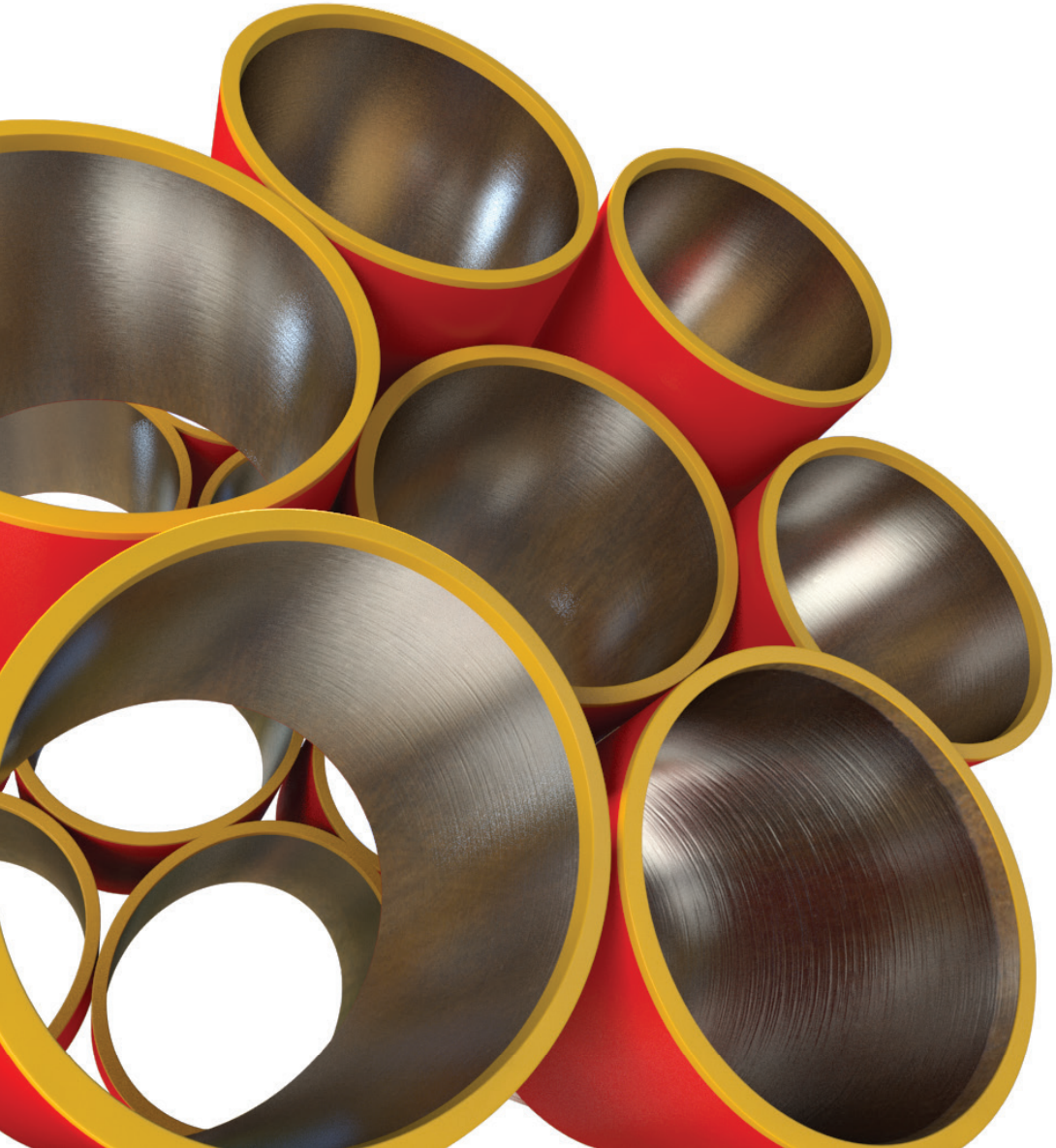
Nap-Gard®

7-2500 Series

FBE Powder Coatings



7-2500 Series
External FBE Powder Coatings

Nap-Gard® 7-2500 series is a family of thermosetting epoxy powders. Designed as a corrosion protective coating, for oil and gas pipelines in underground and subsea environments.

The Nap-Gard 7-2500 series is comprised of the following product numbers:

- 7-2500
- 7-2501
- 7-2508FG
- 7-2508
- 7-2508LG

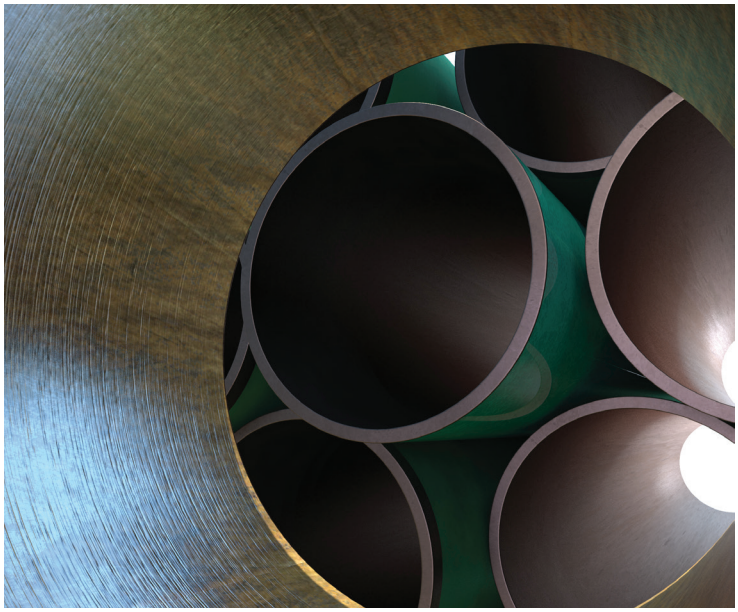
Whether the application is for offshore or onshore service, Nap-Gard 7-2500 Series powder coatings are designed to meet the most demanding performance requirements set by industry standards.

This family of products can be used as a single anti-corrosive layer or as the primer in a dual layer or multilayer system.

Nap-Gard powders are thermosetting, 100% solids, hazardous air pollutant (HAP) free, and are high building (8-30 mils) in just a single coat.

NapGard 7-2500 Series Applications:

- Oil and Gas Pipeline
- Girth Weld Coatings
- Water Pipe and Valves



Products in the 7-2500 Series family are typically applied to a hot substrate, ranging from 225°C (438°F) to 239°C (463°F) and cured with residual heat. These coatings can be applied by flocking, fluidized bed or electrostatic spay.

In buried service, the coatings in the 7-2500 series are capable of withstanding continuous operating temperatures of 107°C (225°F).

The NapGard 7-2500 series meets the requirements of:

- CSA Z245.20-14
- NACE SP-0394
- NSF/ANSI 61 for drinking water system components
- AWWA standards C116, C213, C550
- Low VOC according to ASTM D2369-10 (2015) "Standard Test Method for Volatile Content of Coatings"

Highlights:

- Low Porosity
- Excellent adhesion to steel
- Good chemical resistance
- Excellent flexibility
- Fast Curing
- Damage resistant-high impact strength and gouge resistance 100% solids

More than 100,000 miles of NapGard coated pipes installed worldwide

Global leader for more than 50 years in functional coatings

Typical Powder Properties

Specific Gravity:
Powder 1.44 ± .05
Cured Film 1.35 ± .05

Density:
(CSA Z245.20-14) 1440 ± 50g/L

Theoretical Coverage:
134 Ft^2/ lb/mil

Thermal Characteristics:
Tg2 110 ± 5° C
Tg1 62 ± 5° C
CSA2245.20-14

Typical Powder Qualities

Product:	7-2501	7-2500	7-2508FG	7-2508	7-2508LG
Typical Gel Time: (CSA Z245.20-14) @205°C (401°F)	10 ± 2 seconds	22 ± 4 seconds	8 ± 2 seconds	16 ± 3 seconds	24 ± 5 seconds
Colors:	Red	Red	Green	Green	Green

Typical Properties of Applied Film†

Test /Requirement	Test Method	Description	Result
Recommended Film Thickness		Average Minimum	350µm (14 mils) 203µm (8 mils)
Impact Resistance **1/8" X 5" X 8" steel panels**	ASTM G14-72 CSA Z245.20-14	@ 25°C (77°F) 160 in. lbs @-30°C (-22°F) > 1.5 J	Pass Pass
Bending	CSA Z245.20-14 API-RP-5L7	@-30° (-22°F) 3.0°/PD	Pass Pass
Elongation	Modified ASTM G10-72	@0°C (32°F) @-30°C (-22°F)	4.8% 3.2%
Hardness	ASTM D2583 ASTM D2240-74	Barcol Shore D	60 Average 90 Average
Cathodic Disbondment	CSA Z245.20-14:	24 hours, 3.5 Vdc., 65°C, <6.5mm 28 days, 1.5 Vdc., 23°C, <8.5mm 28 days, 1.5 Vdc., 65°C, <20mm Strained C.D, no cracking	1.2 mm radius 2.3 mm radius 7.2 mm radius Pass
Tensile Properties	ASTM D2370-98 D882-91	Tensile Strength	>9000 psi
Hot Water Resistance	CSA Z245.20-14	75°C, 24 hours 75°C, 28 days	Rating 1-2 Rating 1-2
Chemical Resistance Test*	90 Day Immersion per CSA Z245.20-98	HCl in H_2O** 10% NaCl, H_2SO_4 in H_2O ** 10% NaCl in H_2O ** Distilled Water 5% NaOH in H_2O ** $MgCO_3/CaCO_3$ in H_2O **	No Blistering No Blistering No Blistering No Blistering No Blistering No Blistering

** Distilled Water
* For additional information refer to Nap-Gard Products Catalog Chemical Resistance Chart
† Performance depends on film thickness. Consult a Nap-Gard Specialist for specific recommendations, and application guide.

Typical Electircal Properties Film

Dielectric Strength ASTM D149-97	1500 volts/mil @250µm	**Breakdown Voltage** ASTM D149-97	20K volts @ 450µm (18 mils)
Dielectric Constant ASTM D150	2.15 @ 1 MHz	**Volume Resistivity** ASTM D257	3.3 X 10^{15} ohm-cm
Thermal Conductivity ASTM C177	0.19 ±0.02BTU/ ($hr \cdot ft^2 \cdot ft \cdot °F$)		

Cure† Schedule Guidelines

The cure profile and schedule for Nap-Gard 7-2500 Series shown below, outlines the minimum time at temperature required to achieve the typical performance properties of the coating. Recommended powder application temperature range is 218°C (425°F) to 239°C (463°F) and post heating is not a normal requirement on many pipe sizes with 0.25 inch wall thickness or above. The minimum post application curing temperature (as measured on the coated pipe) and the time to quench may conform to the following cure schedule:

7-2508FG/7-2501		7-2508		7-2508 LG/ 7-2500	
Application Temperature	**Min Time to Quench‡**	**Application Temperature**	**Min Time to Quench‡**	**Application Temperature**	**Min Time to Quench‡**
218°C (425°F) 232°C (450°F) 239°C (463°F)	75 seconds 65 seconds 60 seconds	218°C (425°F) 232°C (450°F) 239°C (463°F)	90 seconds 70 seconds 60 seconds	218°C (425°F) 232°C (450°F) 239°C (463°F)	120 seconds 90 seconds 70 seconds

† Cure is by residual heat in the pipe, therefore very light wall pipe may require additional post heat to complete cure.
‡ Recommended time to quench is based on the assumption that the listed temperature is maintained without any cool down rate. Time to quench will vary with application parameters and pipe sizes. Therefore, the above information shall be used only as a guideline by the applicator to develop proper time to quench. Cure should be verified by DSC or other methods. For three layer, the optimum time for adhesive application is between 30-70% cure of the FBE. This has to be developed by the applicator based on the plant layout.

Manufacturing Sites

Axalta Coating Systems
www.powder.axaltacs.com
www.axalta.us/powder