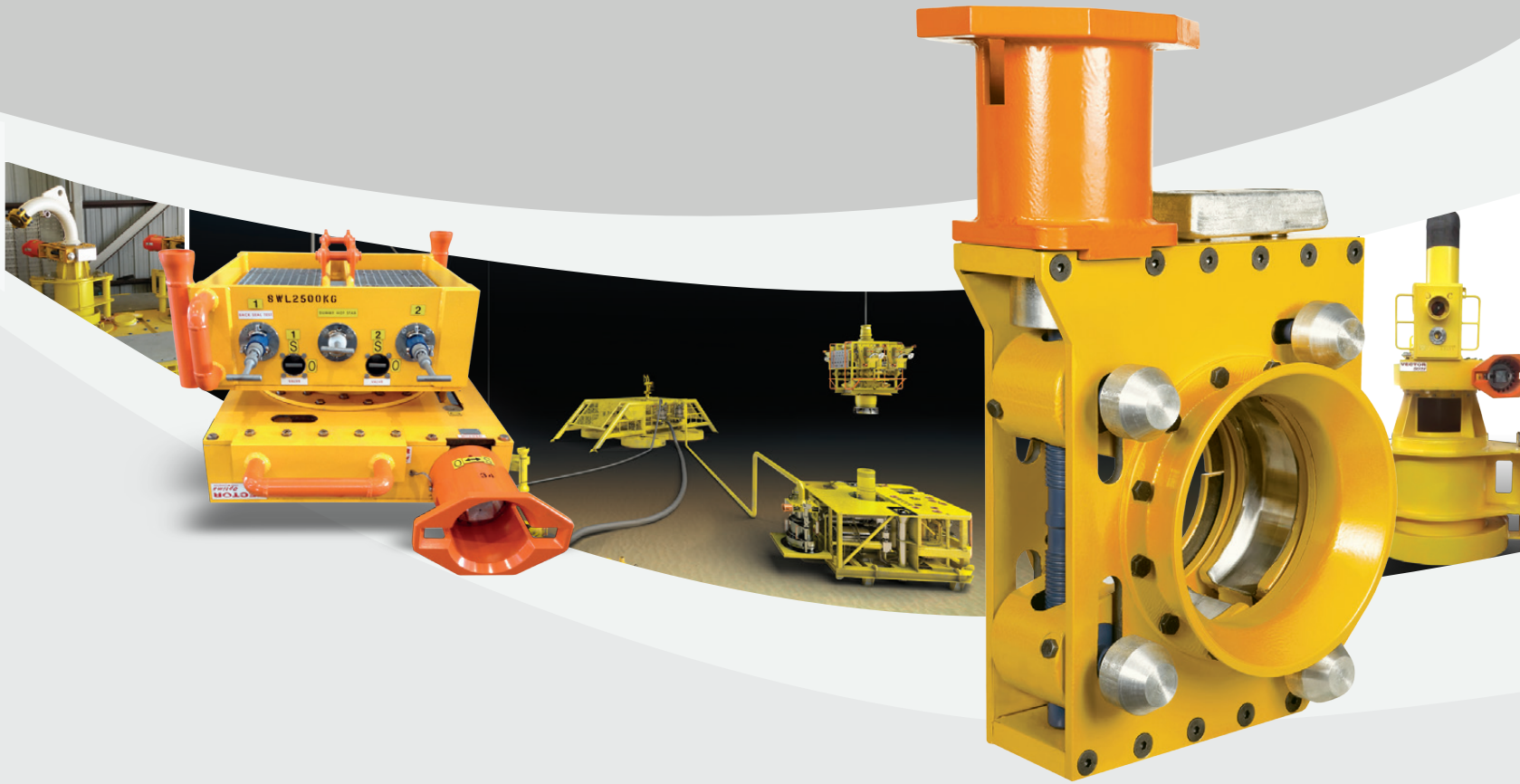




VECTOR
Optima[®] subsea connector





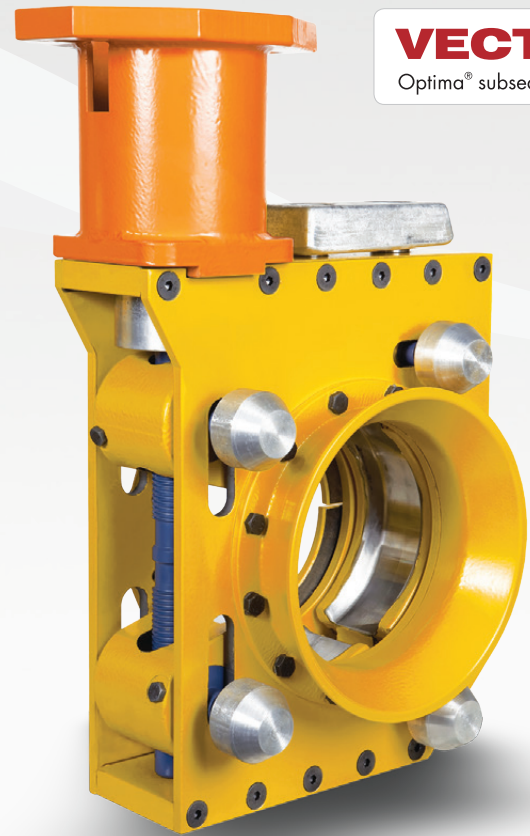
Vector Optima® Subsea Connector

Metal-to-metal sealing connector with enhanced misalignment capability, allowing quick ROV flowline connection, reducing initial CAPEX and installation OPEX

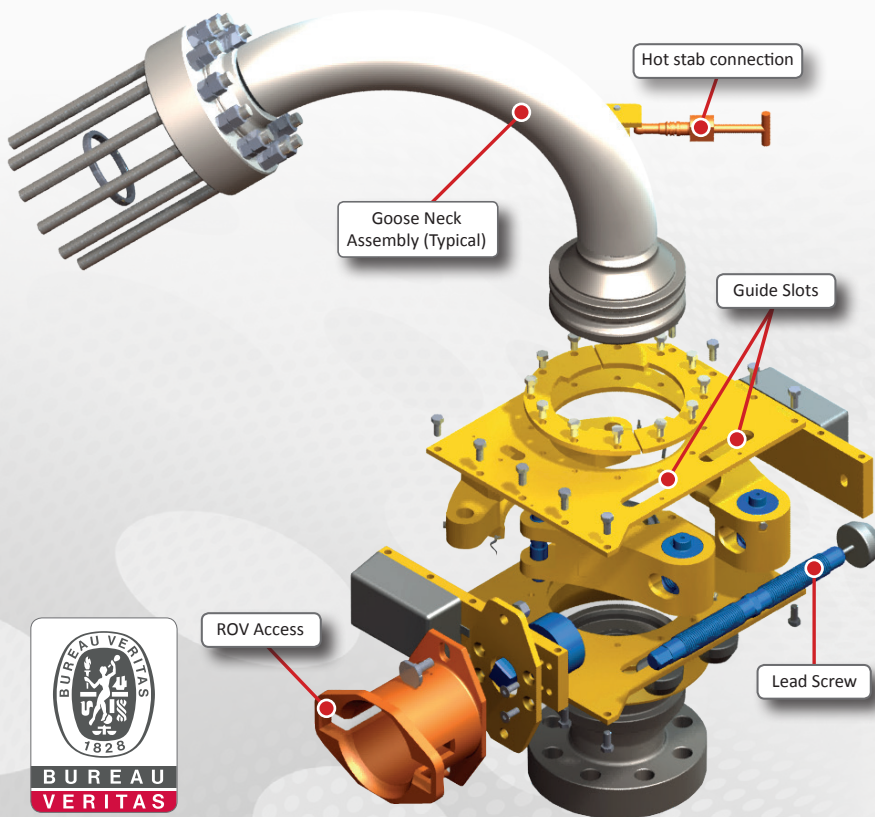
Vector Optima® has been developed in collaboration with some of the industry's major operators. By taking into account the Clients need for operational simplicity, Vector Optima® has been developed with minimal parts and complexity. This ensures clamp connector make-up times are kept to a minimum.

Innovation is at the very heart of the Vector Optima® connector. It is capable of engaging a hub with an angular misalignment of up to 5° or an axial misalignment of 50mm - whichever is the lesser.

Its revolutionary Vector Duoseal™ technology provides a pressure energized inner seal to seal the pipe medium AND a second pressure energized outer seal to seal against sea water. An annulus test port is readily accessible by ROV to confirm seal integrity as well as providing a detection method for leakage throughout the connector's life time. The hubs protect the seal ring from accidental damage during installation whilst both the mass and space envelope are kept to a minimum, ensuring the Vector Optima® subsea connector is both efficient and compact.



VECTOR
Optima® subsea connector



Type Approval by
Bureau Veritas

First time, every time reliability

Engineered for the most demanding deep and ultra deep sea applications, Vector Optima® provides first time, every time reliability and has a minimum impact on interfacing equipment. Its single lead screw provides predictable operational times and allows operators a quick disconnect system.

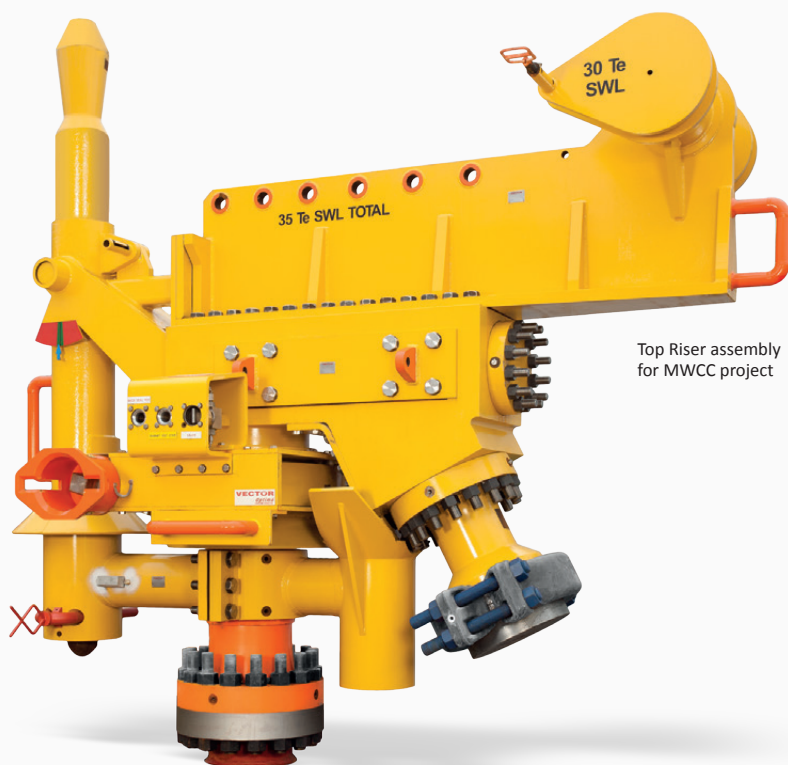
Type Approved by Bureau Veritas and manufactured in accordance with BS EN ISO 9001 Quality Assurance Accreditation Programme, the Vector Optima® connector has a typical minimum design life of 25 years.

The Optima® provides the perfect remote connection for a broad range of subsea applications including tree and manifold connections, flowline jumper installations, retrievable choke valve connections and pipeline tie in and repair.

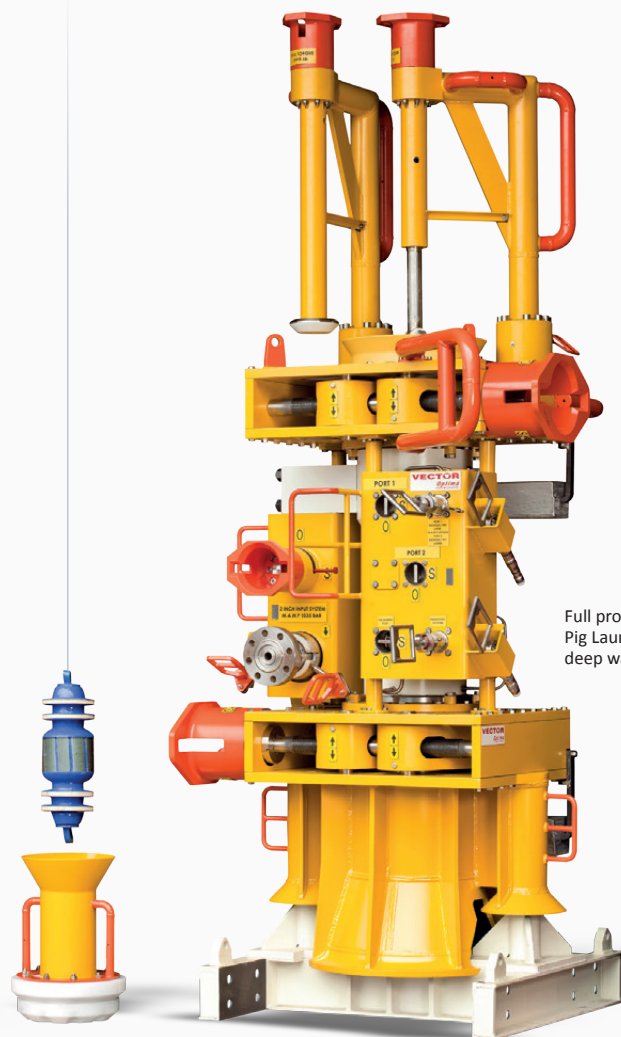
Simple and efficient design

The most efficient, user-friendly deep and ultra-deep sea connector available in today's market

- **Developed in close collaboration with some of the industry's major operators**
- **Proven Technology, in use in the North Sea since 2000**
- **Simple & efficient design**
reduces initial cost & installation time
- **Engineered for remote operation without special installation tooling**
- **Unique angular and radial alignment capacity**
male / female hub profiles ensure accurate alignment during assembly
- **Vector Duoseal™ technology**
double pressure energized metal-to-metal sealing to prevent internal or external leakage
- **Rapid deployment**
3-piece clamp c/w single leadscrew
- **Greater operational efficiency**
- **Corrosion resistant alloy weld overlaid seats**
for extended subsea life (standard supply)
- **Annular backseal test capability**
qualifies joint at point of assembly
- **Hubs available in a wide range of material grades**
- **Fully FAT tested**
all components of the Vector Optima® connector are fully FAT tested



Top Riser assembly
for MWCC project



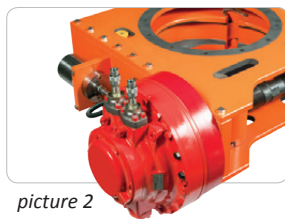
Full production activity
Pig Launcher for use in
deep water.

Vector Optima® Tooling

- Standard ROV actuation (picture 1)
- Hydraulic drive actuation (picture 2)
- Hydraulic ram actuation
- Sealing removal tools
- Sealface cleaning tools
- Hot stab systems
- Soft land and pull-in systems
- Horizontal and vertical installation tooling
- Drive plug



picture 1



picture 2

Engineering Services

Design Engineering

- FEA, in-house assessments to recognized codes
- Full 3D CAD (solidworks) & CAM

Interface Engineering

- Equipment & ROV interfacing
- 3D models exported to client's requirements
- Prototype testing
- Rapid prototyping

Offshore / Site Assistance

- Qualified / experienced engineer support

Vector Optima® Accessories

- Pull-in plugs (for subsea riser pull-in operation)
- Pull-in heads
- Pressure test caps
- Static clamps



Dual Bore Vector Optima® system

Manufacturing

- Wide range of manufacturing facilities to suit client requirements
- Special forged products, blocks, tees, hooks, anchor flanges, stress joints etc.

Codes & Standards

- ASME VIII Div 1 Appendix 24
- ASME VIII Div 2 Appendix 4
- ASME IX
- ASME / ANSI B16.5
- NACE MR-0175
- API 6A as appropriate



other available documentation

- Product Flyers : stay informed about our latest product developments and applications
- Technical documentation

electronic versions of our documentation can be found online.



Vector Optima® full scale pressure and bending test

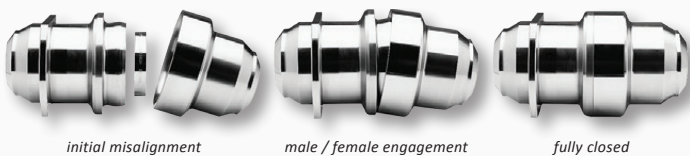
Increased efficiency

From installation to removal

- Standard API 17D & special ROV interfacing
- Simple & efficient design
- Quick connect / disconnect
- External load capability and pull-in capacity
- Visual confirmation when open or closed
- Duoseal™ sealring retained within male hub : ROV removable
- Bi-directional seal + backseal integrity test
- Optima® clamp can be rotated around hub : easy ROV access
- Available in sizes from 2" - 36" NPS
- Qualified up to 15,000psi
- Qualification tested to 13,125ft (4,000m) water depth (temp. range -50°C up to +150°C)
- Available in all material specifications for subsea service

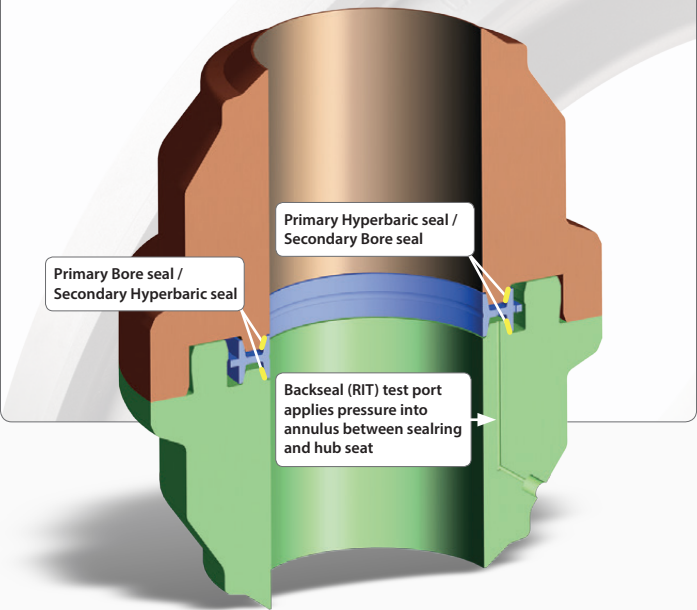
Hub Misalignment Capability

- Angular misalignment up to 5° or 50mm axial hub separation
- Male-female configuration controls misalignment
- Accurate radial misalignment provided by male-female hub
- Radiused profile of male hub prevents binding during makeup



The ONLY dual acting metal-to-metal seal in the subsea connector world !

The advanced Vector Duoseal™ system is both effective and highly flexible. The seal ring can be installed, removed and replaced remotely. An external test port also allows for a Reverse Integrity Test to be conducted. The complete connector is removable from the hubs by ROV and there is also an allowance for a contingency seal option to be deployed in case of failure or seat damage. Duoseals have been qualified delivered for 15,000psi applications up to 34" inside diameter.



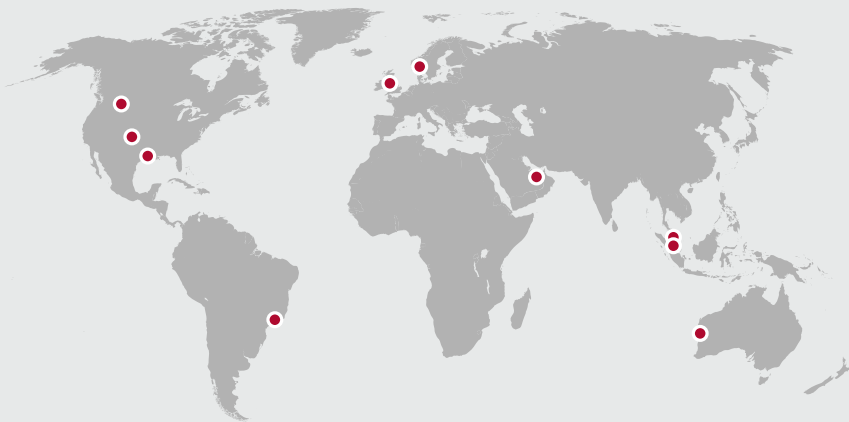
- Angular and radial misalignment controlled to prevent any damage to sealing surfaces during make-up

Alignment controlled in 3 stages	
STAGE 1	Coarse alignment provided by pull-in system
STAGE 2	Mid-range alignment provided by integral guide funnel (or similar)
STAGE 3	Fine alignment provided by male/female hub system

Locations - Vector Products :

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UK (Port Talbot)	+44 1639 822 555
USA (Houston)	+1 713 979 4444

please consult our website for a more complete contact list.



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