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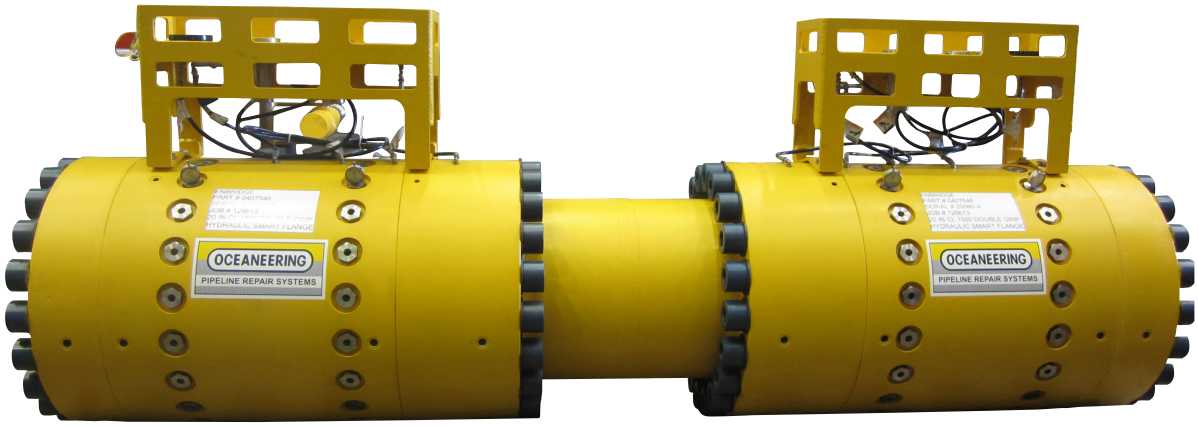
Hydraulic Double Grip and Seal Connector (HDGSC)

Deepwater pipeline repair solution



The HDGSC design evolved from the field-proven technology of the Oceaneering Hydraulic Smart Flange (HSF) connector.

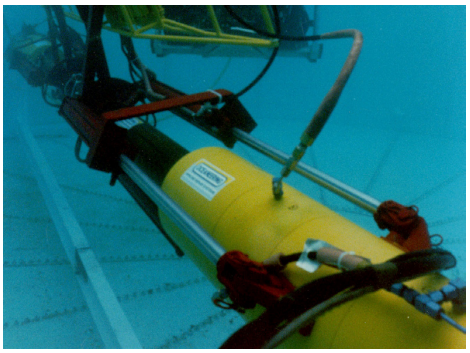
The connector meets deepwater connection requirements by providing a structural connection between a jumper pipe and an existing subsea pipeline.

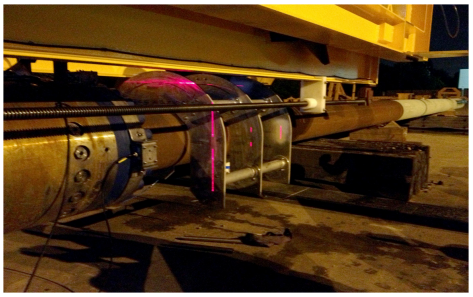
When hydraulically actuated, the HDGSC engages structurally and seals against the jumper and pipe ends. The connector is capable of withstanding full pipeline axial, bending, and torsional loads while withstanding hydrostatic end loads from the pipeline.

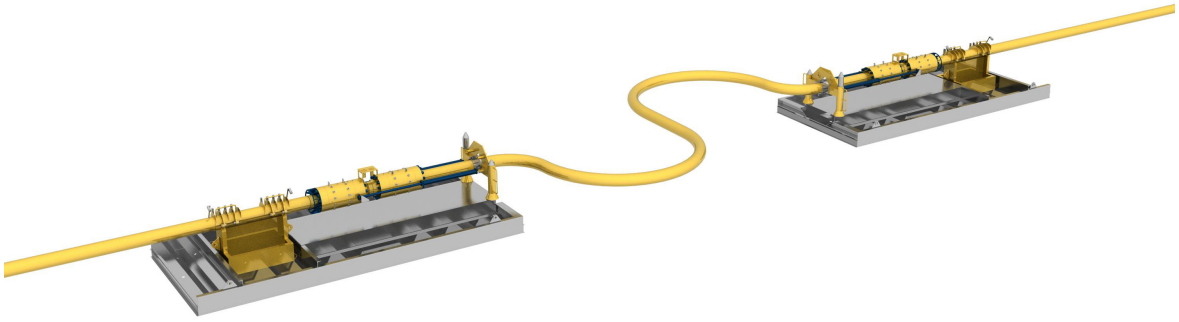
Hydraulic Double Grip and Seal Connector (HDGSC)

The HDGSC is an ideal solution where a diverless solution is required to complete subsea spool piece repair. Installation of the HDGSC to complete a deepwater pipeline repair is achieved by:

- Lifting and supporting the damaged pipeline using a mechanical pipe lift frame
- Removal of coating from damaged section of pipe
- Verification of ovality and straightness of pipe section
- Cutting and removal of pipeline to be replaced
- Completion of metrology on existing pipeline
- Deployment of pre-fabricated horizontal jumper fitted with an HDGSC on each end
- ROV actuation of hydraulic cylinders on the HDGSC to enable correct positioning on each pipe end
- Verification of alignment of the connectors and jumper
- ROV actuation of setting and sealing of the HDGSC gripping mechanisms onto the pipe ends
- Completion of annulus pressure testing prior to full engagement of the gripping mechanisms







Design Parameters
Nominal Pipe Size (NPS): any API specification 5L pipe, wall thickness, and grade
Service: Standard (i.e. crude oil, natural gas, hydrocarbons, water, or chemical injection, etc.)
Design Pressure Rating and Applicable Dimensions: ASME, MSS, or API
Design Temperature Range: 25°F to 250°F / -4°C to 121°C

Material Specifications	
Housing	AISI 4140 forging, quenched and tempered
End cap	AISI 4140 forging, quenched and tempered
Pistons	AISI 4140 forging, quenched and tempered
Slips	AISI 8630 case hardened
Seals	Viton-B, or customer specified
Studs and nuts	ASTM A193 Gr. B7 studs and ASTM A194 Gr. 2H heavy hex nuts, all XYLAN coated (i.e. PTFE, dark blue)
External coating	Carboline® 890 Marine Epoxy Paint System, safety yellow color

Applicable Design Codes, Standards, and Specifications (latest editions)
PCRS Hydraulic Double Grip and Seal Connector Drawings, Bill of Materials (Controlled Copies,) and Vendor Supplied Material Test Reports
ISO 9001:201 Quality Assurance – Quality Control Procedures and PCRS Operating Procedures
Oceaneering Subsea Coating Specification
ASME Boiler and Pressure Vessel Code, Section VIII, Division 1 and 2
ASME B31.4, Pipeline Transportation Systems for Liquid Hydrocarbons and Other Liquids
API 5L, Specification for Line Pipe
API 6A, Specification for Wellhead and Christmas Tree Equipment
API 6H, Specification on End Closures, Connectors and Swivels
API RP 1111, Design, Construction, Operation, and Maintenance of Offshore Hydrocarbon Pipelines

Certifications
ISO 9001:2015 – World Certification Services Ltd. – Accredited by UKAS Quality Management
Det Norske Veritas (DNV) – per unit basis

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