# TECHNICAL DATA SHEET

# Denso Bore-Wrap®

**Field-Applied Abrasion Resistant Outerwrap (ARO)**

## Description

Denso Bore-Wrap is an Abrasion Resistant Outerwrap (ARO) that has excellent performance against impact, gouge, abrasion, and fracture to protect anti-corrosion coatings during pipeline installations in difficult terrain or by means of trenchless installation methods such as directional drilling, HDD or boring. Denso Bore-Wrap creates an abrasion resistant, sacrificial outer laminate which protects pre-approved field joint coatings and mainline coatings such as epoxies, shrink sleeves, 3LPE, 3LPP and FBE.

## Uses

Field-applied ARO. Minimizes the need for spot repairs or re-pulling pipe from damage, while providing the best mechanical protection of the underlying field-joint and/or mainline coatings.

## Features

- Prevents coating damage
- Rapid application and cure time
- No mixing or VOCs
- Tapered surface profile
- Outstanding abrasion, gouge and impact resistance
- Resistant to aggressive soil conditions

## Surface Prep

Follow the anti-corrosion coating manufacturer's recommended installation procedure. When using a two-part epoxy resin system as the anti-corrosion coating, Denso Bore-Wrap should be applied within the manufacturers re-coat window to minimize additional surface preparation requirements. Roughen existing coating to degloss before application of Denso Bore-Wrap, where required. Do not open the foil pouch containing Denso Bore-Wrap until you are ready to use product.

## Application

For field joint coating protection, begin wrapping 6" (150mm) in front of the field joint coating and move back toward the end of the pipe.

For mainline application, the wrap will start at the pipe closest to the installation point and move back toward the end of the pipe.

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## Application

With the randomized angle matting surface facing out and the woven structure (checkerboard) side of the fiber placed facing the surface of the pipe, wrap the material circumferentially to begin. Ensuring that the leading edge has a minimum of 2 layers (100% overlap). Proceed to spirally wrap with a minimum 50% overlap, spraying each layer with water as it is applied. When more than one roll is necessary to complete the application, ensure to begin the next roll 6" (150mm) over the end of the prior roll while it is still wet. Continue application until the wrap has extended to the end of the mainline or 6" (150mm) beyond the field joint coating. Finish with a 2-layer (100% overlap) final wrap-around circumferentially and end with the fiber on top of the fiber to ensure a single layer is not hanging from the back.

At the completion of each roll, ensure the wrap is completely saturated with water and then immediately begin wrapping Denso Poly-Wrap™ in the same direction the layers of Denso Bore-Wrap were applied, compress it quickly and with tension. The Denso Poly-Wrap should have slight necking from the tension. Extend Denso Poly Wrap beyond each end of the Denso Bore-Wrap by at least 2 inches (50 mm) to ensure the ends lay flat, and the resin can be retained. 2 to 3 passes with Denso Poly-Wrap should suffice. Once compressed, use the Denso Perforating Tool to puncture the Denso Poly-Wrap. This will allow for excess resin, moisture, and $CO_2$ from the reaction to escape. Perforate using enough pressure to get through the Denso Poly-Wrap but not through the layers of Denso Bore-Wrap. Denso Poly-Wrap should be left in place to provide UV stability of the Denso Bore-Wrap.

When the material has fully cured and immediately prior to installation, the Denso Poly-Wrap must be removed. Cure can be checked by using a Shore D gauge on a high point of the resin (avoid measuring near ridges and fibers as the gauge tip can move). The product is ready to be used at a Shore D of 65 or greater.

COLD WEATHER INSTALLATIONS: Follow the procedure, however, use ethylene glycol or propylene glycol in the sprayer 30% to 50% with the water to prevent freezing and to progress the curing process. Bore-Wrap will not cure on its own at temperatures below 41˚F (5˚C).

HOT WEATHER INSTALLATIONS: Follow procedure; however, use ice water in the sprayer to slow down the curing process, thus allowing the installer more working time.

## Storage

Store in original, unopened packaging at 41°F (5°C) and 90°F (32°C). Bore-Wrap is sensitive to temperature and when stored above the recommended storage temperature for long periods of time the shelf life of the product could be reduced. Do not open bag containing Bore-Wrap until you are ready to use it, as Bore-Wrap cures when exposed to atmospheric moisture/humidity. Care must be taken when handling the sealed bags to prevent puncturing or scuffing. If the protective foil pouch is punctured, the composite wrap will cure within the sealed foil pouch.

## Shelf-Life

1 year (12 months) when stored in original packaging at 41°F (5°C) and 90°F (32°C).

## HSE

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

## Packaging

Denso Bore-Wrap is supplied in sizes 6" (150 mm) or 10" (250 mm) wide and lengths of either 20' (6 m), 30' (9 m) or 50' (15.2 m). The material is sealed in a nitrogen filled foil bag and boxed in quantities depending on roll size.

| Roll Width | Roll Length | Rolls*/ Case | Coverage with 50% Overlap | Recommended for Pipe Diameters of: |
|---|---|---|---|---|
| in. | ft. | ea. | ea. | in. (mm) |
| 6" (150 mm) | 30' (9 m) | 6 | 7.5 $ft^2$/roll (0.69 $m^2$/roll) | 4 in - 16 in (100 mm - 400 mm) |
| 10" (250 mm) | 20' (6 m) | 5 | 8.3 $ft^2$/roll (0.77 $m^2$/roll) | > 16 in (> 400 mm) |
| 10" (250 mm) | 30' (9 m) | 4 | 12.5 $ft^2$/roll (1.16 $m^2$/roll) | > 16 in (> 400 mm) |
| 10" (250 mm) | 50' (15.2 m) | 3 | 20.8 $ft^2$/roll (1.93 $m^2$/roll) | > 16 in (> 400 mm) |

# TECHNICAL DATA SHEET

## Tech Data

| Properties | Value |
|---|---|
| **Thickness (ISO 21809-3 Annex B)** | 41 mils/layer (1,041 microns/layer) |
| **Impact (RP 0394)** | 113.9 joules |
| **Gouge Depth (CSA Z245.20 Clause 12.15)** | 24 mils (609 microns) 50kg double burr |
| **3 mm Gouge Tip (NFPCA HDD Load to Penetrate)** | 625 kg |
| **10 mm Gouge Tip (NFPCA HDD Load to Penetrate)** | 2000 kg |
| **Flexibility (CSA Z245.20 Clause 12.11)** | >3 deg/PD |
| **Abrasion Resistance (ASTM D4060 C17 Wheel)** | 40,164 cycles/ply |
| **Fracture Toughness Testing (ASTM E1922)** | 21.1 MPa m1/2 |
| **TG** | 268°F (131°C) |
| **Tensile Strength (ASTM D638)** | 33,380 psi (230 MPa) |
| **Tensile Modulus (ASTM D638)** | 2,221,978 psi (15,320 Mpa) |
| **Tensile Elongation (ASTM D638)** | 1.66% |
| **Flexural Strength (ASTM D7264)** | 28,300 psi (195 MPa) |
| **Flexural Modulus (ASTM D7264)** | 1,990,000 psi (13,721 MPA) |
| **Compression Strength (ASTM D695)** | 119,000 psi (820 MPa) |
| **Modulus of Elasticity (ASTM D3039)** | 2,221,978 psi (15.32 Gpa) |
| **Shore D (ISO 868 /ASTM D2240)** | 78 (pull back ready at 65) |
| **Specific Gravity (ASTM D792)** | 106.8 lb/ft$^3$ (1.71 g/cm$^3$) |
| **Water Absorption 2h @ 212°F (100°C) (ASTM D570)** | 0.008 oz (0.221 grams) |
| **Water Absorption 24h @ 73°F (23°C) (ASTM D570)** | 0.004 oz (0.102 grams) |
| **Indentation at 10N/mm$^2$ (ISO 21809-3 Annex E)** | No observable damage |
| **Lap Shear (ASTM D5868)** | 2,348 psi (1.63 MPa) |
| **Dielectic Strength (ASTM D149)** | 110 V/mil |
| **Working Time** | 7 minutes |
| **Application Temperature** | 0°F (-17°C) to 200°F (93°C) |
| **Cure Schedule** | 30 minutes 70°F (21°C) - 80°F (26°C) |
| **Shelf Life** | 1 year |


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**DENSO, INC.**

**HOUSTON:**
9710 Telge Road,
Houston, Texas,
U.S.A. 77095
Tel: 281-821-3355
Fax: 281-821-0304

**TORONTO:**
90 Ironside Crescent,
Unit 12, Toronto,
Ontario, Canada M1X1M3
Tel: 416-291-3435
Fax: 416-291-0898

**www.densona.com**

info@densona.com

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