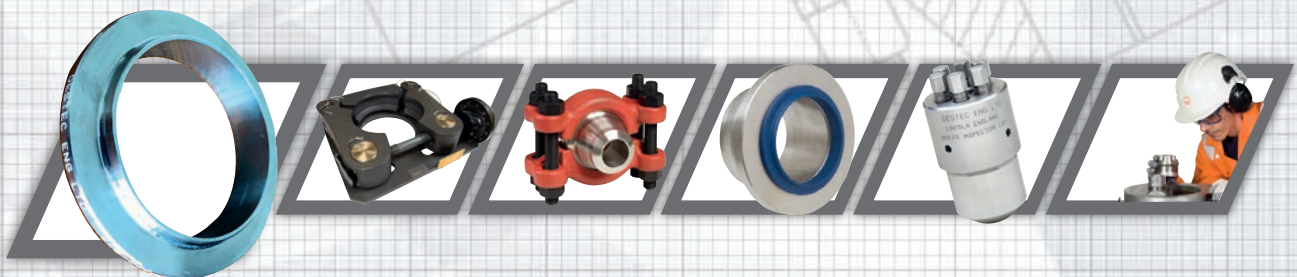


SEAL RINGS



Making and maintaining the Right Connection

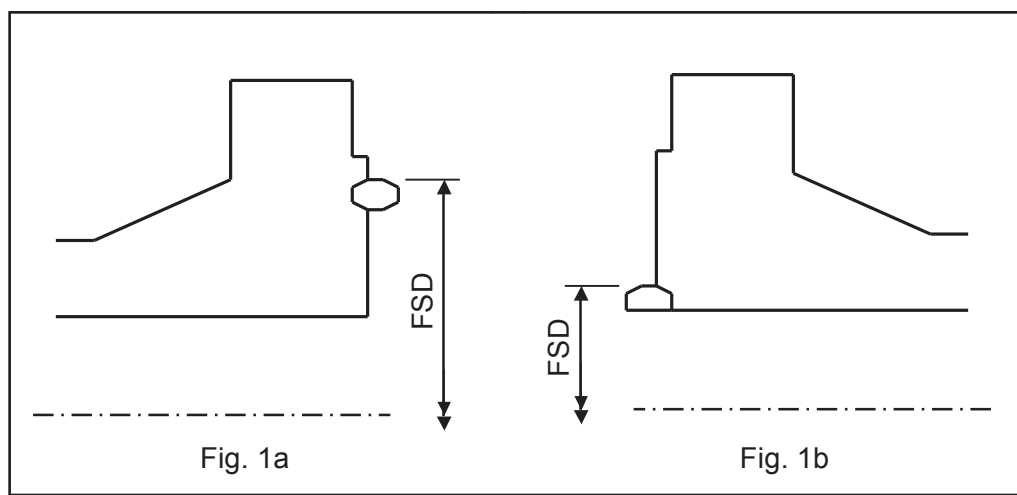




HIGH PRESSURE STATIC SEALS

The seal ring is the heart of all Destec's connections and is the component that gives Destec its advantage over its competitors.

The basic principal of all Destec seal rings is to seal as close to the bore of the joint as possible whilst retaining a reliable and accommodating product. Consider a flange joint as shown below. Figure 1a shows the Fluid Sealing Diameter (FSD) of a standard flange with a traditional ring type joint. Figure 1b shows the same flange with Destec's seal ring. Notice the much smaller Fluid Sealing Diameter. By sealing close to the bore the hydrostatic end load caused by pressure in the system is kept to a minimum.



Many clients have drawn on Destec's specialised knowledge and experience in the use of high pressure and high temperature metal-to-metal static seals. Destec have developed a sealing system which uses a modified cone ring, giving excellent leak tightness properties under the most severe conditions of pressure, temperature, thermal cycling and shock.

Destec's seal rings are being used as original equipment in client's products, and also as replacements for original, troublesome joints. With conversions of old joints to Destec seals, our engineers carry out the design modifications in accordance with established codes and standards, whilst the practical site work is handled by Destec's on-site machining service, using portable machines to carry out the modification and re-build on site.

Destec's seal rings have the following features :- Bore sizes from 13mm to 2150mm currently in service.

The higher the pressure the more attractive the Destec seal design becomes, as internal pressure intensifies the sealing action.

The Destec all metal seal ring can be used at high temperatures, with maximum service temperature being limited by the seal material selected. Materials range from carbon and alloy steels through to Inconel, with a range of coatings for lubrication.

The sealing system is extremely leak tight under the most severe conditions of pressure, temperature, and vacuum, and is suitable for nuclear applications.

Cold quench conditions and thermal cycling are the cause of most leakage problems where conventional compressible type joint materials are used. The elasticity of the Destec seal ring ensures a tight seal during thermally transient conditions.

Lighter and more compact flange designs can usually be achieved by using Destec's seals, as the fluid sealing diameter and joint loads are lower when compared with conventional compressible type joints.

The all metal Destec seal ring is elastic in design and on dismantling returns to its original size ready for re-use. All seals of a given size are interchangeable without any pre-fitting.

Applications for the Destec seal cover the whole range of pressure containing equipment from pressure vessels down to pumps and valves in all industry.

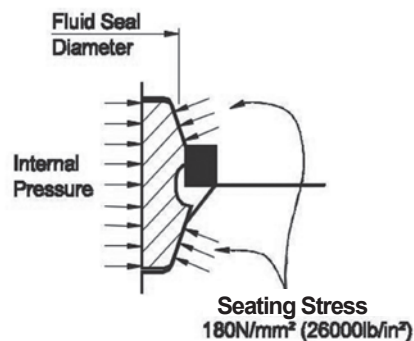
Making and maintaining the Right Connection

Up to 895mm diameter, Destec's seal rings are supplied as double cone rings, as illustrated across. Sizes of standard seal rings go up in 5mm steps to closely match the bore of the component. If an exact match to the bore is required, we will supply a purpose designed seal ring.

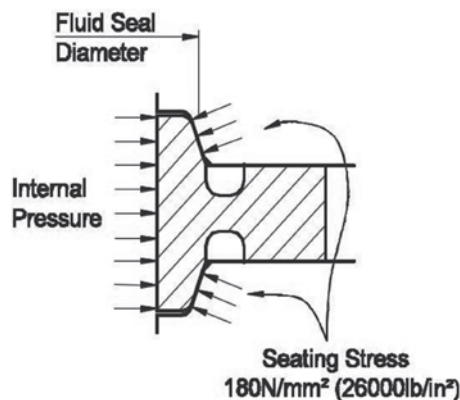
Seal rings over 200mm diameter may be supplied with a central rib. This enables us to maintain a high seating stress whilst keeping the overall width of the seal ring down to a reasonable size.

The fluid sealing diameter is close to the bore, minimising the end loads on the joint. The internal surface area of the seal ring exposed to pressure is greater than the seating contact area, so internal pressure adds to the initial seating stress with a multiplication factor of at least 2.

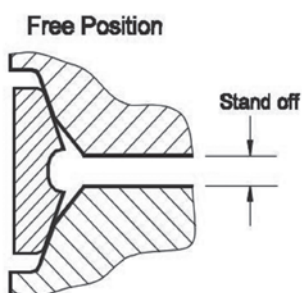
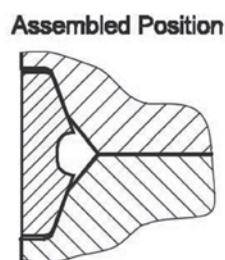
Joint faces make contact outside the seal faces, preventing external axial and bending loads from being transmitted through the sealing area.



D Range Seals
upto 895mm Dia



RD Range Seals
200 to 2200 Dia.



Radial interference between the seal ring and the seat gives a "Stand-off " in the free position. On assembly this disappears but on dismantling the stand-off returns, showing that the seal ring has been operating within its elastic limit and is suitable for re-use.



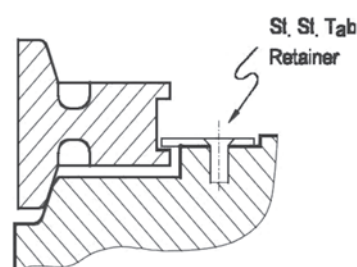
HIGH PRESSURE STATIC SEALS

Destec Seal Rings are supplied in many forms to suit diverse applications. A selection of some of the variations are given below together with explanations of their use.

Seal Ring Retainers

To assist assembly the seal rings can be retained in one of the flanges. This has proven to decrease assembly times when working under difficult conditions, for example, on work barges connecting flexible hoses.

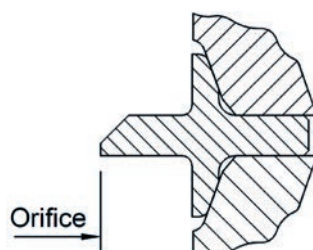
Special subsea retainers are also available that allow the seal ring to be fitted and removed by ROV, using a special tool that fits through the seal ring's bore.



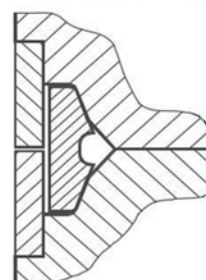
Orifice Seal Rings and Blinds

Destec seal rings can be designed to incorporate orifice plates, chokes or blinds. Large orifices requiring seals 200mm and above, would normally be supplied as a wafer to fit between flanges and use two seal rings. This also applies to blinds which would have pressure limitations if incorporated as part of a seal ring.

Orifice Seal Rings



Protected Seal Rings



Shrouded Seal Rings

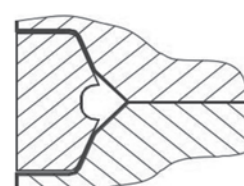
Where there is severe corrosion or erosion the seal ring can be protected by fitting sleeves in the bore. Shrouds in special materials are often fitted in clad piping.

The standard Destec seal ring is satisfactory for normal pipe corrosion allowances.

Heavy Duty Seal Rings

Destec manufacture a range of heavy duty seal rings to meet the requirements of very deep sea applications. These seal rings are designed to take high external pressure and will take high flange shear loads without using spigots.

Heavy Duty Seal

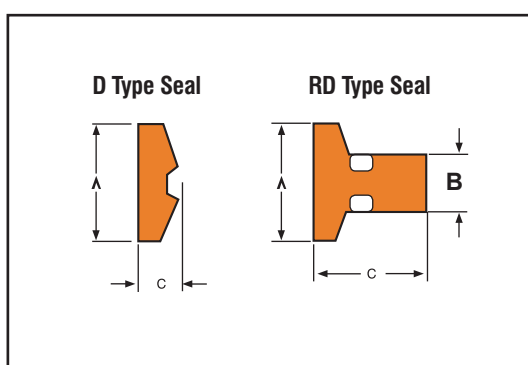


HIGH PRESSURE STATIC SEALS

Standard Destec seal ring profiles are given below to enable clients to incorporate them into original equipment. Bore sizes go up in 5mm steps, although specials can be made to match the actual bore of the equipment when required.

Seal Ring load characteristics for assembly and operating conditions can be provided by Destec together with flange stress calculations. To provide this information we will require details of the operating conditions together with materials and corrosion allowances etc.

For clients who incorporate Destec Seal Rings into their equipment, Destec can provide the necessary machining details or offer an on-site machining service. Measuring equipment, engineering inspection and assembly assistance is also available if necessary, providing long term value to the client.



D Type Seal		
Dimensions in millimetres		
Bore Size	A	C
20-29	8	3
30-54	10	4
55-79	12	5
80-99	15	6
100-149	18	8
150-199	22	9
200-269	25	10
270-396	28	11
400-549	35	15
550-699	44	20
700-899	52	30

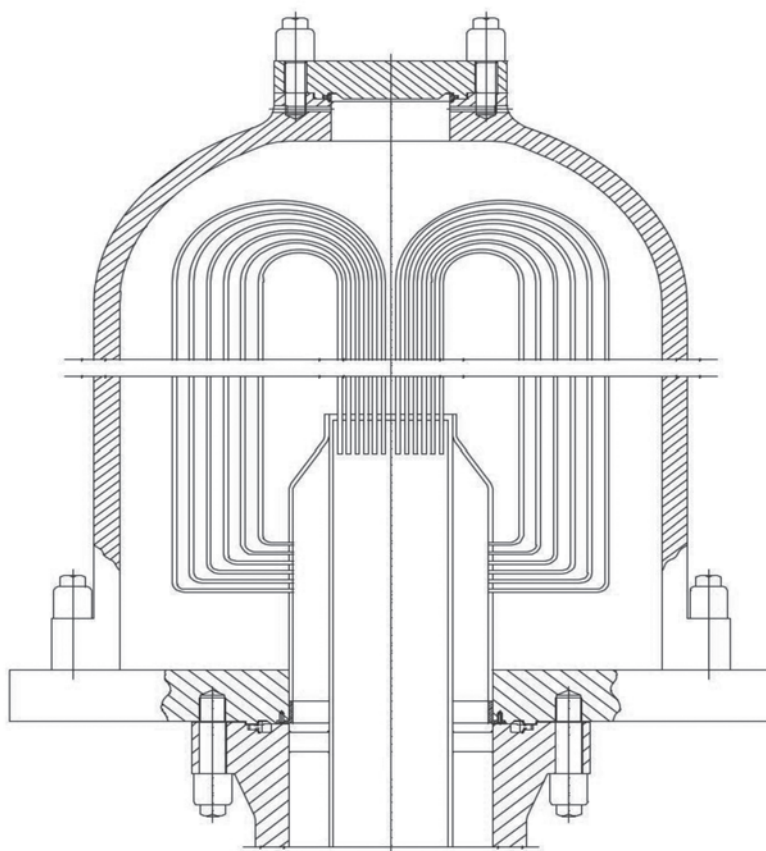
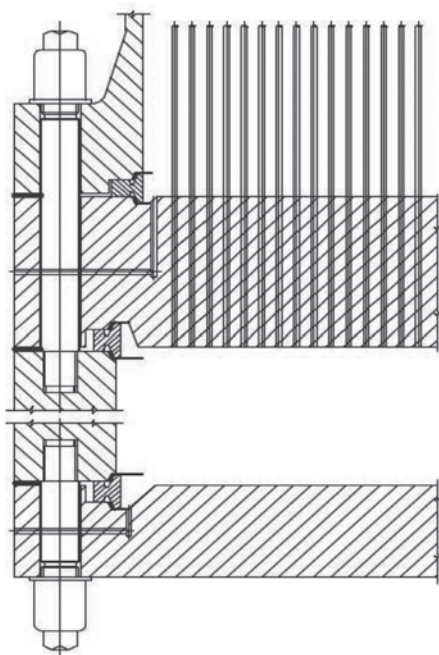
RD Type Seal			
Dimensions in millimetres			
Bore Size	A	B	C up to
200-249	28	14	17.5
250-299	28	14	22
300-349	28	14	27
350-399	28	14	31
400-449	36	18	27
450-499	36	18	37
500-549	36	18	37
550-599	36	18	39
600-699	43	25	36
700-799	43	25	40
800-899	50	30	45
900-999	50	30	48
1000-1099	58	35	52
1100-1199	58	35	59
1200-1299	62	37	65
1300-1399	62	37	72
1400-1499	67	39	75
1500-1599	67	39	80
1600-1699	67	39	85
1700-1799	67	39	90
1800-1899	67	39	85
1900-1999	84	50	92
2000-2199	84	50	102



FEED WATER HEATERS

Over the years both Ratcliffe Power Station and its sister station Ferrybridge C have converted the original High Pressure joints to Destec seal rings on the heat exchanger after the original joints leaked consistently. Particularly when two cycles per day operation was introduced.

Seal ring sizes are 355mm and 770mm with working conditions of 220bars at 260°C. These conditions apply to both the shell and tube sides of the heat exchanger.



Destec converted the joints on Willington Power Station feed water heaters.

Joint faces were overlayed with 316 Stainless Steel including the tube sheet joints.

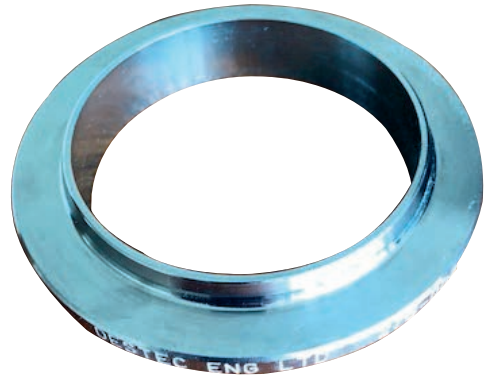
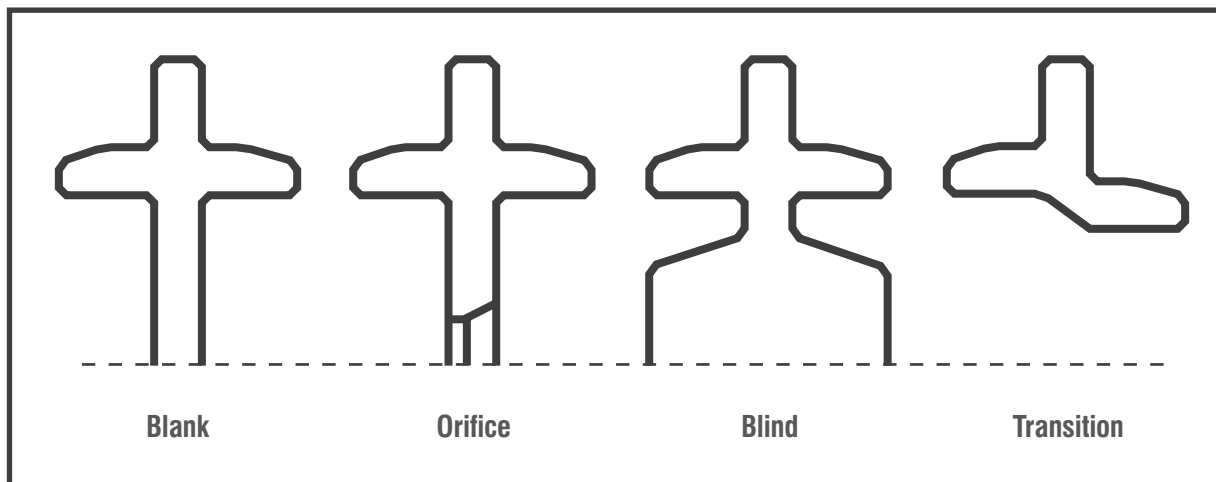
Seal ring sizes were 1060mm and 990mm diameter.

Operating conditions are 62bars at 238°C and 40bars at 250°C

Destec G Range Seal Ring

The seal ring is a modified cone ring giving excellent leak tightness properties under the most severe conditions of pressure and/or thermal shock. On assembly the taper joint faces compress the seal radially. The sealing force is provided by the stored energy in the stressed seal ring, any internal pressure intensifies the sealing action.

The G Range is interchangeable with other main manufactures of Hub Connectors. Size ranges from 4 with an OD of 1.000 to 395 with an OD of 43.500.



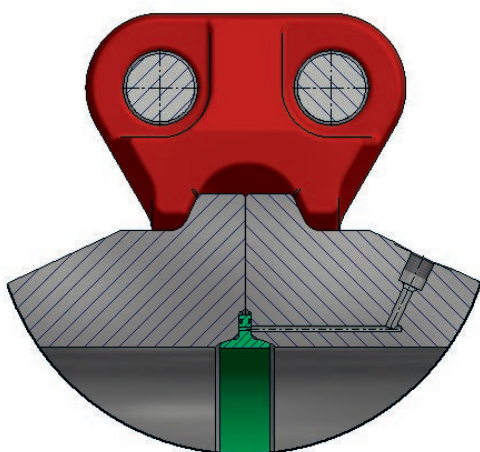
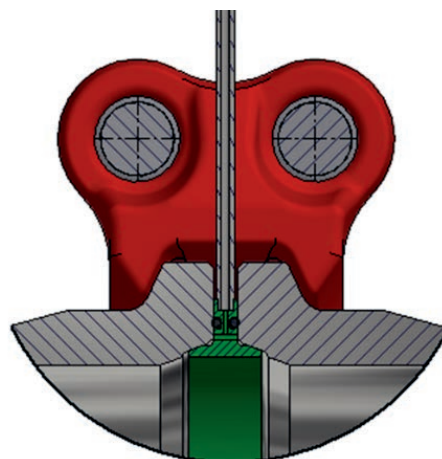
- | | |
|-------------------|--|
| Blank | - Used to blank off a section of pipe or where customers wish to drill their orifice hole |
| Orifice | - Used in flow measurement systems |
| Blind | - Used to blank off a section of pipe under pressure (the amount of pressure that a seal can accommodate is dependent on its size and geometry) |
| Transition | - Used to bridge between mismatched seats (the amount of mismatch is limited by the practicality of the seal geometry). |



Destec Reverse Integrity Seals



Destec Engineering Ltd has the means of testing the Destec G range Hub clamp connector joint and our other metal-to-metal seal rings in-situ prior to, or in place of a line leak test to save time and ensure seal integrity. The integral test pipe allows the Destec seal ring to be fitted to existing equipment.



Destec seal rings with no test pipe are used in hubs/flanges with pre-drilled test ports and for those joints using recessed seat pockets which would prevent the exit of the test pipe.

The Destec Outer Ring Reverse Integrity Seal is used on the larger seal rings, but allows existing seals to be used and can be manufactured from a less exotic material.



Destec G Range seal used in high pressure valves

2500 Class rated valve 220°C to 400°C size



All critical dimensions on Destec seal rings are 100% inspected

Seal User List-OEM's & Conversions

Company	Country	Size Bore - mm from to	Application
ABB Control Valves	U.K.	90 to 290	Subsea Valve Bonnet Seals
Alco Valves	U.K.	30	Subsea Valves
Amoco	U.K.	Up to 754	Subsea Pipeline
BP	U.K.	130 to 300	Subsea manifold and risers
BP	U.K.	Various Sizes	Offshore and Subsea Pipework
BP Exploration	U.K.		
BAE Systems	U.K.		
Aberthaw Power Station	U.K.	1005	H.P. Feedwater Heater
Burgess Manning	U.K.	1000	Separator Vessels(Piper Bravo)
C.A.Parsons	U.K.	384	Manway Closure
CF Fertilisers	U.K.		
Didcot Power Station	U.K.	355	Feedwater Non Return Valves
Fawley Power Station	U.K.	1473	H.P. Feedwater Heater
Ferrybridge 'C' Power Station	U.K.	355 to 770	H.P. Feedwater Heaters
Fisons	U.K.	1060	Heat Exchanger
Great Island Power Station	U.K.	460	H.P. Feedwater Heater
HIGHgh Marnham Power Station	U.K.	1220	H.P. Feedwater Heater
Hopkinsons Oil & Gas Services	U.K.	95 to 510	Valve Bonnet Seals
Ince Power Station	U.K.	1050	H.P. Heater
ISA Solartron	U.K.		
Kingsnorth Power Station	U.K.	1473	H.P. Heater
L.B.Bentley Limited	U.K.	13 to 65	Subsea Valve Seals
Loughborough University	U.K.	200	Test Vessel
Maersk Oil	U.K.		
Mobil	U.K.	248 to 1165	Tubeplate Seals
Northfleet Power Station	U.K.	1105	H.P. Heater
Oliver Valvetek	U.K.	25 to 45	Subsea Valve Seals
Onesubsea	U.K.	30 TO 220	Subsea GSB clamp closures
Pacson Limited	U.K.	25 to 55	Subsea Valve Seals



Seal User List-OEM's & Conversions...continued

Company	Country	Size Bore - mm from to	Application
Perenco Revenspurn	U.K.		
Ratcliffe Power Station	U.K.	355 to 770	H.P. Feedwater Heaters
Reaction Engines	U.K.	30	H.P. Feedwater Heaters
RWE Npower	U.K.		
Severn Glocon	U.K.	13 to 65	Subsea Valves
Shannon Bridge Power Station	U.K.	855	H.P. Feedwater Heater
Shell	U.K.		
TAQA	U.K.		
Willington Power Station	U.K.	990 to 1060	H.P. Feedwater Heater
Wood	U.K.	Various Sizes	Reactors, Vessels, Valves and Pipework
Uskmouth Power Station	U.K.	256 to 1066	Non Return Valves
ExxonMobil EU	EU	4 to 295	Vessels, Pipework and Valves
Evonics	China		
Sinopec	China		
Bronswerk	Holland	320 to 660	Vessel Closures
D'Hondt	Holland	825	Export Gas Cooler
Dutch State Mines	Holland	465 to 1120	Reactor Vessels
Eastman Chemicals	Holland	Various Sizes	H.P. Pipework & Closures
Eastman Chemicals (Netherlands)	Holland		
Sabic	Holland		
Exxon	Holland	295 to 595	Reactor Vessels
HCG/NAM	Holland	670 to 800	Vessel Closures
Korpershoek - DSM	Holland	525	Gas Cooler
Plaatijzer	Holland	1100 to 1700	Vessel Closure
Verolme	Holland	200 to 600	Wax Separators & Decobalters
Zappeij	Holland	295 to 595	Reactor Spool
Advance Flow Technics	Germany		
BP Chemicals	Germany	4 to 432	Separator / Reactors Vessels & Piping
BASF	Germany	430	Vessel Closure
BASF	Germany		
Bayer	Germany	375 to 575	Vessel Closures
Chema Prozess und Systemtechnik	Germany		
Cognis Corporation			
Henkel	Germany	432 to 685	Separator Vessels
Ineos	Germany	4 to 432	H.P. Pipework & Closures
Mannesmann	Germany	520	Reactor Vessels
Ruhrchemie	Germany	448	Vessel Closure
Uhde	Germany	600 to 1510	Reactor Vessels
Schoeller Bleckmann	Austria	610	Polymer Vessel
Woodside Offshore Petroleum	Australia		
Axens Mozyr Refinery	Belarus		
BP Chemicals	Belgium	330	Gas Filter Closure
Doel Power Station	Belgium	255	Compressor Flanges
Doel Power Station	Belgium	255 to 450	Boiler Feed Pump
Du Pont de Nemours	Belgium		
Exxon	Belgium	595	Reactor Vessels
Geslot	France	595	Tubeplate Seals
Noroxo	France	295 to 595	Reactor Vessels
Luigi Resta	Italy	550 to 760	Wax Hydrofiner Reactors
Mangiarotti S.p.A.	Italy	Various Sizes	High Pressure Vessels
Raffineria di Milazzo	Italy	27 to 550	Pipe and Valve Connections
OMB Valves Spa	Italy	Various Sizes	Valve Connections
Pietro Fiorentini Spa	Italy	Various Sizes	Subsea Hub Connections

Making and maintaining the Right Connection

Company	Country	Size Bore - mm from to	Application
Tengizchevroil	Kazakhstan	550 to 705	Tubeplate Seals
Cognis Rika Sdn Bhd	Malaysia	1510	Reactor
SBM Offshore	Malaysia	46 to 112	Offshore Pipework and Valves
Single Buoy Moorings Inc	Malaysia	46 to 112	Offshore Pipework and Valves
Conoco/Kvaener	Norway		
Sices	Poland	12 to 120	Pipework and Valves
Chevron	Thailand	27	Offshore Pipework and Valves
ADNOC	UAE	Various Sizes	Offshore Pipeline and Vessels
Onesubsea	USA	30 to 220	Subsea GSB clamp closures
Masterflow	USA		Subsea Pipelines
Technip FMC	USA		
University of California	USA	12.7	
Petrobras	USA	Various Sizes	Offshore Pipework

The above list covers sizes from 13mm to 2150mm bore with pressures up to 2700 bar and 450 °C

Making and maintaining the Right Connection



Destec Engineering Ltd

Five Mile Lane, Washingborough,
Lincoln, LN4 1AF. UK

TEL: +44 (0)1522 791 721

FAX: +44 (0)1522 790 033

EMAIL: sales@destec.co.uk



For more information visit www.destec.co.uk

First Point Assessment Limited Supplier No. 41618