LOCTITE®

CSNRI

COMPOSITE SOLUTIONS *FOR TRANSMISSION PIPELINE*

Henkel

Henkel Adhesive Technologies

WHO WE ARE

CSNRI is the leader of innovative composite repair and maintenance solutions. We simplify asset and environmental stewardship and help drive global economies, delivering safe, sustainable solutions for the construction, maintenance, and emergency repair of critical infrastructure. Our composite construction and repair solutions have been deployed in 75 countries and include industry standard products such as Clock Spring, Atlas, A+ Wrap, SynthoGlass XT, ThermoWrap, and DiamondWrap composite products.

We support our products with best-in-class design, engineering, testing, and training services to ensure proper installation and optimal performance. Our industry-leading products are **easy to install**, **cost-effective to deploy, and durable for decades.**

INDUSTRY-LEADING SOLUTIONS FOR FOR PIPELINE

CSNRI pipeline repair systems are the most robust and best tested in the industry. Through repeated testing and on-going innovation, the pipeline solutions portfolio can address a wide range of defects and overcome many repair challenges. Our industry-leading solutions are a safer and more sustainable alternative to other technologies and repair options. Composite repairs reduce the most hazardous variables in pipeline integrity operations – primarily welding and lifting. By reducing many of the risks associated with these and other physical hazards, composites are increasing the safety of field personnel. Composites are also more sustainable, since they remove the need to vent or purge the pipeline, which reduces GHG emissions.

ADDRESSABLE DEFECTS

- Corrosion / Erosion
- Dents / Wrinkle Bends
- Cracks or Crack-Like Features
- Seam and Girth Weld Defects
- Manufacturing Defects
- Gouges / Metal Loss

TESTED FOR PIPELINES

- With high continuous pressure
- With high cyclic pressure lines
- With high temperatures ranges
- Above ground or buried
- Near- or Underwater lines
- Under axial or bending loads
- Located in Geohazards

TECHNICAL SUPPORT

- Deliver world class training and in-field support
- Provide responsive and on-demand service

ENGINEERING EXPERTISE

- Assess challenges and recommend customized solutions
- Leverage multiple technology platforms with delivery systems
- Provide in-depth documentation and third-party validation

PROJECT OPTIMIZATION

- Lower total project cost
- Improve contractor productivity
- Extend life cycle

CRACKS

DENTS

WRINKLE BENDS

GEOHAZARD

For information on our full range of superior solutions, please contact your local representative.

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CORE TRANSMISSION PIPELINE PRODUCTS

Family Brand	Product Name	Defects Addressed	Additional Benefits	Per Ply Thickness	Max Temperature	Fabric Description	Resin Description
Clock Spring	Clock Spring	Metal Loss, Small Deformations	Pre-Engineered for most defects	0.0625 in. (1.6 mm)	201°F (94°C)	Unidirectional Fiberglass 8 layers in one coil	Pre-cured Polyester
	SnapWrap		Can be installed with limited site access			Unidirectional Fiberglass Applied 1 layer at a time	
A+ Wrap	A+ Wrap	Metal Loss, Small Deformations	Fast and easy on small diameters	0.014 in. (0.35 mm)	194°F (90°C)	Bi-directional fiberglass	Moisture-cured Polyurethane
	A+ Max		Intended for large diameters	0.027 in. (0.69 mm)		Tri-directional fiberglass	
Atlas	Atlas	Large deformation and crack/crack-like features	Focus on reducing hoop stress in pipe	0.017 in. (0.43 mm)	180°F (82°C)	Bi-directional carbon fiber	High-strength epoxy
	Atlas MT				331°F (166°C)		
	Atlas UA	Axial Dominated, Large Deformations, Crack / Crack Like	Focus on reducing axial stress in pipe	0.016 in. (0.41 mm)	180°F (82°C)	Unidirectional (axial) carbon fiber	

DEFECT TYPE OVERVIEW	
Metal Loss:	Corrosion | Internal wall loss | Gouges | Minor manufacturing defects | Abrasion
Deformation	Plain Dents | Dents on weld | Dent with wall loss | Buckles | Ovality concerns | Wrinkle Bends (hoop)
Crack / Crack Like:	Seam-weld anomalies | SCC | Plain body cracks | Laminations | Severe manufacturing defects | SSWC | Hard Spot | Arc Burns
Axial Dominated	Girth weld anomalies | CSCC | Geohazards | Bending loads | Thermal cycling | Wrinkle Bends (axial)

PIPELINE DEFECT MATRIX

	Metal Loss					Deformation*						Crack-Like*							
	External	Internal	Gouge	Girth Weld	Corrosion Near Seam Weld	Plain Dent	Dented Girth Weld	Dent w/ Interacting Metal Loss/Gouge	Buckle	Wrinkle, Ripple	Ovality	Seam Anomalies (LOF, Planar, Hook)	SCC	SSWC	Laminations	Arc Burns	Hard Spot	CSCC	Girth Weld
Clock Spring	●	◔	●	●	●	●	●	●				◷	◷		◷				
A+ Wrap	●	◔	●	●	●	●	●	●											
Atlas	●	◔	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

*Permanency is dependent on defect size and cyclic profile

● Permanent (50+ years) ◷ Temporary ◔ Permanent only if defect is mitigated

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