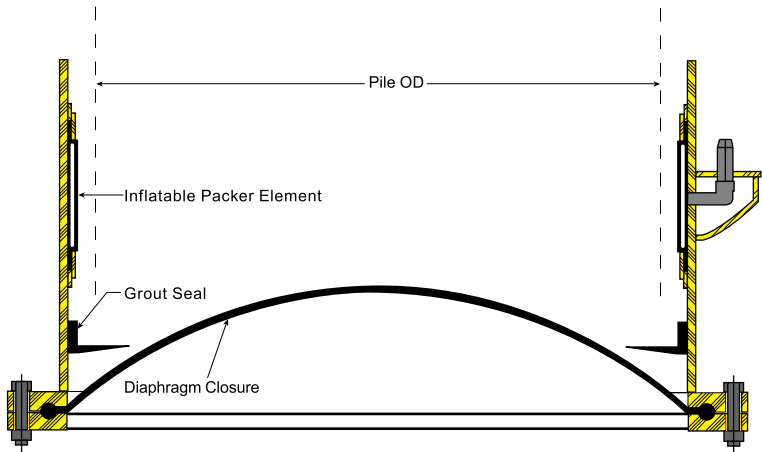
PILE SIZE		A*		B*		C*	
In.	mm	In.	mm	In.	mm	In.	mm
		12	305	19	483	2.5	64
		15	381	22	559	2.5	64
		19	483	26	660	2.5	64
18	457	24	610	34	864	3.0	76
24	610	28	711	38	965	3.0	76
24	610	30	762	40	1016	3.0	76
30	762	33	838	43	1092	3.0	76
36	914	38	965	48	1219	3.0	76
36	914	40	1016	50	1270	3.5	89
42	1067	44	1118	54	1372	3.5	89
42	1067	49	1245	59	1499	3.5	89
48	1219	51	1295	61	1549	3.5	89
48	1219	55	1397	65	1651	3.5	89
54	1372	58	1473	68	1727	3.5	89
60	1524	63.5	1613	73.5	1867	3.5	89
60	1524	66	1676	76	1930	3.5	89
66	1676	68	1727	78	1981	4.0	102
66	1676	71	1803	81	2057	4.0	102
72	1829	75	1905	85	2159	4.0	102
72	1829	78	1981	88	2235	4.0	102
78	1981	82	2083	92	2337	4.0	102
84	2134	87	2210	97	2464	4.0	102
84	2134	90	2286	100	2540	4.0	102
96	2438	101	2565	111	2819	4.0	102
102	2591	107	2718	120	3048	4.0	102
120	3048	128	3251	138	3505	4.0	102
132	3353	139	3531	149	3785	4.0	102
144	3658	149	3785	159	4039	4.0	102

* All dimensions for reference only

Inflatable Grout Packers & Grout Seals / Wipers

Inflatable grouting packers provide a reliable and robust seal between the ID of the jacket/ skirt and the OD of the driven pile. When fully inflated by gas or liquid, it seals the annulus and grout is injected between the pile & leg.

Our grout packers are made from reinforced rubber and comes with complete quality control in terms of pressure testing and weld inspection. Clamping plates hold the grout packers securely inside the legcan. This stringent design and manufacturing process ensure successful sealing performance and proper grout setting.



LEGCAN WITH INFLATABLE GROUT PACKER,
PASSIVE GROUT SEAL & DIAPHRAGM ASSEMBLY

Physical Properties of Rubber		
Property	Test Standard	Specification
Tensile Strength (MPa)	ASTM D412	18 min
Elongation @ break (%)	ASTM D412	500 min
Compression set (%)	ASTM D395 (B)	25 max
Tear resistance (kN/m)	ASTM D624 (B)	80 min
Ozone resistance	ASTM D1149	No cracks

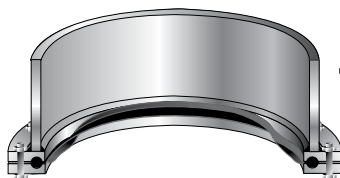
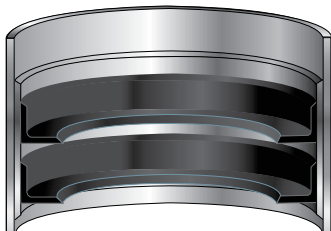
*Values are for reference only

Inflatable Grout Packer & Passive Grout Seals

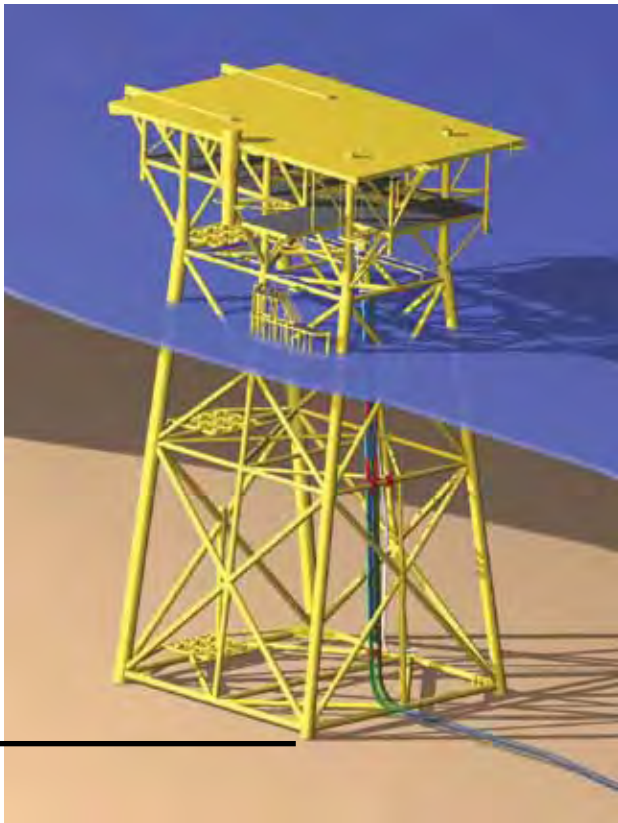


Grout seals / wipers assist grout packers in ensuring that the jacket pile annulus is clean by preventing mud contamination. Sometimes, it can also be used alone without grout packers – especially at shallow water depths. When the pile is driven through, the tension on the rubber as it slides along the pile seals the annulus and ensures proper grouting. Our grout seals / wipers can tolerate reverse movement in the pile.

We use ASTM A36 or equivalent steel with our grout packers & seals/wipers unless otherwise specified. We can design grout-sealing solutions to your specifications. Contact us for further details.



Passive Grout Seals



Typical Jacket Launching Sequence



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