

# Diverless Smart Clamp

## 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.

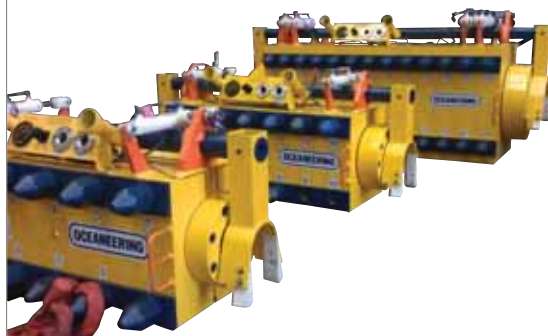
The fitting, available in structural and non-structural versions, provides pressure containment to the pipeline within the encapsulated area. The non-structural version may be used to repair a pipeline that is structurally sound and has only minor damage such as pinhole leaks, local pipe wall thinning 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.



## 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 (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 years

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

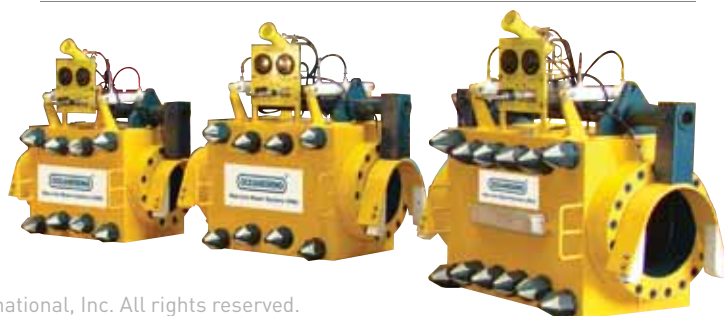
Elastomeric Circumferential and Longitudinal Seals: Viton-B, 70/80 durometer

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



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