

PROTAL 3200CF™

Carbon Fiber/Epoxy Wet-Layup Composite Repair System

Description

Protal 3200CF™ is a high-strength, bi-axial carbon fiber epoxy wet-layup composite repair system engineered to restore or enhance the structural integrity of steel pipelines and associated components. The system is suitable for straight pipe, elbows, tees, reducers, welds, and other complex geometries. Repairs using the Protal 3200CF System shall be installed in accordance with a Denso Engineered Composite Repair (ECR)* design developed per ASME PCC-2 Article 4.1.

The Protal 3200CF Pipeline Repair System consists of:

Protal 3210 - High-modulus, two-part epoxy structural filler used to restore pipe surface geometry, reinforce corroded areas, and establish a continuous load-transfer interface.

Protal 7200 - VOC-free, 100% solids, high-build epoxy providing corrosion protection and a bonding surface for the composite laminate.

Protal 3200CF Wrap - Dry carbon fiber fabric that is saturated in the field with two-component Protal 3220, a two-part epoxy saturant, to form the structural laminate defined in the ECR design.

* Engineered Composite Repair (ECR): A project-specific design that defines laminate thickness, layer count, wrap orientation, and repair length in accordance with ASME PCC-2 Article 4.1 based on pipeline operating conditions and defect data.

Uses

- External corrosion and pitting
- Gouges, scratches, dents, and mechanical damage
- Gouges, scratches, dents, and mechanical damage
- Suitable for straight pipe, elbows, tees, reducers, and non-standard geometries

Features

- Engineered composite reinforcement system
- High-modulus epoxy filler for optimal load transfer
- Zero VOCs
- Protal 7200 as High-build corrosion barrier epoxy
- Wet-layup carbon fiber system for maximum structural performance
- Maximum operating temperature: 140°F (60°C)



TECHNICAL DATA SHEET

Surface Prep

Surface Preparations for the Protal 3200CF Repair System shall be performed only by personnel trained and certified by Denso.

Prepare surfaces by abrasive blasting to a clean near-white finish in accordance with SSPC-SP10 / NACE No. 2 / Sa 2½. Use an appropriate abrasive media to achieve a 2.5 - 5 mil (63.5 - 127 microns) surface profile. Remove all contaminants prior to coating. Oil and grease shall be removed in accordance with SSPC-SP1 using a non-oily solvent such as xylene, MEK, ethanol, or an equivalent cleaner. Allow 1-2 minutes for solvent flash-off. After surface preparation, mark and tape the designated repair area in accordance with the Denso ECR Design to define the Protal 3210 filler and Protal 7200 application zone. Verify that final defect dimensions are within the Denso Engineered Composite Repair (ECR) Design parameters.

Application

Installation of the Protal 3200CF Repair System shall be performed only by personnel trained and certified by Denso.

Apply Protal 3210 Load Transfer Filler: Mix Parts A and B thoroughly. Apply the filler to pits, dents, corrosion cavities, and irregular surfaces, ensuring all defect edges are fully filled. Allow the filler to set until it holds its shape and will not shift when Protal 7200 is applied, while remaining tacky to promote proper bonding.

Apply Protal 7200 Corrosion Barrier Epoxy: Apply Protal 7200 Corrosion Barrier Epoxy: Independently mix Part A (resin) and Part B (hardener) prior to combining. After adding Part B to Part A, mix at a slow speed until a uniform, constant color is achieved, making sure all sides and the bottom of the container are scraped. Apply the mixed material onto the prepared surface using a brush, trowel, Denso applicator pad, or roller. Apply to a recommended wet-film thickness of 25 - 30 mils (635 - 762 µm) and verify thickness using a wet-film gauge. If the surface temperature falls below 50°F (10°C), preheat the substrate to promote curing. Preheating may be achieved with a propane torch or induction coil. Resin and hardener components shall be kept warm (minimum 60°F / 15°C) to ensure proper mixing. For complete installation requirements, refer to the Protal 7200 Application Specifications.

Apply the Protal 3200CF Carbon Fiber Wrap: Mix Part A and Part B of Protal 3220 Epoxy Saturant until a uniform, streak-free color is achieved. Saturate the dry Protal 3200CF Carbon Fiber Fabric with the mixed Protal 3220 Epoxy Saturant on a clean wet-out table. Apply resin to both sides of the carbon fiber fabric using a paint roller or squeegee. Make proper cuts to the saturated fabric if recommended by Denso. Apply the saturated carbon fiber fabric to the pipe while the Protal 7200 epoxy remains tacky. If Protal 7200 has fully cured, lightly abrade the surface before installing the composite wrap. Wrap under uniform tension, following the layer count, overlap, and fiber orientation specified in the Denso ECR design.

Install Denso ILI Markers and Consolidate the System: Place Denso ILI Markers (magnets or steel bands) between wrap layers as specified in the ECR design. These markers may be required to ensure the repaired area can be located during future in-line inspections. Apply 4 to 6 layers of Denso Poly-Wrap under tension to consolidate the laminate and allow the system to cure for 3 to 8 hours, depending on temperature. Perforate the Poly-Wrap as needed to relieve trapped moisture. Remove the Poly-Wrap after the composite has cured.

TECHNICAL DATA SHEET

Archco 15 or 65 Topcoat (When Required): For UV-exposed above-ground applications, topcoat the cured composite with Archco 65 or Archco 15. For buried applications, the Protal 3200CF System provides complete protection as installed

Optional Outerwrap: Denso ViscoWrap or Densyl Tape may be applied when preferred by the client or when required by project specifications for additional mechanical or environmental protection.

**Please contact a Denso representative for any installation training needs or technical questions.*

Storage

Protal 7200, Protal 3210 and Protal 3220: Store in a dry, well-ventilated area between 41°F (5°C) and 90°F (32°C) in original, unopened packaging. Do not store in direct sunlight. Shelf Life of 2 years (24 months) from manufacturing date when stored as instructed.

Protal 3200CF Wrap: These dry carbon fiber fabric should be stored in a dry, well-ventilated area. Keep out of direct sunlight prior to installation, as carbon fiber may get very hot, speeding up the chemical reaction of the Protal 3220 Epoxy Saturant that is impregnated into it, reducing working time.

HSE

Wear protective clothing and ensure adequate ventilation. Avoid contact with skin and eyes. See Safety Data Sheet (SDS) for further information.

Packaging

Protal 3200CF Carbon Fiber Rolls are supplied in sizes 2" (50.8 mm), 4" (101.6 mm), 6" (152.4 mm), and 12" (304.8 mm) wide and lengths of 5' (1.5 m), 15' (4.57 m), 30' (9.14 m), or 60' (18.3 m).

Protal 7200 is supplied in size 1 Liter (1 Quart). Protal 3220 Epoxy Saturant is supplied in size 0.5625 liter (0.5 Quart). Protal 3210 Filler is supplied in sizes 0.5 Pint (8 oz) and 1 Pint (16 oz). Other sizes available upon request.



TECHNICAL DATA SHEET

Tech Data

Properties	Imperial	Metric
Ply Thickness	0.038"	0.97 mm
Tensile Strength (ASTM D3039)	114,500 psi	790 MPa
Ultimate Tensile Strain (ASTM D3039)	8.00%	8.00%
Elasticity Modulus (ASTM D3039)	9.32 Msi	64.27 GPa
Filler Compressive Strength (ASTM D695)	12,600 psi	86 MPa
Filler Compressive Modulus (ASTM D695)	556,000 psi	3,834 MPa
Cathodic Disbondment (ASTM G95)	Completed	Completed
Installation Temperature – Min	50°F	10°C
Installation Temperature – Max	120°F	48°C
Max Operating Temperature	140°F	60°C



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