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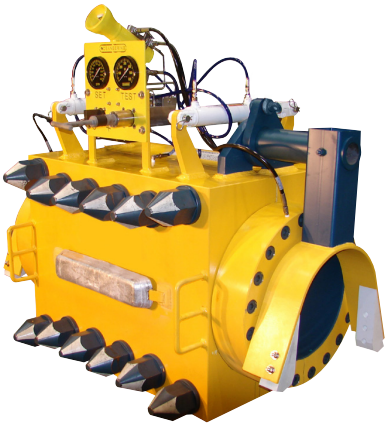
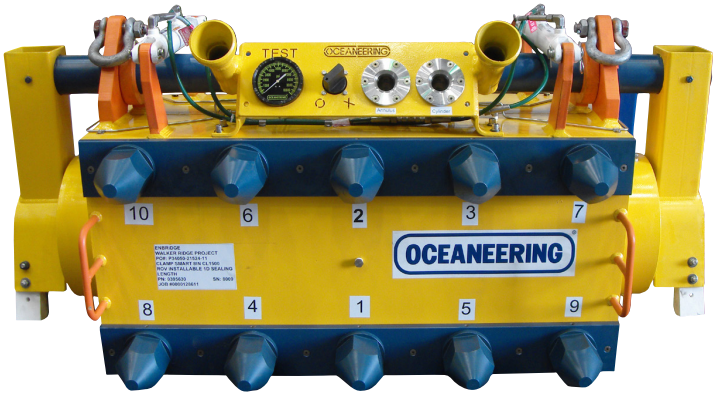
Diverless Smart Clamp

Permanent pipeline repair solution

The diverless Smart Clamp is a split mechanical fitting used to repair a damaged or leaking subsea pipeline. The fitting eliminates costly pipeline shut downs and expensive hyperbaric welding associated with alternative repair methods. After installation, the Smart Clamp design provides a permanent, high-quality seal and structural reinforcement for the duration of the design life of the pipeline.





FEATURES

Available in structural and non-structural configurations

Provides pressure containment within the encapsulated area

Cost saving, effective repair method

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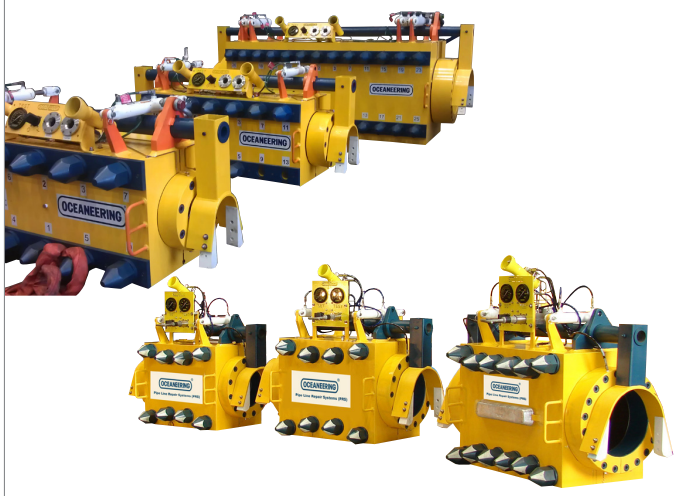
Our structural and non-structural configurations ensure we meet diverse permanent pipeline repair requirements. Typically, the non-structural version is used to repair a pipeline that is structurally sound and has only minor damage such as pinhole leaks, local pipe wall thinning, or shallow dents. The structural clamp uses a grip and bowl mechanism to provide structural integrity to more severely damaged pipelines with defects including cracked girth welds, kinks, or punctures.

Installation of the diverless smart clamp is achieved using hydraulic setting functions operated via an ROV panel with API 17D interfaces. The typical sequence involves:

- Lifting and supporting the damaged pipeline using a mechanical pipe lift frame
- ROV deployment and positioning of the clamp above the damaged section
- Opening the clamp via a hot stab using ROV pressurizing cylinders
- Lowering the clamp onto repair area with pipe saddle assistance
- Closing the clamp with ROV depressurization of the clamp via the hot stab
- Tightening of the body studs using the ROV and modified hydraulic torque wrench
- ROV intervention via second hydraulic coupling to simultaneously pressurize actuator flanges and set grip and seal mechanisms
- Completion of ROV annulus testing to verify sealing integrity of the clamp



Design Parameters
Nominal pipe size (NPS): Any API Specification 5L pipe and wall thickness
Service: Standard (i.e. crude oil, natural gas, hydrocarbons, water, or chemical injection, etc.) and sour (i.e. hydrogen sulfide, carbon dioxide, etc.)
Design pressure rating: up to ANSI Class 2500
Hydrostatic test pressure (minimum): 1.5 x design pressure rating rounded up to nearest 25 psig
Hydrostatic test duration (minimum): 4 hrs
Design temperature range: 25°F to 250°F / -4°C to 121°C
Water depth (maximum): 10,000 fsw / 3,048 msw
Design life: 25 years
Length between tension grips: The greater of 12 in or nominal pipe diameter
Internal diameter at center of clamp: Design standard is pipe outside diameter +1.625 in
Hydraulic cylinder pressure (maximum): 2,500 psi (172 bar)
Hydraulic actuator flange pressure (maximum): 10,000 psi (690 bar)

Material Specifications (Primary Components)
Body, actuator flanges, and pusher rings: ASTM A105 forging
Load ring and ratchets: AISI 630 (17-4 PH), hardened
Tension bowl and grips: AISI 4140 hardened, electroless nickel plated
Compression rings and structural attachments: carbon steel
Seal extrusion guards: 316 stainless steel
Elastomeric circumferential and longitudinal seals: Viton-B, 70/80 durometer
Screws and studs: ASTM A193 Gr. B7, all Sermagard® coated for low friction and corrosion protection
Anode(s): Galvalum III
Internal coating (ferrous components): Phosphate and oil
External coating: Carboline® 890 epoxy paint system, safety yellow color