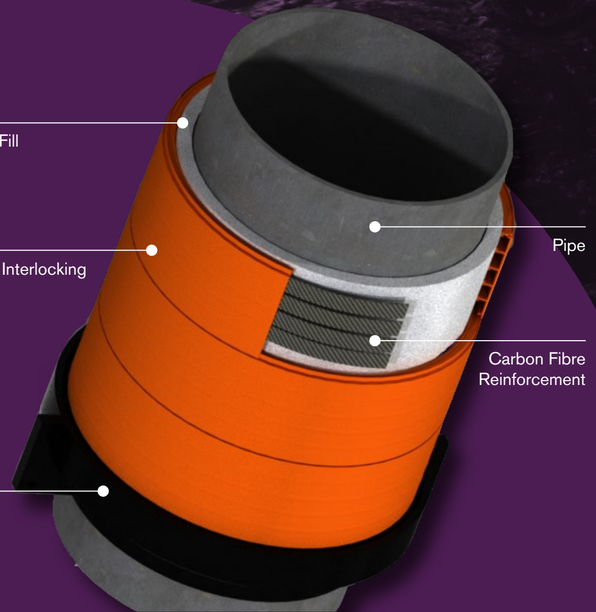
DIAGRAM:
SECTIONAL CUT-OUT DETAIL



Client Lists

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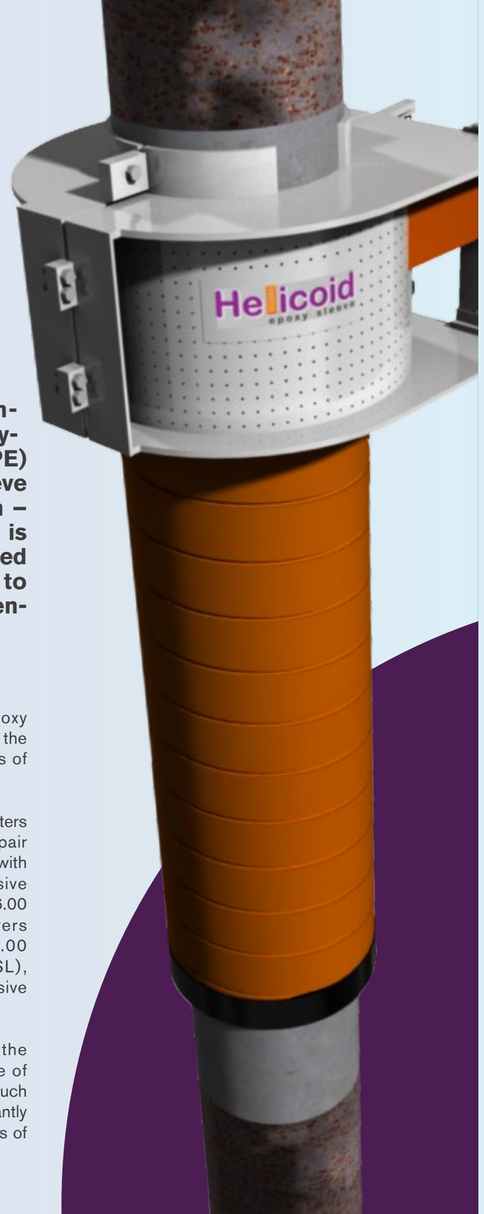
Helicoid™ epoxy sleeve

Full-composite Epoxy Sleeve Designed for Strengthening and Protection of Offshore Risers & Conductors.

ISO 9001:2015 CERT NO.: 768295

Technologically Advanced & Innovative | Diver-less & Online Installation | Cost Effective | Verified as per ASME PCC-2

Redefining Pipeline Repair Technology



The Helicoid Epoxy Sleeve™ is a helically-wound, carbon-fibre reinforced, mechanically-interlocking Polyethylene (PE) strip. The Helicoid Epoxy Sleeve creates an annulus of 25mm – 40mm around the pipe, which is filled with a specially formulated epoxy or cementitious grout to provide outstanding strengthening & protection qualities.

Designed, tested and certified in accordance with the ASME PCC-2, the Helicoid Epoxy Sleeve is an accepted repair method under the ASME B31.4 & ASME B31.8S, for repairs of external wall thinning, dents and gouges.

The Helicoid Epoxy Sleeve, available in diameters from 150mm to 750mm, is a diver-less repair system for defective risers and conductors with specific focus on the abrasive and corrosive splash zone area. With a nominal length of 6.00 meters, the Helicoid Epoxy Sleeve covers approximately 3.00 meters above and 3.00 meters below the Mean Sea Level (MSL), ensuring a more effective and comprehensive repair and strengthening system.

The innovative, diver-less installation of the Helicoid Epoxy Sleeve eliminates the use of divers and support vessels. It is thereby a much more cost effective solution and more importantly eliminates the risks, hazards and safety issues of a conventional diver & vessel solution.

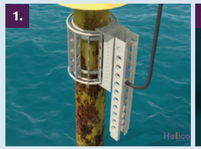
Typical Installation Sequence on a Riser or Conductor

A. Surface Preparation

The installation of the Helicoid Epoxy Sleeve begins with Surface Preparation of the Riser or Conductor, capable of removing rust, neoprene liners & coatings, as well as marine growth up to 3.00m below the Mean Sea Level (MSL), without the intervention of divers or support vessels.

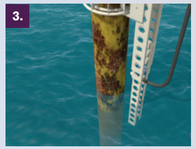
The lightweight, modular and semi-autonomous system allows for full, circumferential movement and cleaning, and can be installed by a crew of 2 technicians. It is capable of achieving surface cleanliness up to Industrial Hydroblasting Standard SSPC-SP-12-WJ3 by means of ultra-high pressure water-blasting.

The progress of the surface preparation can be monitored using underwater cameras.

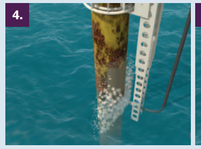


Installation of the Helicoid Surface Preparation System

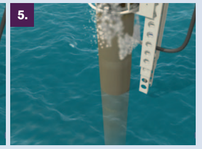
The telescopic extension allows for underwater cleaning of the riser or conductor



The telescopic extension is retracted, allowing for cleaning in stages.



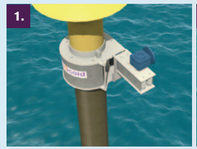
Surface preparation of the pipe above the water



The riser or conductor is fully cleaned up to bare metal

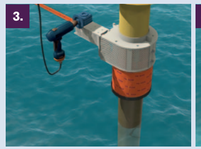
Surface preparation for past projects

B. Winding of the Sleeve

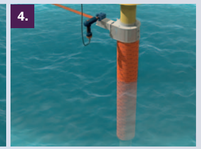


Installation of the winding cage

Insertion of PE strip to begin initial winding process

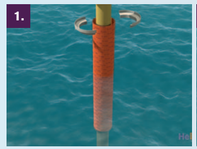


The bottom End cap is attached

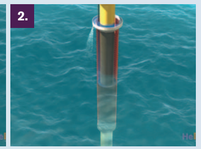


The sleeve is then wound to its full, required length

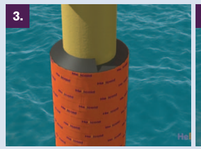
C. Grouting Process



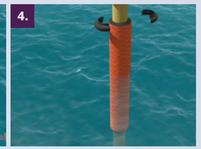
"Grout collector" is placed to prevent spillage



Application of Epoxy or Cementitious grout, through tremie method



Completed filling of the sleeve annulus



The top End cap is placed

Certified Tests for the Helicoid Epoxy Sleeve

Tests for Carbon-Fiber Strip

- ASTM D3039 : Tensile Properties
- ASTM D3039 : Poisson's Ratio
- ASTM D5379 : Shear Properties
- ASTM D790 : Flexural Properties
- ASTM E831 : Coefficient of Thermal Expansion
- ASTM D3418 : Glass Transition Temperature
- ASTM D3165 : Lap Shear Strength Carbon-Fibre to Epoxy

Tests for Epoxy Grout (HC 68)

- ASTM C579 : Compressive Strength
- ASTM C580 : Flexural Strength Modulus of Elasticity
- ASTM D4541 : Pull-Off Adhesion
- ASTM D3165 : Lap Shear Strength to Steel
- ASTM C531 : Linear Shrinkage and Coefficient of Thermal Expansion
- ASTM D6604 : Glass Transition
- ASTM C413 : Water Absorption
- ASTM G42 : Cathodic Disbondment
- ASTM D648 : Heat Deflection Temperature
- ASTM C1202 : Rapid indication of grout resistance to chloride ion penetration
- BS EN-12390-8 : Depth of Penetration of Water under Pressure

Tests for High-Density Polyethylene (HDPE) Strip

- ASTM G154 : UV Resistance
- ASTM E96 : Water Vapor Transmission Rate

Hydrostatic Pressure Tests

- Hydrostatic Pressure Test – Short Term
- Hydrostatic Pressure Test – Survival (1,000 hours)
- Hydrostatic Pressure Test – Test to Burst
- Hydrostatic Pressure Test – Leaking Pipe

Benefits of the Helicoid Epoxy Sleeve™

- **Cost-effective repair system**
- **Provides Strengthening & Protection for offshore Risers & Conductors**
- **Diver-less installation for the splash-zone area, up to 3.00m below Mean Sea Level (MSL)**
- **Simple & fast, online installation**
- **Range of diameters from 6" to 30"**
- **Lengths of up to 10.00m**
- **Pre-engineered and off-the-shelf product**
- **Corrosion and Impact resistant**
- **Tested in accordance with ASME PCC-2 and independently verified by Lloyd's Register**