

SMART CLAMP - DIVERLESS



Permanent Pipeline Repair Clamp

The Diverless Smart Clamp is a split mechanical / hydraulic fitting used to repair a damaged or leaking subsea pipeline. The fitting eliminates costly pipeline shut downs and offers an alternative to hyperbaric welding repair methods.

The fitting, available in structural and non-structural versions, provides pressure containment to the pipeline within the encapsulated area. The non-structural version may be 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 version, utilizing a grip and bowl mechanism, replaces structural integrity in more severely damaged pipelines with cracked girth welds, kinks, or punctures.

Diverless Installation

The Diverless Smart Clamp is lowered into position just above the damaged pipeline section that has been lifted off the seabed

using pipe lift frames. First, a Remotely Operated Vehicle (ROV) intervenes through a hot stab into one hydraulic coupling to pressurize the cylinders in order to open the clamp. The fitting is then lowered until the pipe saddles contact and position on the pipeline. An ROV utilizes the same dual port hot stab and hydraulic coupling to depressurize the cylinders to close the clamp. The body studs are then tightened using an ROV modified hydraulic torque wrench. The ROV intervenes through the second hydraulic coupling to simultaneously pressurize the actuator flanges and set the grip and seal mechanisms of the clamp. If the damaged pipeline section is not leaking, ROV again intervenes through the second dual port hydraulic coupling to perform an Annulus Test to verify the sealing integrity of the clamp. All the setting functions are hydraulic and are operated via an ROV panel with API 17D interfaces.

Installation Equipment

A work class ROV vessel that can lift the clamp and lower it to the seafloor is required.



SMART CLAMP - DIVERLESS SPECIFICATIONS

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 ASME Class 2500
- Hydrostatic Test Pressure (min): 1.5 times Design Pressure Rating rounded up to nearest 25 psig
- Hydrostatic Test Duration (min): 4-hrs
- Design Temperature Range: 25°F (-4°C) to 250°F (121°C)
- Water Depth (max): 10,000 fsw
- Design Life: 25-yrs
- Length Between tension Grips: the greater of 12" or 1-nominal pipe diameter
- Internal Diameter at Center of Clamp: design standard is pipe outside diameter + 1.625"
- Hydraulic Cylinder Pressure (max): 2500 psig (172 barg)
- Hydraulic Actuator Flange Pressure (max): 10,000 psig (690 barg)

Material Specifications (primary components):

- Body, Actuator Flanges & Pusher Rings: ASTM A105 forging
- Load Ring & Ratchets: AISI 630 (17-4 PH), hardened
- Tension Bowl and Grips: AISI 4140 hardened, electroless nickel plated
- Compression Rings, & Structural Attachments: carbon steel
- Seal Extrusion Guards: Type 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

Applicable Design Codes, Standards & Specifications (latest editions):

- OIE/PCRS Group Smart Clamp Drawings, Bill of Materials (Controlled Copies) and Vendor Supplied Material Test Reports
- OIE ISO 9001:2008 Quality Assurance - Quality Control Procedures & PCRS Operating Procedures
- ASME Boiler Pressure Vessel Code, Section V Nondestructive Examination
- ASME Boiler Pressure Vessel Code, Section VIII, Division 1 and 2
- ASME Boiler and Pressure Vessel Code, Section IX Welding and Brazing Qualifications
- ASME B31.4, Pipeline Transportation Systems for Liquid Hydrocarbons and Other Liquids
- ASME B31.8, Gas Transmission and Distribution Systems
- ASME B18.2.1, Square and Hex Bolts and Screws Inch Series
- API SPEC 6H, Specification on End Closures, Connectors and Swivels
- API SPEC 5L, Specification for Line Pipe
- DNV Recommended Practice RP B401, Cathodic Protection Design
- Code of Federal Regulations, Title 49, Parts 192 and 195

Certifications:

- ISO 9001:2008 - World Certification Services Ltd. - Accredited by UKAS Quality Management
- EN 10204 Section 3.1.B (DIN 50049), Inspection Documents for the Delivery of Metallic Products

