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Testing Performed on SPC SP3888  
Spray Grade Material

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## INTRODUCTION

Steel test panels coated in Canada with SPC SP3888 spray grade material were received at this laboratory for testing. The samples consisted of flat plates coated with SP3888 and sections of pipe coated with fusion bonded epoxy pipe then topcoated with SP3888. A small kit of SP3888 liquid components were also included in the material received. Where possible, testing was conducted according to CAN/CSA Z245.20-M92. Testing included: cathodic disbondment, moisture permeation, intercoat adhesion, impact resistance, adhesion (ASTM D4541), and flexibility.

## DESCRIPTION OF TESTS

### Cathodic Disbondment Test

This test was conducted on duplicate panels for 14 days at 80°C, 14 days at 95°C, 28 days at 80°C, and 28 days at 95°C. Testing was conducted by a method similar to CAN/CSA Z245.20M92 section 12.8. An apparatus similar to that described in ASTM G95-87 was used for this test. A 3.5" diameter PVC cell was centered around a 0.250" drilled holiday and the cell was attached to the surface using a silicone sealant. The cell had a 2" diameter side-arm. The cell was filled with a 3% NaCl solution. A polyester filter plug was inserted into the horizontal section of the side-arm to separate the coating from the bleach produced at the platinum wire anode which was inserted below the solution level in the side-arm. The potential was maintained at 1.5 volts as measured with a calomel electrode in the solution near the holiday. The test samples were placed in an enclosed hot box where the solution temperature was maintained at 80°C or 95°C. The solution and filter were changed every 7 days. At the end of the test period, the cells were removed and radial cuts were made from the edge of the holiday out towards the edge of the plate. The radius of disbondment was measured from the edge of the drilled holiday to the point that the coating exhibited good adhesion.

### Moisture Permeation

This test was conducted on duplicate panels for 7 days at 75°C, 7 days at 95°C, 14 days at 75°C, and 14 days at 95°C. The test samples were fully immersed in tap water which was maintained at 75°C and 95°C. At the end of the test periods, the samples were removed and allowed to cool. Adhesion was rated by cutting 13mm x 25mm rectangle through the coating and prying with a utility knife. Ratings are based on a scale of #1 (Best) to #5 (Very Poor Adhesion).

### Intercoat Adhesion @ 25°C

A 4" x 8", blasted steel panel was coated, lengthwise, with a 2" wide pass of approximately 20-25 mils of SPC SP3888. At 10 minutes, 30 minutes, 1 hour, and 4 hours a narrow pass of the coating was applied across the width of the panel. The following day, the coated sections were scribed and an attempt was made to remove the top coat from the base coat.

### Impacts

This test was conducted similar to the method listed in CAN/CSA Z245.20-M92 Section 12.12. The impacts were conducted at -30°C, -5°C, and 25°C using a 15.8mm diameter bearing with a 1kg falling weight. The impact sites were checked using a high-voltage detector set at 3400 volts.

### Adhesion - Elcometer Pull-off

This test was conducted similar to the method listed in ASTM D4541. There were two different coating materials tested. One panel was a flat plate with only SP3888. The second test sample was a pipe section coated with a fusion bonded epoxy then top coated with SP3888. Three elcometer adhesion dollies were attached to both of the 4" x 4" panels using an epoxy adhesive and allowed to cure overnight at room temperature. The panels were scored through both the adhesive and coating to the steel substrate. The panels were clamped to the lower fixed platform of the tensile machine and the dollies were pulled off at a rate of 1 inch per minute. The force required was recorded on an X-Y plotter. The adhesion value in psi is reported as the average of the two highest pulls from each of the panels.

### Flexibility

Straps measuring 1" wide by 8" long were cut from the coated test plates and bent on a fixed radius mandrel apparatus at 25°C, -5°C, and -30°C.

**TEST RESULTS**Cathodic Disbondment

<u>Duration</u>	<u>Test</u>	<u>Temp.</u>	<u>D.F.T.</u>	<u>Results</u>
14 days	CDT	80°C	22-28	6-8mm
14 days		80°C	28-34	6-8mm
14 days	CDT	95°C	17-22	9-10mm
14 days		95°C	22-26	7-8mm
28 days	CDT	80°C	19-20	12-13mm
28 days		80°C	20-23	8-10mm
28 days	CDT	95°C	22-28	9-11mm
28 days		95°C	28-30	10-11mm

Moisture Permeation

<u>Duration</u>	<u>Test</u>	<u>Temp.</u>	<u>D.F.T.</u>	<u>Results</u>
7 days	Soak	75°C	18-24	#1
7 days	Soak	75°C	22-24	#1
7 days	Soak	95°C	18-22	#1
7 days	Soak	95°C	25-30	#1
14 days	Soak	75°C	22-26	#1
14 days	Soak	75°C	18-29	#1
14 days	Soak	95°C	21-25	#1
14 days	Soak	95°C	18-20	#1

Intercoat Adhesion at 25°C

The material showed excellent adhesion up to 30 minutes after the initial application. The topcoat that was applied 1 hour after the initial application showed fair to good adhesion. However, small chips could be made to fracture at the interface between the two coats with great effort. Only moderate effort was required to produce the intercoat delamination in the area that was topcoated after 4 hours.

Impacts

<u>Temp.</u>	<u>Status</u>	<u>DFT</u>
25°C	(CSA) 3 passes @ 1.5 joules (CSA) 1 pass and 2 failures @ 3.0 joules	21-25
25°C	(ASTM G14) 50.0 inch-pounds	28-35
-5°C	(CSA) 3 passes @ 1.5 joules (CSA) 1 pass and 2 failures @ 3.0 joules	24-26
-30°C	(CSA) 3 passes @ 1.5 joules (CSA) 2 passes and 1 failure @ 3.0 joules	13-18
-30°C	(CSA) 3 passes @ 1.5 joules (CSA) 2 passes and 1 failure @ 3.0 joules	23-27

Flexibility

<u>Temp.</u>	<u>Mandrel</u>	<u>°/pd</u>	<u>Coating Thk/mils</u>	<u>Pass/Fail</u>
-30°C	10"	1.55	24-31	Fail
	14"	1.13	24-30	Fail
	25"	.638	25-27	Pass
-5°C	14"	1.15	23-31	Fail
	20"	0.81	23-28	Fail
	25"	0.66	34-36	Pass
25°C	10"	1.55	22-36	Fail
	14"	1.46	12-16	Pass

