Denso Protal 7200 Brush Grade	Manufacturer's Qualified Application Procedure MQAP	With reference to CSA Z245.30 Field-applied external coatings for steel pipeline systems	Page **1** of **4**
Manufacturer	Denso North America (Canada) 90 Ironside Crescent, Unit 12, Toronto Ontario, Canada M1X1M3 Tel: 416-291-3435, Fax: 416-291-0898 www.densona.com		
MQAP Version Number	1.0 (1 July-2015)		
MQAP Unique identifier	Denso Protal 7200 (CSA Z245.30 System FC1/FC3)		

a) tools, consumables, and equipment required to apply the coating.	Variable speed power drill with mixing paddle and strong wooden stir sticks. 4" wide brushes for small diameter pipe and/or short nap rollers for large diameter applications.
b) approved solvents or other cleaning agents to be used to clean the steel and adjacent anti- corrosion coating prior to surface preparation.	Including but not limited to: water, acetone, xylene, MEK, ethanol, toluene.
c) surface preparation of the steel	Prior to being grit blasted, oil and grease contaminants should be removed in accordance with SSPC SP-1 and/or using a solvent (ie: Xylene, Acetone, MEK, Water etc.). All abrasive blast by-product contaminants shall be removed from the steel surface to be coated. All surfaces to be coated shall be abrasive blasted to a near-white finish (SSPC SP-10, NACE 2 or SIS Sa 2 1/2). A surface profile of 0.063 – 0.125 mm (2.5 – 5 mils) is required. Metal areas that develop flash rust due to exposure to rain or moisture shall be re-blasted to return them to their original blasted condition.
d) surface preparation of adjacent anti-corrosion coatings	Edges of the existing coating shall be roughened by sweep blasting the coating for a distance of 25mm (1”) minimum to feather edge the transition. The prepared adjacent coating will also be free of any contamination or residue left by abrasive blast material, a proper solvent in conjunction with clean, lint free cloths and/or compressed air are recommended here.
e) compatibility with other anti-corrosion coatings	Compatible with all anti-corrosion coatings.
f) preheat methods	Propane torch, induction coil or infrared heaters are acceptable methods for pre-heating.
g) substrate temperature range for surface preparation, application, and cure	Substrate temperature range for application of Protal is 10°C (50°F) to 100°C (212°F).

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h) ambient conditions considering dew point temperature h) ambient conditions considering dew point temperature – cont'd	Substrate temperature must be a minimum of 3°C (5°F) above the dew point temperature before proceeding with the coating operation. Ambient temperature can be lower if the substrate is heated with a propane torch prior to abrasive blasting or an induction-heating coil may be utilized either before or after abrasive blasting.
i) coating mixing and thinning procedures	This product is 3:1 100% solids epoxy and no thinners can be used at any time. Lowering the viscosity of the Part A (base) and Part B (hardener) will be done so by storing/warming the material prior to application to a temperature of 20°C (68°F) to 35°C (98°F). Ensure the part A (Resin) and Part B (Hardener) components match in both material and size as specified on the containers. Mix the B component first, independent of the resin. Pour the contents into the part A (Resin) component. Mix, using a power drill with a mixing paddle at a slow speed so as not to introduce air into the mix, making sure to scrape the bottom and sides of the container with a wooden stir stick, continue mixing with the power drill until a uniform color is achieved. Application shall take place immediately after mixing.
j) coating thickness range	A wet on wet brush technique where coating should be applied to a thickness of 0.508 – 2.032 mm (20 - 80 mils) in single coat. A thinner (i.e. 0.635 - 0.889 mm or 25 - 35 mils) application is recommended for standard burial where a thicker application (i.e. 1.016 - 1.778 mm or 40 - 70 mils) is to be used on sections of pipe that require extra abrasion resistance.

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k) coating application method	Material shall be applied by a Denso approved applicator using the prescribed equipment in part a). Pour the mixed product onto the top of the pipe and spread down and around the entire surface of the bare steel and overlap onto the existing coating a minimum of 1". Applicators shall use a brush to smooth out any obvious sags or rough edges, valleys, or drips. Special attention shall be given to weld buttons and bottom of the pipe. The coating shall be applied to the specified Dry Film Thickness (DFT) up to 2.032 mm (80 mils) in one application. The finished coating will be free of runs, sags, and drips.
l) coating curing or cooling schedule and condition	The coating curing is time and temperature dependent i.e. handling time at 25°C (77°F) ambient is 2.5 - 3 Hours, at 47°C (117°F) is 1 Hour, and at 69°C (157°F) is 20 Minutes. If the steel substrate falls below 5° C (41°F) the coating will stop curing, below 0° C (32°F) the coating will freeze. A detailed coating cure chart is available from the manufacturer.
m) recoat and repair method	Small repairs may be accomplished by using Protal Repair Cartridges. Larger repairs shall be repaired using Protal 7200 Brush Grade or Protal 7200 Spray Grade. The surface to be coated shall be abraded using 80 grit sandpaper or by sweep blasting the repair area. The abraded area should be wiped clean with a solvent and shall be clean and dry prior to applying the coating. Surfaces below 50F (10°C) shall be pre-heated.
n) time to backfill	The coating curing is time and temperature dependent and cure times can be adjusted by controlling the temperature of the steel substrate or the temperature of the surrounding environment. For most applications, backfill can be accomplished when the coating reaches a minimum Shore D of 80. The

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n) time to backfill – cont'd	"thumb nail test" can also be used. The thumb nail test is defined by when one can no longer make a permanent indentation in the coating using one's thumb nail. 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. Holiday 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 100 -125 volts/mil based on the specified minimum mil thickness.
o) handling and storage requirements for coating materials:	Storage and shipping of the material shall be between 5° C (41°F) and 40°C (104°F). The containers shall be stored up right in a dry environment.
i) temperature limitations (e.g., freezing, excessive heat);	Materials will freeze below 0° C (32°F), product cannot be used after it has been frozen. Excessive heat will shorten the shelf life of the material.
ii) humidity;	Store in a dry place.
iii) protection from the elements (e.g., snow, rain, sunlight);	Store in a dry place.
iv)protection from contaminants (e.g., dust, water, chemicals);	Store in original packaging.
v) expiration date	Expiration date is labelled on the packaging of the materials.
vi) protection from physical damage.	In normal use no special measures required. Do not over-stack pallets of product.