



Protal 7700™

Spray Application Specifications

Introduction

Protal 7700 is a VOC free 100% volume solids, 2 part epoxy, coating specifically formulated to be compatible with FBE coated pipe. Protal 7700 is a high build coating that may be brush/roller or spray applied in a single application either in the field or shop environment. Protal 7700 has very fast curing properties aiding quick handling and back fill times.

Protal 7700 is used on site for the protection of field joints, tie-ins, HDD field joints, FBE repairs, push-rack applications, station piping, fittings and fabrication. It is also used for main line pipeline coating, sacrificial coating for HDD (ARO), road bore pipe and rehabilitation of existing pipelines.

Protal 7700 Features

- Fast touch dry and cure times
- High temperature resistance up to 95°C (203°F)
- High build (up to 1778 microns in one coat)
- Excellent adhesion (compatible with FBE coated pipe)
- Can be used as an abrasion resistant overcoat (ARO)
- Safe and environmentally friendly
- Does not shield cathodic protection
- May be applied by brush, roller or airless spray
- Available in a variety of packaging options
- Exhibits excellent cathodic disbondment results
- Meets AS 4822:2018 specifications

1.0 Scope

- 1.1 This specification covers the external surface preparation and application of pipeline for rehabilitation, welds, directional drill, fittings and fabrication.

2.0 Material and Storage

- 2.1 Material shall be Denso Protal 7700 liquid coating system as supplied by Denso (Australia) Pty Ltd.
- 2.2 Material shall meet the physical properties of the product data sheet. Protal 7700 bulk kits to be supplied in full kits only (800 L kit - 3 x 200 L Part A, 1 x 200 L Part B drums or 80 L kit - 3 x 20 L Part A and 1 x 20 L Part B).
- 2.3 Storage of the material shall be in a warm, dry place at 4°C (40°F) to 41°C (105°F). The containers shall be stored upright. Do not allow material to freeze.

3.0 Application Equipment

- 3.1 At a minimum, equipment shall be a specifically configured heated airless plural component proportioning spray system in either fixed or variable ratio configuration such as the Graco XP (fixed ratio plural component system) series in a 7000 psi capable platform.

- 3.2 Configured system components that are imperative to correct processing and application.

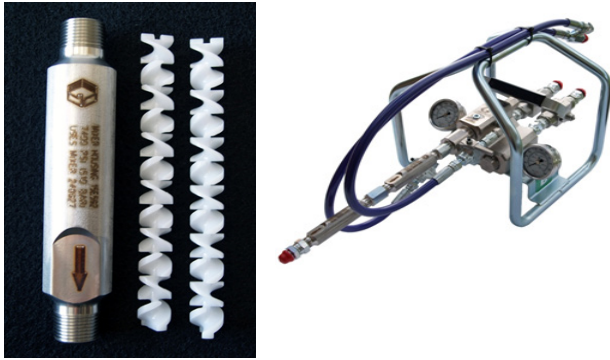
- Pre-conditioning heaters (jackets etc.)
- 200 L drum transfer pumps (for 200 L containers)
- 4000 W - 5500 W primary heaters (Inline A&B)
- Heated hose set capable of maintaining material temperature at 60°C to 65°C to the remote mix manifold
- Adjustable remote mix manifold with solvent flush capability
- 30:1 or 45:1 solvent flush pump
- 9.5 mm (3/8") x 12 element static mixer set for pre-mixing (set of two)
- 6.4 mm (1/4") whip hose (4.5 m / 15' to 7.6 m / 25' with 6.4 mm (1/4") static mixing tip)
- Tip size 19 -27 thou (0.50 - 0.70 mm)
- Third static mixer just before application handpiece (used for final mixing to ensure correct mix)
- Application handpiece with insulated handle
- Pressure monitoring kit
- Ratio check kit



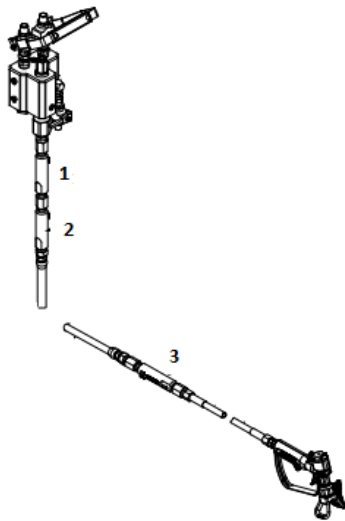
- 3.3 A typical pump pressure range of between 3,500 and 6,000 psi is suitable for spraying, however pressure must be balanced within 200 - 300 psi for both Part A and Part B material. This will depend on the temperature the product needs to be pre-conditioned to and ensures material is sprayed on ratio (see Section 5.0).



- 3.4 Three static mixers are required in order to ensure that material is correctly mixed. Two at the remote mix manifold and one before the hand piece.
- 3.5 Static mixers need to be flushed thoroughly with each stoppage. They should be inspected on a daily basis for potential build up around the helix. If any build up is evident, this will disrupt the efficiency of the mix. Inspect daily, and replace weekly regardless of condition.



(Static mixer and housing, location of housing on remote mix)



(3 x Static mixers shown)

4.0 Pre-conditioning

(PLEASE DO NOT UNDERESTIMATE IMPORTANCE OF PRE-CONDITIONING)

- 4.1 Protal 7700 material is to be pre-conditioned to a recommended temperature of 60°C to 71°C for Part A and 38°C to 43°C for Part B. Heater blankets (not bands) are recommended for even and gradual distribution of heat.
- 4.2 Protal 7700 is to be pre-conditioned to a suitable temperature whereby the transfer and pumps and or the main pumps are able to process/pump Part A and B. (If Part A and B are too cold i.e. the viscosity is too high, the transfer main pumps will cavitate and struggle to move Part A and B material through the main material heaters). It is important to pump cooler material very slowly until temperature increases.

Allow sufficient time for heater blankets to elevate material temperature in the drums, this will ensure that transfer pumps are able to move material to the main pumps. If practically possible, Protal 7700 A and B material may be stored in a temperature controlled environment between 30-40°C. This will greatly reduce pre-conditioning and start-up times.

4.3 Heating

In order for Protal 7700 to be successfully spray applied, both A and B temperatures need to be elevated.

- Protal 7700 Part A 60°C to 71°C
- Protal 7700 Part B 38°C to 43°C

The temperatures listed above have been found to offer the most consistent and most balanced spray application and mixing of Part A and B. Viscosity at these temperatures allow the material to spray and atomise at pressures as low as 3500 psi.



(Heater blankets)

- 4.4 We recommend the introduction of suitable drum agitators to aid with mixing and even heat distribution.



(Agitator)

5.0 Ratio Control

- 5.1 Ratio kits are fitted to the remote mix manifold. Ratio checks must be conducted each day at the start-up and at completion of every day and recorded in the ITP (see Independent Test Procedure).

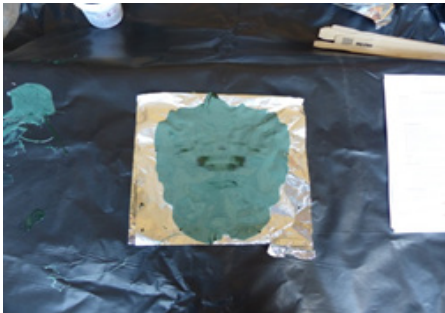


(Top row: Ratio test kit fitted to remote mix manifold
Bottom row: 3 Part A to 1 Part B, by volume)

- 5.2 Control and Sampling: once contractor has established material is dispensing at the correct ratio (3:1 by volume), the following 2 controls must be completed and kept stored for reference.

Control 1 - Butterfly Test (for correct mixing appearance NOT RATIO)

This test is achieved by conducting a spray/pour out of the Protal 7700 material from the front of the gun (not tip) under low pressure onto heavy duty aluminium foil which is folded in half and then unfolded and examined. No signs of either, mottling, marbling, or colour separation will confirm correct mixing of Part A and Part B material.



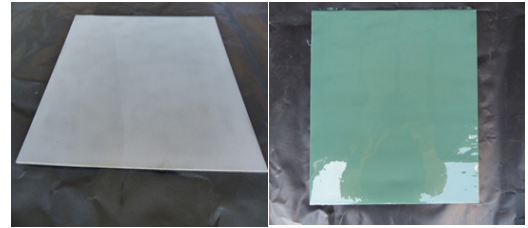
(Incorrect mixing)



(Correct mixing)

Control 2 - Spray Out.

Sample test plates (one per day or every 150 joints) to confirm mix and colour sample is as expected. This test is to be spray applied as per the specification on to a SA 2½ surface prepared steel test plate 1 mm in thickness, 200 mm x 100 mm in size.



(Retain sample plates)

- 5.3 Pressure monitoring kit.



(Pressure monitoring kit)

Ratio: It is the responsibility of the contractor to ensure that any and all user defined parameters for the above mentioned ratio assurance or pressure monitoring equipment is correctly set to ensure immediate shut down should the ratio fall outside the defined coating 3:1 volume ratio specification. These records must be kept for reference in conjunction with the ITP.

Denso (Australia) Pty Ltd reserves the right to access these records and ITP at any time or upon request.

6.0 Equipment Maintenance

- 6.1 Equipment shall be serviced and maintained as per manufacturer's recommendations or when required to ensure that all equipment functions as it is intended to do so in order to properly meet all application criteria, and ensure the Protal 7700 is correctly mixed and is on ratio.
- 6.2 Any and all the plural component spray equipment shall have a physical ratio check capability.

7.0 Surface Preparation

- 7.1 All contaminants shall be removed from the steel surface to be coated. Oil and grease should be removed in accordance with SSPC SP-1 using the approved solvent.
- 7.2 Material for abrasive cleaning shall be the appropriate blend of grit to produce an angular surface profile of 0.063 - 0.125 mm (2.5 - 5.0 mils).
- 7.3 All surfaces to be coated shall be abrasive blasted to a near-white finish (SSPC SP-10, NACE No. 2 or SA 2½).

Note: Near white finish is interpreted to mean that all metal surfaces shall be blasted clean to remove all dirt, mill scale, rust, corrosion products, oxides, paint and other foreign matter. Very light shadow, very light streaks or slight discoloration shall be acceptable; however, at least 95% of the surface shall have the uniform grey appearance of a white metal blast-cleaned surface as defined by Swedish pictorial Surface Preparation Standard Sa 2½ or SSPC VIS-1.

- 7.4 Edges of the existing surface shall be roughened by power brushing or sweep blasting the coating for a distance of 25 mm (1 inch) minimum or as per specified factory applied coating overlap requirement. Step downs from the factory applied coating shall be chamfered to a 30-degree angle or less.
- 7.5 The contractor shall check the profile depth by using a suitable calibrated surface profile gauge (Press-O-Film Gauge or equal).



(Press-O-Film Gauge)

- 7.6 Metal areas that develop flash rust due to exposure to rain or moisture shall be given a sweep blast to return them to their original blasted condition.

8.0 Application

- 8.1 The surface shall have no condensation, precipitation or any other forms of contamination on the blasted surface prior to coating.
- 8.2 The substrate temperature range for Protal 7700 is 10°C (50°F) to 100°C (212°F). The substrate temperature must be a minimum of 3°C (5°F) above the dew point temperature before proceeding with the coating operation. Ambient temperatures may be lower than 10°C (50°F), if the substrate is heated. Preheating may be achieved by using a propane torch or induction coil prior to abrasive blasting.
- 8.3 Using the prescribed equipment (Section 2 & 3), Protal 7700 shall be applied using a wet on wet spray technique to the specified Dry film Thickness (DFT). Protal 7700 can be applied in a single coat from 500 to 1500 micron (20 to 60 mils) wet film thickness.
- 8.4 The thickness of Protal 7700 should be checked continuously by wet film gauge to achieve the minimum/maximum film thickness specified. Notification to the applicator of any inadequately coated sections must be made immediately and repaired.



(Wet film thickness gauge)

9.0 Inspection

- 9.1 The finished coating shall be smooth and free of runs, sags and/or holidays. All surfaces shall have the required minimum/maximum DFT.
- 9.2 After the Protal 7700 has cured to a hard cure condition, the owner's representative and/or contractor's inspector should measure the film thickness by magnetic gauge and notify the applicator of their acceptance.
- 9.3 For most applications, backfill can be accomplished when the coating reaches a Shore D of 80. Using a Shore D Durometer, measure the hardness on an area of the coating that measures a minimum 30 mils (762 microns) DFT. Several measurements should be taken at various locations circumferentially around the pipe to ensure sufficient cure.
- 9.4 An acceptable field test to check to see if the coating has a full chemical cure, a solvent such as Xylene, MEK or Toluene can be rubbed on to the coating. If the gloss/sheen is removed the coating is not fully cured.
- 9.5 Spark testing shall be performed to ensure proper film thickness and for holiday inspection. The voltage used for testing weld joints and field applications shall be equal to that used for testing the mainline coating in the field or 4,920 V/mm (125 volts/mil).
- 9.6 Denso and/or the owner's representative immediately upon completion of the work shall make final inspection of the completed application. Notification of all defects must be made within a reasonable time frame from completion of the work to allow for all repairs within the allowed time frame for the project.
- 9.7 Recoating: If a second coat is required and passes the cure test as described in Section 9.4, the surfaces shall be roughened by sweep blasting. If the coating is soft, no surface preparation is required.

10.0 Repairs

- 10.1 Pinhole repairs may be repaired by using Protal 7700 Repair Cartridge. Areas shall be roughened a minimum 25 mm (1 in.) around holiday using Carborundum cloth or 80 grit sandpaper and wiped clean with a cloth or brush prior to patching.
- 10.2 Areas larger than 0.3 sq. cm. (0.15 sq. in.), but less than 100 sq. cm (1.0 sq. ft.), shall be repaired using a Protal 7700 Repair Cartridge. The surface to be coated shall be clean and dry prior to applying the coating. Surfaces below 4°C (40°F) shall be pre-heated in accordance with Section 8.2. Areas requiring repair shall be prepared with a surface grinder or by grit blasting prior to application of the coating. All edges of the surrounding area should be feathered prior to performing the repair.

11.0 Certified Training

- 11.1 Certified applicator/spray pump training MUST be carried out prior to the commencement of spraying Protal 7700 material. This can be completed during Pre Qualification Trials (PQT) or arranged at an agreed date. Please contact your Denso representative for further details.

12.0 Safety Precautions

- 12.1 Follow the guidelines detailed in the Safety Data Sheet (SDS).
- 12.2 The applicator shall provide safe and secure access to application on site.
- 12.3 Keep containers closed when not in use. In case of spillage, absorb with inert material and dispose of in accordance with applicable regulations.
- 12.4 Always refer to project specifications as they may supersede Denso specifications.



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