

CarbonSeal™ HT1

CarbonSeal™ HT1 is a high strength bi-axial carbon composite system used for strengthening damaged or corroded piping systems and vessels. CarbonSeal™ HT1 is designed to withstand elevated temperatures and harsh chemicals. CarbonSeal™ HT1 conforms to ASME PCC-2, ISO 24817, API, DOT and ASME B31 for non-metallic repairs.

Common Applications

- Flare Line Repairs
- Cooling Water Piping
- Blow Down Lines
- Chemical Processes
- Internal / External Corrosion
- Weld Defects
- Soil to Air Interface Corrosion
- MIC

Benefits

- Unmatched Strength per ply = less layers, reduced cost, and faster installations
- No post-cure required
- Conforms to tees, elbows, and straights
- All Diameters
- Wide range of temperature and chemical resistance
- Can be machine saturated for large projects
- Custom packaging to handle any scope of work.

Typical Data & Physical Properties

Shelf Life & Storage Conditions	2 years in original factory sealed container. Store dry. Do not over stack boxes.	
Color	Black	
Heat Distortion Temperature HDT (ASTM D648)	440°	227°C
Tensile Strength in Circumferential and Axial Directions (ASTM D3039)	77,000 psi	530 MPa
Young's Modulus in Circumferential and Axial Directions (ASTM D3039)	5,662 ksi	39,038 MPa
Poisson's Ratio (ASTM D3039)	0.091	
Elongation @ Break (ASTM D3039)	2.70%	
Single Ply Thickness	0.051 inches	1.30 mm
Lap Shear (ASTM D3165)	3,417 psi	23.6 MPa
Shear Modulus (ASTM D5379)	508,000	3,503 MPa
Flexural Strength (ASTM D790)	17,200 psi	118,590 kPa
Flexural Modulus (ASTM D790)	3,611,000 psi	24,897 MPa
Service Temperature Per ASME PCC-2 & ISO/TS- 24817	A' Non-Leaking 348°F	B' Leaking 330°F
Shore D Hardness (ASTM D2240)	78	
Thermal Expansion (ASTM E831)	3.65 x 10 ⁻⁶ in/in-deg F	6.57 x 10 ⁻⁶ m/m-deg C

Installation Procedures for CarbonSeal™ HT1

Design Specifications

Certified Installer Company Name

Certified Technician(s)

HJ3 Design Case #

Project Name

Diameter (inches)

Length of Repair (inches)

Total Layers

Material Handling & Storage

Product was stored between 65°F (18°C) and 80°F (27°C)

Packing Slip has been verified against order and design calculations

Record	Primer	Filler	ShapeShift	Saturant	Fabric	Top Coat
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Item Code

QTY

Lot #'s

EXP Date

Environmental Conditions

Skin Temperature of Pipe Use an infrared thermometer to obtain value and record below:
_____ (°F) _____ (°C)

Ambient Temperature Use a digital temp gauge to obtain value and record below:
_____ (°F) _____ (°C)

Dew Point Use a dew point meter to obtain value and record below:
_____ (°F) _____ (°C)

Skin Temperature of Pipe



CARBON SEAL™

HT1



- Skin Temp _____ (°F) _____ (°C) -Dew Point _____ (°F) _____ (°C)
- VALUE _____ (°F) _____ (°C)

Installation

Prime the pipe with 5-10 mils CarbonSeal™ HT1 Primer

- Start by pouring the entire contents of Primer Polymer Part B into the container marked Part A. Mix for 3 minutes using a low-speed drill at 400-600 RPM. Using a brush or roller nap apply the primer to 100% of repair area. No dry spots shall be visible in the prepared area.

Fill Pits & Smooth Transitions CarbonSeal™ HT1 Filler

- Start by pre-mixing the Part A for 3 mins until completely smooth and consistent. Then pour the entire contents of Filler Part B into the container marked Part A. Mix for 3 minutes using a low-speed drill at 400- 600 RPM. Apply high modulus paste to fill pits and or transition existing “stop gaps” like clamps, plugs or patches. All pits shall be filled and high spots but must be smoothed using a 3:1 transition.

Saturate the carbon fabric CarbonSeal™ HT1 Saturant

- Start by pouring the entire contents of Saturant Polymer Part B into the container marked Part A. Mix for 3 minutes using a low-speed drill at 400-600 RPM. Unwrap the carbon fabric from its packaging. Unroll the carbon and prepare for wet-out and keep foreign matter off of the dry fabric. Use a brush, roller nap, or spatula to fully wet out the carbon fiber on both sides. Roll the wet carbon fiber onto a clean core.

Apply saturated CarbonSeal™ HT1 to primed & prepared surface

- After saturating, press the saturated fabric on to the substrate and using a roller apply pressure to the surface of the fabric to ensure good bonding. Roll out any trapped air before the polymer sets. Smooth bidirectional fabric from center to the edge with roller in all directions to remove air pockets. For multi-layer applications, the second and subsequent layers of saturated fabric are applied in the same direction as the first layer. For piping repairs, spiral or circumferential application methods should be used to achieve a 50% overlap, building 2 layers per pass. Layers shall be applied per design calculations using correct overlaps. All bubbles, voids, and fiber disruptions shall be removed while fiber is still wet.

Apply CarbonSeal™ Compression Film

- Once fiber is applied, apply 4 layers of compression film in the same direction as the “wet” fabric. Compression film shall be applied to “wet” fabric and can be removed in 12-24 hrs depending on ambient temperature.

Apply ChemSeal™ (or approved) Topcoats

- After all layers of fabric have been installed, apply HJ3 Topcoat or other pre-approved coating. If Saturated CarbonSeal™ HT1 fiber has cured for more than 5 days, for all ChemSeal™ Topcoats, sand lightly to remove gloss, then clean with solvent and damp rag, waiting 20 minutes for solvent to flash. Topcoat shall cover 100% of surface area at min 7-10 mils.



Building Stronger Bonds™

info@hj3.com // 877-303-0453 // hj3.com

Post-Installation Inspection & Repair

- Visual Inspection** A visual inspection shall be performed to detect defects such as but not limited to dry fiber, voids, bubbles, insufficient overlaps
- Acoustic Tap-Test** An acoustic tap test shall be performed to detect voids and delamination between the composite repair and host pipe
- QC Repair** All anomalies requiring repairs shall be performed prior to return to service

Cure

- Pipe Skin Temps < 77°F / 25°C (Shore D of 78 required)** A minimum 72 hours of cure time has been achieved prior to return to service
- For Pipe Skin Temps > 77°F / 25°C (Shore D of 78 required)** A minimum 24 hours of cure time has been achieved prior to return to service

NOTE:

Cure times can be decreased by adding heat to the repair location.
Consult with HJ3 for specific cure schedules associated with elevated temperatures.