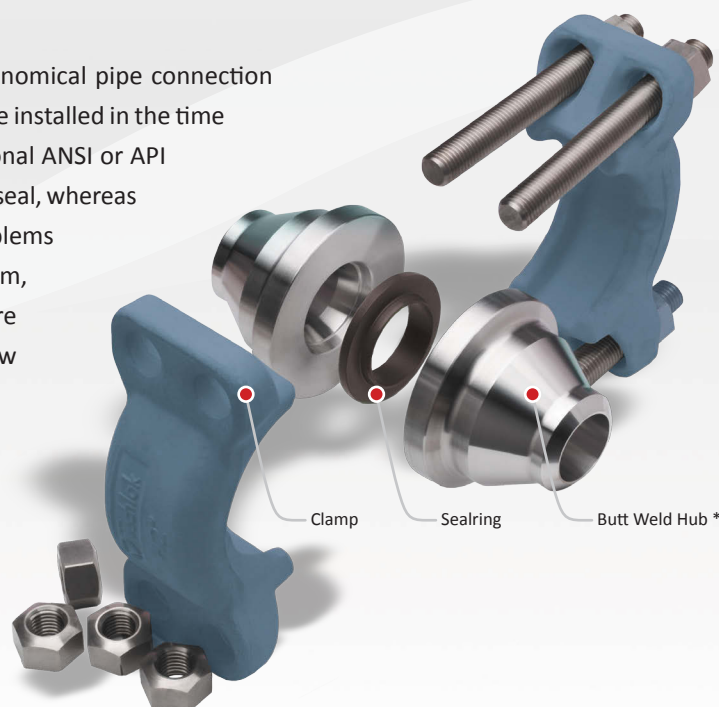


Product Range

Most effective, economical system available

Vector Techlok® Clamp Connectors are the most effective and economical pipe connection system available today. Typically several Vector Techlok® joints can be installed in the time it takes to assemble a single standard ANSI or API flange. Conventional ANSI or API flanges with their 4 to 24 bolts require accurate alignment to ensure a seal, whereas Techlok® Clamp Connectors have only four bolts, no alignment problems and require less bolt loads. High pressure systems are not a problem, with Vector Techlok® Clamp Connectors working in applications where pressures of 60,000psi and above are found; Vector Techlok's low weight is a real advantage - a factor applicable in any industry where weight and overall installation cost is a consideration.



Benefits

- Up to 75% lighter and significantly smaller than a comparable ANSI or API flange.
- Less bolting, no alignment : only 4 bolts to tighten
- Radial bolting : allows 360° orientation around the pipe.
- Lower bolt torque : typically 50% less than that for a ring joint flange.
- Minimize maintenance downtime : quicker assembly/disassembly.
- Reusable sealrings : giving greater flexibility for hydro-testing and commissioning prior to service.
- Support/Interface with 3rd party equipment such as valves, pumps and metering equipment.

** also available : Blind hubs and threaded hubs*

VECTOR
Techlok® clamp connector

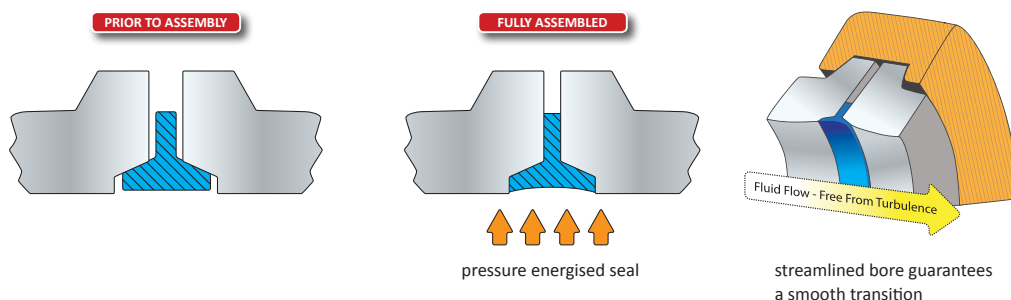
Design codes & regulations

- ASME B31.3 / ASME VIII Div2 Part 5
- API 6A / ISO 10423
- PD 5500
- UK Offshore Regulations
- Customer's special requirements
- Country codes
- Norsok
- PED (Pressure Equipment Directive)



Pressure energized sealing

The Vector Techlok® sealring offers several advantages over conventional gasket types; for example, the gasket forces and seal diameter are minimal, meaning that the load capacity of the components is maximized and the lack of a conventional flange gasket gives a gas-tight metal-to-metal seal.



Vector Techlok® clamp connector

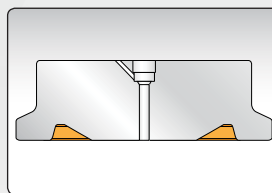
Product Range

Weld-o-hubs, Sweep-o-hubs and Tees



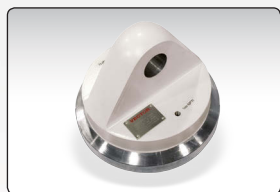
Weld-O-Hubs, Sweep-O-Hubs and Tees are a standard range of Freudenberg Oil & Gas Technologies (FO>) products in their own right and are incorporated within our standard product brochure.

Tapped blind



Tapped blind hubs can either be used for end of line blanking applications, or if tapped with the appropriate tapping as a pressure monitoring fitting. Sizes range up to 30", larger on application, and in any material grade.

Pulling head



Pulling heads are adapted from blind hubs to function as part of a standard Vector Techlok® clamp connection. Our pulling heads are designed using Finite Element Analysis (FEA) to meet customers'

application requirements and every pulling head is load tested prior to release.

Adapter spool



Available to connect different connector types and sizes. For example : Techlok®-Techlok®, Techlok®-ANSI and Techlok®-API.

Transition spools can be supplied in various lengths to suit client in-situ applications. Hydrostatic pressure testing of spools can be undertaken upon request.

Orifice connectors



Vector Techlok® Metering (FE) orifice connectors can either be supplied with 'D-D/2' or 'flange' tappings. In either case the branch tapping can be integral in the form of a female tapping (threaded, socket weld or

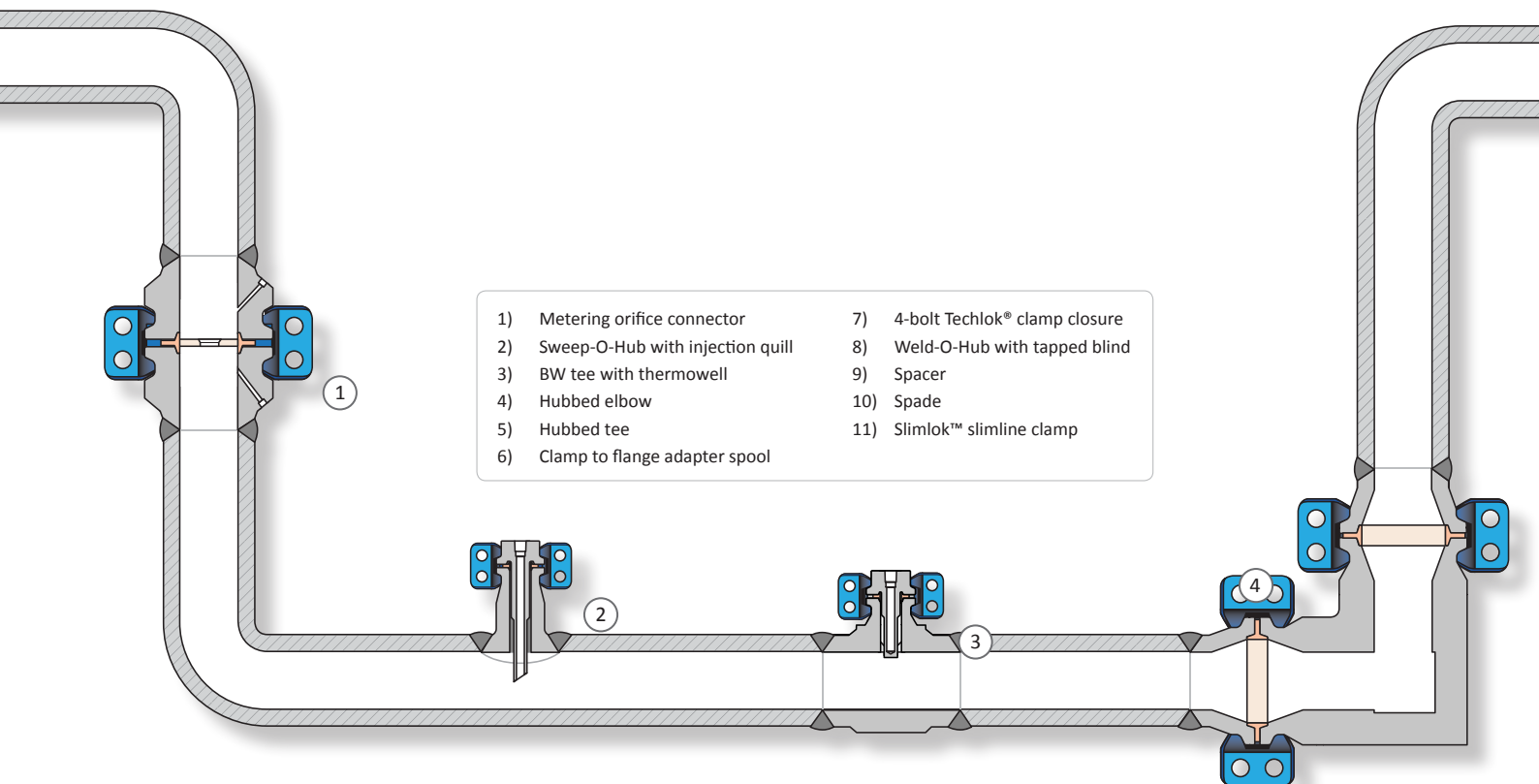
butt weld) or as a hub/flange. FO> also offers a range of Restriction Orifice (RO) connectors. Sizes offered range up to 30" and pressures in excess of 20,000psi.

Thermowells and Quills

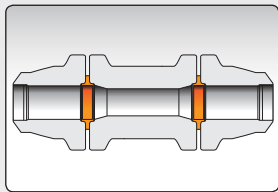


Thermowells and sample/injection quills can be supplied with either a parallel or tapered shaft of any length in any material grade and are used as an integral part of Weld-o-hub and Sweep-o-

hub assemblies. Calculations can be supplied in accordance with PTC19.3(2010). Thermocouple tappings can be supplied in any format.



Spade/Spacer



Components are available for all hub/clamp sizes. For smaller sizes spade/spacers can be fabricated into "spectacle blinds", however, for most applications the spade and spacer remain as separate components. The length of the Spade/Spacer will be slightly greater than the width to allow two clamps positioned side by side.

Slimline clamps



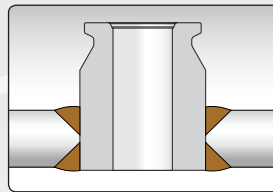
Available as an option to fit all hub sizes. The design allows for a reduced diameter envelope and also specialised materials, due to fully machined construction. Used in conjunction with "Pulling blinds" and also electrically insulated connectors.

Hubbed Tees & Elbows



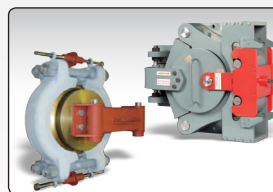
A range of hubbed elbows, tees and cross pieces are available to help facilitate compact piping layouts. Components are manufactured in forged steel with reinforced bend sections.

Nozzles



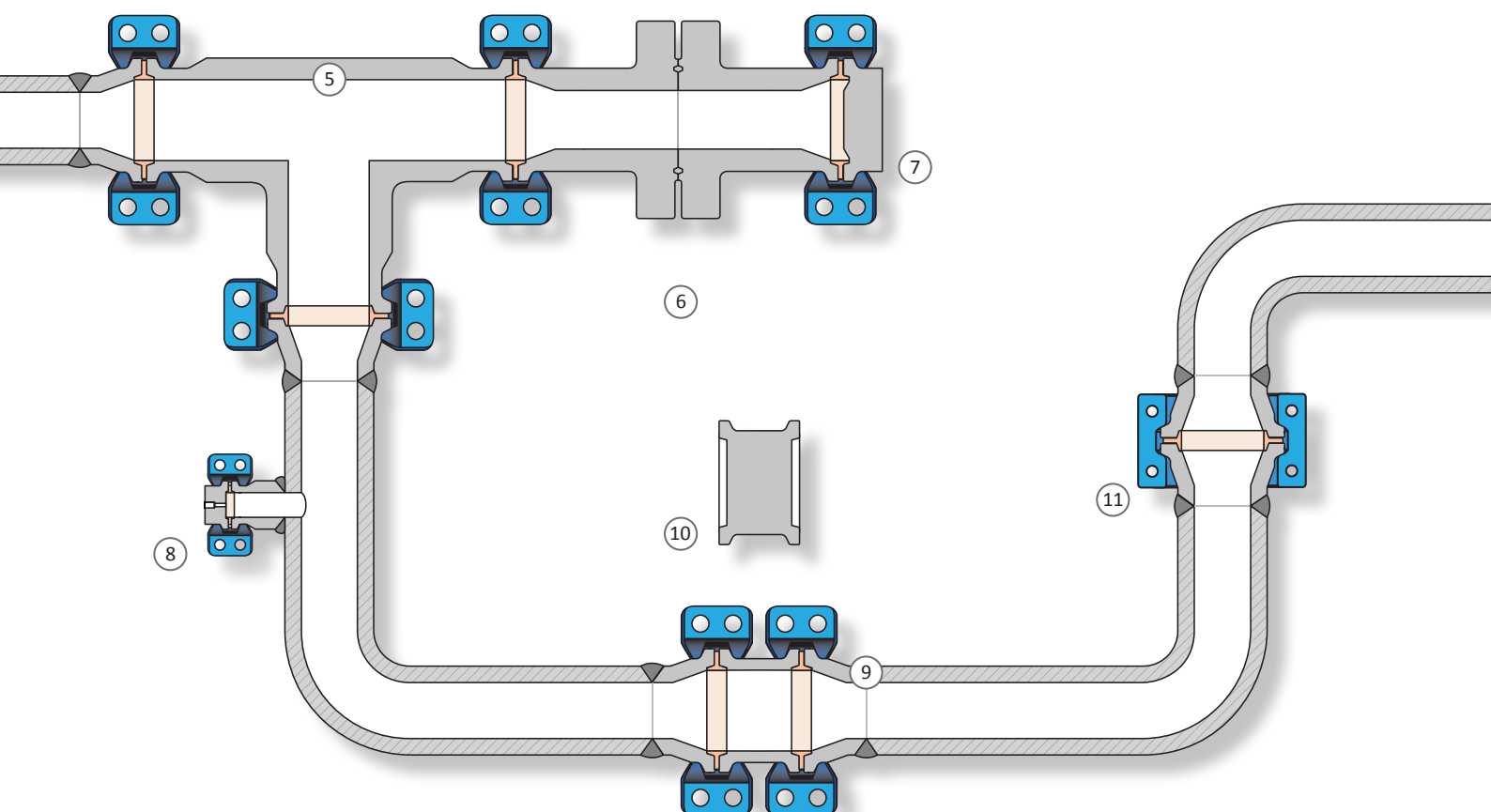
Vector Techlok® Nozzles are available for use with pressure vessel construction to provide a convenient system for connecting pipework. The nozzle is used for "set through" construction providing reinforcement for the pressure vessel wall. Nozzles are manufactured from forged steel and are available in all sizes and materials to suit client needs.

Industrial Closures



A full range of Vector Techlok® and Vector Powerlok® closures are available, for pressure ratings of up to 15,000psi. Vector Powerlok® closures are available in sizes 2-36" and incorporate an integrated

pressure check bleed screw and double interlock providing 100% leadscrew redundancy. Techlok® bolted closures are available as 4-bolt closure for sizes 2-26", and as 6-bolt closure for sizes 28-42". Both closure types can be provided with hinges, davits or lift eyes for horizontal or vertical opening and incorporate seal retention in the blind door to minimise the risk of seal damage when the door is opened during use.



Sealring types

Vector Techlok® Sealring



The standard Techlok® sealing offers assured joint integrity first time, every time. The gasket forces and seal diameter are minimal to maximise the load capacity of the components and the time-

proven pressure energized bore seal gives a high integrity gas-tight metal-to-metal seal. All Techlok® sealrings meet NACE hardness requirements.

Transition sealring



Transition sealrings are available to seal two different seat sizes. Normally this may accommodate pipe specification breaks of the same nominal size, i.e. 6in46 hub matching a 6in52 hub

would require a 46/52 transition ring. Only certain sizes are stocked.

D-Seal compatibility



All Vector Techlok® clamps are compatible with D-seal hub connectors. D-seals are available in all sizes and are incorporated into Vector Analysis software for full load evaluation.

D-seals provide an optional low profile sealing system within the standard Vector Techlok® hub geometry providing full face to face contact between hubs. D-seal connectors provide slightly higher load capacities and are compatible with other existing designs. Full Pressure-Temperature tables are available for the Vector Techlok® D-seal connector range.

Tooling

Vector Techlok® Lifting Frame



EasiLift has been designed as the optimum solution to the continuous challenge of manoeuvring Vector Techlok® blind hubs and clamps, safely and easily. EasiLift enables safe assembly and disassembly of

blind hub connections. It is also capable of safely retaining the sealring during assembly. There are a minimized number of moving and removable parts to aid reliability and the frame itself is a rigid, welded structure, tested and certified to comply with LOLER and PUWER regulations.

Blind sealrings



Blind sealrings are an effective means of blocking off pipe runs and can normally take full line pressure.

Vector Techlok® blind sealrings are typically used as an auxiliary pressure isolation

device, rather than a permanent installation. Blind sealrings are not suitable for cyclic pressure.

Strainer/Acoustic Sealing



Strainer and acoustic sealrings are custom Techlok® sealrings, designed and manufactured to the client's specifications. During start up phases these can be used to protect high value equipment such as

valves, pumps and compressors. Strainer and Acoustic sealing can be manufactured from any traditional material associated with the Techlok® sealing.

Reverse Integrity Testing (RIT) Rings



Freudenberg Oil & Gas Technologies has developed a means of testing any connector using a Vector Techlok® metal sealring in-situ, either prior to, or in place of, a line leak test which saves time and

ensures seal integrity. There are two variations of this product, firstly a modified standard Vector Techlok® ring and secondly, an alternative design for those sealring sizes that cannot be modified. Both designs are available with or without an integral test pipe. The Techlok® RIT-ring with integral test pipe can be "retro-fitted" to existing equipment, whilst RIT-rings without a test pipe are used in hubs/flanges with pre-drilled test ports and joints using recessed seat pockets.

Twin Torque Gun



The Vector Twin Torque Gun allows fast, controlled, tightening of two Vector Techlok® bolts simultaneously. It ensures optimum and equal tension on all bolts, and one gun will fit a number of clamp

sizes. The Vector Twin Torque gun will allow tightening of both bolt pairs on a 6" connector in just one minute.