CLOCK SPRING

CONTOUR

ENGINEERED REPAIRS FOR PLANT, REFINERY & TERMINAL APPLICATION

Clock Spring® Contour is an engineered, wet applied repair system featuring bi-axial or quad-axial stitched fiberglass cloth applied in a wet-lay system with two-part epoxy and a filler material.

- Available in multiple kit-sizes for any diameter pipe
- Engineered repairs are designed by our skilled technicians following ISO or ASME guidelines.
- Ideal option for repairs involving complicated geometry situations such as tees, flanges, & varying diameter pipe.

No pipe cutting or welding is necessary, with repairs only requiring a cold-work permit.

Clock Spring® Contour is regularly used in plants, refineries, tank farms, terminals & offshore locations around the globe.

- **Engineered Repair Design Report (ISO or ASME) is Available**
- **Installation Kit includes Necessary Job Tools**
- **Kits Available in Multiple Sizes to Fit Your Job**
- **Cloth is Stitched, not Crimped, to minimize creep with Quad or Biax Fabric Available Depending on Geometry of Repair**

PROCESS PLANT, REFINERY AND OFFSHORE PIPE REPAIRS

An engineered repair designed using Clock Spring® Contour will help ensure your repairs are applied quickly and get you safely to the next scheduled turn-around.

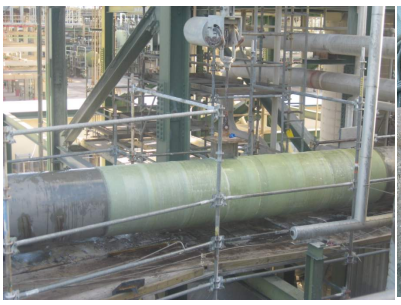
OFFSHORE CAISSON LEAK REPAIR

Clock Spring® Contour can be used for leak repair, even challenging environments with complicated pipe architecture and design.

REPAIR WITH VALVE FEATURE

Facilities often feature complicated design of pipe works with tees, flanges and valves. Clock Spring® Contour is very useful for a quick, economical repair in these applications.






CONTOUR by CLOCK SPRING®

Clock Spring® Contour is a wet wrap repair which is suited to a variety of different geometries including bends, tees and reducers. All Contour repairs are designed following the guidelines of ISO TS 24817 or ASME PCC-2. Repairs can be used as a pressure containing repair to seal leaks or as a reinforcing repair to restore the strength of a pipe in the axial and circumferential directions. Clock Spring® Contour can be installed with minimal disruption to the operation of a pipe, and normally only requires a cold work permit to complete the installation, as only hand tools are used.

SERVICE TEMPERATURE	*Contact Clock SpringCompany, L.P. for severe temperature application & service.*	-67˚ to 275˚ F	-55˚ to 135˚ C

CLOCK SPRING CONTOUR ISO TS 24817 QUALIFICATION DATA	***For Quad Fabric***		***For Biax Fabric***	
QUALIFICATION REQUIREMENT	**RESULT**	**RESULT**	**RESULT**	**RESULT**
Ply or Layer Thickness	2.1mm	0.0827 inch	2.1mm	0.0827 inch
Tensile Modulus (Circumferential)	11.0 GPa	1.60 x 10^6 psi	9.1 GPa	1.32 x 10^6 psi
Tensile Modulus (Axial)	10.8 GPa	1.57 x 10^6 psi	14.4 GPa	2.09 x 10^6 psi
Tensile Strain to Failure (Circumferential)	1.8%	1.8%	2.7%	2.7%
Tensile Strain to Failure (Axial)	1.9%	1.9%	1.8%	1.8%
Tensile Strength (Circumferential)	147 MPa	21.3 ksi	138 MPa	20.1 ksi
Tensile Strength (Axial)	149 MPa	21.6 ksi	153 MPa	22.3 ksi
Thermal Expansion Coefficient (Circumferential)	15.7 x 10^{-6} ° C^{-1}	8.7 x 10^{-6} ° F^{-1}	25.6 x 10^{-6} ° C^{-1}	13.9 x 10^{-6} ° F^{-1}
Thermal Expansion Coefficient (Axial)	15.7 x 10^{-6} ° C^{-1}	8.7 x 10^{-6} ° F^{-1}	20.0 x 10^{-6} ° C^{-1}	11.0 x 10^{-6} ° F^{-1}
Poisson's Ratio (Circumferential)	0.29	0.29	0.07	0.07
Poisson's Ratio (Axial)	0.30	0.30	0.11	0.11
Shear Modulus (Resin)	1.1 GPa	0.159 x 10^6 psi	1.1 GPa	0.159 x 10^6 psi
Barcol/Shore Hardness	82.5 shore D	82.5 shore D	82.5 shore D	82.5 shore D
Glass Transition	99˚ C	210˚ F	99˚ C	210˚ F
Lap Shear Strength to Steel	10.0 MPa	1450 psi	10.0 MPa	1450 psi
Aged Lap Shear Strength (1000 hours in 93˚ C water)	9.3 MPa	1349 psi	9.3 MPa	1349 psi
Fracture Toughness, LCL	149 Jm^{-2}	0.851 in lbf/in^2	149 Jm^{-2}	0.851 in lbf/in^2

Find Field Reports, Testing Validations and More at www.ClockSpring.com

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