

Powercrete® F-1

Girth Welds



Pipeline Repair



Rehabilitation



Pipe Bends, Fittings, Valves, Odd Shapes



IBERRY[™]
P L A S T I C S
C O R P O R A T I O N
AND SUBSIDIARIES
CORROSION PROTECTION GROUP

www.berrycpg.com



Comparison Testing

1

F-1 Data Sheet

2

Physical Properties of Powercrete F-1

3

Comparison Testing

4

Powercrete F-1 Manual Application Guide

5

Powercrete F-1 Spray Application Guide

6

Theoretical Usage Rates

7

Powercrete F-1 Material Safety Data Sheet
Part A

8

Powercrete F-1 Material Safety Data Sheet
Part B

9

North American Distributors for Powercrete F-1

10

Berry Plastics CPG Locations

1

Data Sheet



Product Description

Powercrete F-1 is a 100% solids liquid epoxy coating with a fast cure time for efficient, user-friendly application and rapid backfill. In addition to ease of application, F-1 provides excellent long term corrosion protection for bare steel or FBE coated pipe. This high-build, two-component epoxy can easily achieve a dry film thickness (DFT) of up to 40+ mils (1 mm) in a single application.

Powercrete F-1 can be applied using plural component spray equipment or by hand brush, roller or trowel. Powercrete F-1's unique combination of handling and performance characteristics make it the ideal coating for pipes, girth welds and/or the repair & rehabilitation of existing pipelines.

Product Features & Benefits

- **100% Solids Epoxy: no V.O.C.s / no Isocyanates**
Safe to use.
- **Super Fast Cure Time**
Speeds up production time and saves costs.
- **High Build: 1 mm (40 mils) in a Single Pass**
Saves time and costs.
- **Compatible with Bare Steel or FBE Coated Pipe**
Flexible Use & Reduces Inventory.
- **2:1 Part A:B Mix Ratio by Volume**
Sprayable with Conventional Plural Component Equipment.
- **High Adhesion and Abrasion Resistance**
Superior performance for superior asset protection.
- **High Wet Out for Ultra High Surface Anchorage**
Longer life, better performance.
- **Same Formula for Hand or Spray Application**
Flexible and reduced inventory. Saves money.
- **Excellent Cathodic Disbondment at maximum operating temperature.**
Broad range of applications.

Typical Applications

- Pipeline Coating (Girth Welds, Pipe Bends, Fittings, Valves, Odd Shapes), Repair & Rehabilitation



Physical Properties

Property	Condition	Test Method	Typical Value	
		Test Method	US Imperial	Metric
Hardness	(Shore D)	ASTM D-2240	85	85
Thin Film Water Absorption		ASTM D-570	0.22 %	0.22 %
Dielectric Strength	(Oil)	ASTM D-149	617 volts/mil	25 kV/mm
Chemical Resistance		ASTM G-20	Excellent	Excellent
Adhesion to FBE		ASTM D-4541	> 3,000 psi	21 MPa
Bare Steel		ASTM D-4541	> 3,400 psi	23 MPa
Impact Resistance		ASTM G-14	118 inch-lb/27mils	3 Joules/27mils
Flexibility	(Degrees per pipe diameter)	NACE RP-0394	< 0.45 °	< 0.45 °
Abrasion Resistance	(CS-17 wheel, wear cycles)	ASTM D-4060	986 cycles/mil	39 cycles/micron
Cathodic Disbondment	(30 days at 60°)	ASTM G-95	< 0.4 inch	< 10 mm
Hot Water Immersion	(24 hours immersion at 60°C)	CSA Z245-20-06	100% coating cohesion >3,000 psi	100% coating cohesion >21 MPa

Product Selection Guide

Maximum Operating Temperature:	60°C (140°F)	Color:	Green
Compatible Line Coatings:	FBE	Typical Single Coat Thickness:	
Mixing Ratio:		Manually Applied	40 mils (1.0 mm)
By Volume	2:1 Part A to B 100:36	Spray Applied	40 mils (1.0 mm)
By Weight	Part A to B	Recoat Interval (Spray):	
Recommended Surface Profile	2.5 - 4.0 mils	@ 25°C (77°F)	10 - 17 minutes
	63.5 - 101.6 microns	@ 43°C (110°F)	3 - 7 minutes
Surface Preparation:	SA 2 1/2	Theoretical Coverage:	13.5 Sq. Ft./liter @30 mils
	SSPC-10 - Near-White	Clean Up:	Acetone, MEK, Toluene
	SSPC-SP5 - White		

Typical Application

Hand Apply	Coverage Rates	Spray Apply	Waste Factor													
	Theoretical Coverage Rates		<div>(approx.)</div> <table><tr><td>10%</td><td>Kit Application</td></tr><tr><td>15%</td><td>20" + pipe OD</td></tr><tr><td>25%</td><td>14"-18" pipe OD</td></tr><tr><td>35%</td><td>2"-12" pipe OD</td></tr></table>	10%	Kit Application	15%	20" + pipe OD	25%	14"-18" pipe OD	35%	2"-12" pipe OD					
	10%	Kit Application														
	15%	20" + pipe OD														
25%	14"-18" pipe OD															
35%	2"-12" pipe OD															
Recommended Tip Sizes																
<table><tr><td>Tip Size</td><td>Pipe Size (DN)</td><td>Flow Rates (approx.)</td></tr><tr><td>331</td><td>to 12" (DN300)</td><td>19tip = 1.1L / min.</td></tr><tr><td>419/431</td><td>12"-16" (DN300-400)</td><td>31tip = 2.8L / min.</td></tr><tr><td>519/531</td><td>16"-24" (DN400-600)</td><td></td></tr><tr><td>619/631</td><td>24"-48" (DN600-1200)</td><td>Note: Fluid pressure at tip approx. 3,500 psi.</td></tr></table>	Tip Size	Pipe Size (DN)	Flow Rates (approx.)	331	to 12" (DN300)	19tip = 1.1L / min.	419/431	12"-16" (DN300-400)	31tip = 2.8L / min.	519/531	16"-24" (DN400-600)		619/631	24"-48" (DN600-1200)	Note: Fluid pressure at tip approx. 3,500 psi.	
Tip Size	Pipe Size (DN)	Flow Rates (approx.)														
331	to 12" (DN300)	19tip = 1.1L / min.														
419/431	12"-16" (DN300-400)	31tip = 2.8L / min.														
519/531	16"-24" (DN400-600)															
619/631	24"-48" (DN600-1200)	Note: Fluid pressure at tip approx. 3,500 psi.														

Temperature Considerations

If the surface to be coated is below 10° C (50° F), preheating of the substrate is recommended. Preheat temperatures should not exceed 80° C (176° F) prior to application.

Note: The application should only be done when temperature of the steel is at least 3° C (5° F) higher than the dew point, as recommended by NACE.

Storage and Handling

For optimum performance, store Powercrete F-1 epoxy product in a dry well ventilated area. Maintain products in original packaging and sealed until just before use. Avoid exposure to direct sunlight, rain, snow, dust, and other adverse environmental conditions or contaminants.

Always consult Material Safety Data Sheet prior to handling Powercrete F-1.

Note: Avoid prolonged storage at temperatures above 40° C (104° F) or below 5° C (40° F)

Cure Times @ 25°C (77°F)

Pot Life: 0.5 L / 2 Lb kit	9 minutes
Gel Time: 40 mils	12 minutes
Dry Time: 40 mils	37 minutes
65 Shore "D" Reading: 40 mils	60 minutes
75 Shore "D" Reading: 40 mils	75 minutes

Shelf Life:	Part A - 2 years Part B - 1 year
-------------	-------------------------------------

Ordering Information

1. Drums

211912-000 **Part A Drum:** PC-F1-A-156L-41Gal (299Kg-660Lb)
 380234-000 **Part B Drum:** PC-F1-B-156L-41Gal (215Kg-475Lb)

2. Kits:

645247-000 **0.5 L Kit:** PC-F1-0.5L-kit (0.9Kg-2Lb)
 124017-000 **1 L Kit:** PC-F1-1L-kit (1.7Kg-4Lb)
 690692-000 **2.5 L Kit:** PC-F1-2.5L-kit (4.3Kg-10Lb)

3. Accessories Kit:

contains: latex gloves;
 trowels;
 mixing paddle for an electric drill;
 hand stirrer;
 wet mil gauge;
 disposable face masks.



Product Support and Additional Information

For additional information on delivery, application, training, appropriate equipment, sales and customer service, please visit www.berrycpg.com, call or email one of the worldwide locations listed below.

Berry Plastics warrants that the product conforms to its chemical and physical description and is appropriate for the use stated on the technical data sheet when used in compliance with Berry Plastics written instructions. Since many installation factors are beyond the control of Berry Plastics, the user shall determine the suitability of the products for the intended use and assume all risks and liabilities in connection herewith. Berry Plastics liability is stated in the standard terms and conditions of sale. Berry Plastics makes no other warranty either expressed or implied. All information contained in this technical data sheet is to be used as a guide and is subject to change without notice. This technical data sheet supersedes all previous data sheets on this product.

IBERRU™
PLASTICS™
CORPORATION
 AND SUBSIDIARIES
CORROSION PROTECTION GROUP
www.berrycpg.com

Local Distributor / Representative:

For contact details of local Distributors / Representatives
 Please visit www.berrycpg.com.

Headquarters: Berry Plastics Tapes & Coatings Division, Franklin MA, USA

Franklin, MA, USA
 Tel: +1 508 918 1714
 US Toll Free: +1 800 248 0149
 Fax: +1 508 918 1910
CPG@berryplastics.com

Houston, TX, USA
 Tel: +1 713 676 0085
 US Toll Free: 01 888 676 7202
 Fax: +1 713 676 0086
CPGH@berryplastics.com

Tijuana, Mexico
 Tel US: +1 866 9 CORROSION
 Fax US: +1 619 424 4258
 Tel Mexico: +52 664 607 0926
 Fax Mexico: +52 664 623 6463
CPGTJ@berryplastics.com

Aarschot, Belgium
 Tel: +32 16 55 36 00
 Fax: +32 16 55 36 74
CPGE@berryplastics.com

Baroda, India
 Tel: +91 2667 264721
 Fax: +91 2667 264724
CPGIN@berryplastics.com

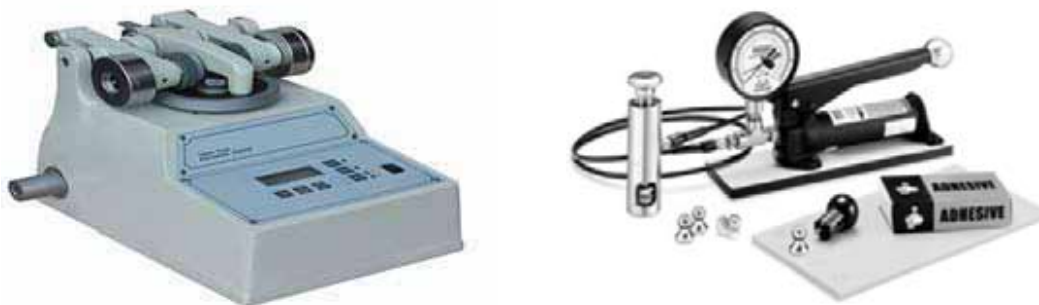
DS-PC-F1-REV2-0208

2

Physical Properties of Powercrete F-1

PHYSICAL PROPERTIES OF POWERCRETE F-1

Independent Laboratory Testing and Results



IBERRY™
PLASTICS
CORPORATION
AND SUBSIDIARIES
CORROSION PROTECTION GROUP

www.berrycpg.com

Headquarters : Berry Plastics Tapes & Coatings, Franklin MA, USA

Franklin, MA, USA
Tel: +1 508 918 1714
US Toll Free: +1 800 248 0149
Fax: +1 508 918 1910
Email: CPG@berryplastics.com

Houston, TX, USA
Tel: +1 713 676 0085
US Toll Free: 01 888 676 7202
Fax: +1 713 676 0086
E-mail: CPGH@berryplastics.com

Tijuana, Mexico
Tel US: +1 866 9 CORROSION
Fax US: +1 619 424 4258
Tel Mexico: +52 664 607 0926
Fax Mexico: +52 664 623 6463
Email: CPGTJ@berryplastics.com

Aarschot, Belgium
Tel: +32 16 55 36 00
Fax: +32 16 55 36 74
E-mail: CPGE@berryplastics.com

Baroda, India
Tel: +91 2667 264721
Fax: +91 2667 264724
E-mail: CPGIN@berryplastics.com

Table of Contents

PHYSICAL PROPERTIES OF POWERCRETE F-1

Independent Laboratory Testing and Results

Physical Properties	Test Method	Page
Water Absorption	ASTM D-570	2
Adhesion to Steel	ASTM D-4541	3
Adhesion to FBE	ASTM D-4541	3
Flexibility	NACE RP-0394	3
Hot Water Immersion		4
Impact Resistance	ASTM G-14	4
Abrasion Resistance	ASTM D-4060	4
Cathodic Disbondment	ASTM G-95	5
Chemical Resistance	ASTM G-20	5
Compressive Strength	ASTM C-109	6
Dielectric Strength	ASTM D-149	7

Test Certificate

Berry Plastics
11010 Wallisville Road
Houston, TX 77013

REF No
Ord No

0701187: Issue 2
Verbal 122599

Date Tested
Date Reported

03-06-2007
03-31-2007

Phone: 713-676-0085
Fax: 713-676-0086
Attn: Bang Tran

Item	Samples submitted to complete seven (7) testing procedures
Specification	ASTM D570, D4541, G14, D4060, G20, G95 Modified NACE RP0394, and Customer Requirement

Several samples were supply by Mr. Bang Tran of Berry Plastics to perform various tests on the Berry Plastics Powercrete F1 pipeline coating.

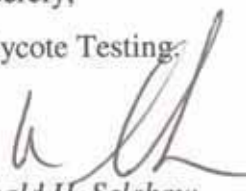
This report has been assembled to record the results of this testing of the above-mentioned material.

Should you have any questions or concerns please contact the undersigned at (281) 848-0270 or by email at Donald.Selchow@bodycote.com, at your convenience.

Report re-issued (Issue 2) to reflect company name change from Covalence Adhesives to Berry Plastics at the customer request.

Sincerely,

Bodycote Testing



Donald H. Selchow
QA/H&S Manager Oil & Gas

Materials Supplied and Tested

Berry Plastics Powercrete F1 material was supplied to perform the following tests:

Water absorption	ASTM D570	Free-Film (6)
Coating Adhesion	ASTM D4541	4-(6"x 6"x 1/4")
Coating Adhesion	Direct to FBE	3-(4"x 8")
Flexibility	NACE RP0394	5 Pieces
Hot Water Immersion	Customer Requirement	3 Pieces
Impact Resistance	ASTM G14	4-(6"x 6"x 1/4")
Abrasion Resistance	ASTM D4060	2 Pieces
Cathodic Disbondment	ASTM G95 Modified	3 Pieces
Chemical Resistance Test	ASTM G20	10 Pieces

Water absorption	ASTM D570	Free-Film (6)
-------------------------	------------------	----------------------

Samples dried for 72 hours (over weekend) at 105C prior to immersion.
Immersion in DI water at 25C for 24 hours

Sample #	Length (in)	Width (in)	Thick (in)	Weight Before (g)	Weight After (g)	Weight Gain (g)	% Increase in Weight
360(001)-1	3	1	0.044	3.8528	3.8613	0.0085	0.22
360(001)-2	3	1 1/32	0.038	3.4598	3.4682	0.0084	0.24
360(001)-3	2 15/16	1 1/32	0.039	3.5578	3.5664	0.0086	0.24
360(001)-4	2 31/32	1 1/16	0.046	4.4961	4.5043	0.0082	0.18
360(001)-5	2 31/32	1	0.039	3.5854	3.5944	0.0090	0.25
360(001)-6	3	1 1/32	0.051	4.9153	4.9243	0.0090	0.18
Average				3.9779	3.9865	0.0086	0.22

Total percentage of water absorbed is 0.22%.
Specimens appeared the same after water soak as before.

Coating Adhesion
ASTM D4541
4-(6"x 6"x 1/4")
Coating Direct to Steel

Sample #	Thickness (mils)					Pull-Off Strength (psi)	Failure Method		
	Point 1	Point 2	Point 3	Point 4	Average		% Glue Adhesion	% Coating Cohesion	% Coating/ Substrate Adhesion
361(002)	29.6	28.5	28	30.3	29	3986	95	5	0
362(003)	28	25.8	26.2	27.8	27	4068	95	5	0
363(004)	30.5	27.6	28.6	29.3	29	3090	100	0	0
381(005)	29.5	30	29.3	30	30	2764	99	1	0

Coating Adhesion
Direct to FBE
3-(4"x 8")
Coating Direct to FBE

Sample #	Thickness (mils)					Pull-Off Strength (psi)	Failure Method		
	Point 1	Point 2	Point 3	Point 4	Average		% Glue Adhesion	% Coating Cohesion	% Coating/ Substrate Adhesion
364(006)	34.1	35	32.9	35.3	34	3497	10	90	0
365(007)	35.5	36.8	33.6	33.8	35	3579	0	100	0
366(008)	35.8	38.6	37.2	35.8	37	1868	0	50	50

Flexibility
NACE RP0394
5 Pieces
Coating Direct to Steel

Sample #	t = Thickness (mils)					R = Bend Radius	°/PD= (57.3*t)/(R-(t/2))
	Point 1	Point 2	Point 3	Point 4	Average		
701187 - 367(009)	0.289	0.292	0.293	0.294	0.292	36	0.467
701187 - 368(010)	0.288	0.287	0.285	0.287	0.287	36	0.458
701187 - 369(011)	0.285	0.283	0.281	0.280	0.282	36	0.451
701187 - 370(012)	0.276	0.274	0.276	0.276	0.276	36	0.440
701187 - 371(013)	0.283	0.280	0.280	0.278	0.280	36	0.448
Average					0.283	36	0.453

Hot Water Immersion @60°C Customer Requirement 3 Pieces

Samples were immersed in hot water held at 60°C for 24 hours prior to testing

ID	Thickness Mils	Pull-Off Strength (psi)	Cohesive Failure in PCF1	Color Faded
372 - #1	34	2764	100%	Yes
373 - #2	38	3090	100%	Yes
374 - #3	41	3334	100%	Yes

Impact Resistance ASTM G14 4-(6"x 6"x 1/4")

This testing was performed to a modified version of ASTM G-14. All the testing was performed at room temperature (75°F ± 3°F) using a four (4) pound weight.

J/N 701187 Identification	Drop Number	Avg. Thickness Mils	Height (inches)	Impact strength In/lbs (in-lbs/mil)	Impact strength Joules (Joules/mil)
375(017)-25	#21	22.5	16.0	64 (2.8)	7.23 (0.32)
376(018)-29	#12	26.9	22.0	88 (3.27)	9.94 (0.37)
377(019)-27	#10	23.4	27.0	108 (4.60)	12.21 (0.52)
378(020)-31a	#5	26.5	29.5	118 (4.45)	13.34 (0.50)

Abrasion Resistance ASTM D4060 2 Pieces

Specimen	Weight Loss (mg)	Wear Index	Mils Loss	Cycles Per Mil
701187 - 379(021)	132.5	132.5	1.2	860.2
701187 - 380(022)	119.7	119.7	0.9	1111.1
Mean	126.1	126.1	1.03125	985.7

Cathodic Disbondment	ASTM G95 Modified	3 Pieces
----------------------	-------------------	----------

The following samples, labeled EF-1 (FE-4), were tested at 60°C for a period of 30days.

Position	Sample ID	Comments
EF-1 (FE-4)	045-64 (#1) / 32 Mils	Coating Blistered inside disbondment 9.2 mm radius
EF-1 (FE-4)	045-64-2 (#2) / 32 Mils	Coating Blistered inside disbondment 5.3 mm radius
EF-1 (FE-4)	045-64-2 (#2) / 32 Mils	Coating Blistered inside disbondment 7.9 mm radius

Chemical Resistance Test	ASTM G20	10 Pieces
--------------------------	----------	-----------

10 samples were soaked the following solutions for a period of seven (7) weeks.

Chemical	Solution %	Start pH	Thickness Mils	30-Day Review	5-Week Review	6-Week Review	7-Week Review
				Color Change	Blistered	Color Change	Blistered
Diesel	100%	8	36.4	No	No	N/C	No
Sulfuric Acid	25%	0	36.6	Yes	No	N/C	No
Acetic Acid	5%	1	33.8	No	No	N/C	No
Gasoline (unleaded)	100%	8	34.6	No	No	N/C	No
Hydrochloric Acid	10%	0	42.2	No	No	N/C	No
Kerosene	100%	8	38.7	No	No	N/C	No
Nitric Acid	10%	0	32.9	Yes	No	N/C	No
Sodium Carbonate	25%	11	39.8	No	No	N/C	No
Sodium Hydroxide	25%	12	36.7	No	No	N/C	No
Sodium Chloride	10%	8	36.6	No	No	N/C	No

222 Cavalcade Street, 77009-3213
P.O. Box 8768, Houston, Texas 77249-8768
Tel: (713) 692-9151 Fax: (713) 696-6205

Attention: Bang Tran
Berry Plastics
Corrosion Protection Group
11010 Wallisville Road
Houston, TX 77013
P: (713) 676-0085 / F: 713/676-0086

W/O. No.: COV012-03-02-26901-1
P.O. No.: Cash
Report Date: 3/5/2007

Identification: TAR 044-84
Description: Three Cubes
Material: Powercrete F-1

Date Cylinders Cast: Unknown

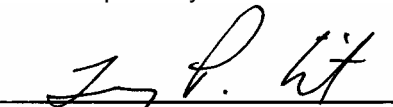
RESULTS OF TESTS
COMPRESSIVE STRENGTH – CUBES

Specimen ID	Age (days)	Length (in.)	Width (in.)	Max Load (lbs)	Compressive Strength (psi)	Fracture Type
1A	Unknown	2.00	2.00	59,200	14,550	Cone
1B	Unknown	2.00	2.00	59,300	14,830	Cone
1C	Unknown	2.00	2.00	56,800	14,200	Cone

Our letters and reports are for the exclusive use of the client to whom they are addressed and shall not be reproduced except in full without the approval of the testing laboratory. The use of our name must receive our written approval. Our letters and reports apply only to the sample tested and/or inspected, and are not indicative of the quantities of apparently identical or similar products. Material submitted to our metals department will be discarded after a period of 30 days unless otherwise directed.

Stork SWL, is an operating unit of Stork Materials Technology BV., Amsterdam, The Netherlands, which is a member of the Stork group

Respectfully Submitted


Terry Wilt
Manager, Product Evaluation

POLYHEDRON LABORATORIES[®], INC.

PLASTICS, POLYMERS and RUBBER TESTING

10626 KINGHURST ST. HOUSTON, TX 77099

281-879-8600 • FAX: 281-879-8666

e-mail techsales@polyhedronlab.com

February 19, 2007

Berry Plastics
Corrosion Protection Group
11010 Wallisville Road
Houston, TX 77013

Attn: Mr. Bang Tran


Analytical Report

Dielectric Strength by ASTM D 149 *

<u>Sample No.</u>	<u>Dielectric Breakdown Voltage (kv)</u>	<u>Thickness (mil)</u>	<u>Dielectric Breakdown Strength (v/mil)</u>	<u>Volume Resistivity by ASTM D 257 † (ohm-cm)</u>
Powercrete F1	25.0	46.8	535	$3.061 \times 10^{12} \pm 0.16 \times 10^{12}$
TAR-044-84	26.0	42.8	607	
	26.0	38.9	669	
	25.0	41.6	602	
	24.5	36.4	674	
			AV = 617.4 ± 57.2	

* Immersed in mineral oil

† Kiethly Electrometer Model 610C


Howard Kaye, Ph.D., FAIC
Director

HK/dr

3

Comparison Testing

**COMPILATION OF BERRY PLASTICS* REPORTS
701004, 701234, AND 701933**

Prepared by

Donald Selchow
QA/H&S Manager Oil & Gas

May 11, 2007

*Formally Covalence Adhesives

REPORT NUMBER: 702456

ISSUE: 3

Report re-issued (Issue 3) to reflect company name change from Covalence Adhesives to Berry Plastics at the customer request.

Test Certificate

Berry Plastics
11010 Wallisville Road
Houston, TX 77013
Phone: 713-676-0085
Fax: 713-676-0086

REF No
Ord No

Date Tested
Date Reported

0701004: Issue 3
Verbal Bang Tran

02-23-2007
02-24-2007

Attn: Bang Tran

Item Comparison testing of three (3) pipeline coating products

Specification ASTM G14

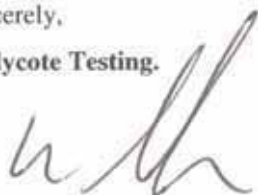
Three (3) pipeline coating products were supplied to Bodycote Testing - Houston North by Bang Tran of Berry Plastics. Bodycote was to witness the preparation, application and perform the testing on samples prepared by Mr. Tran and his associate.

This report has been assembled to record the results of this witnessing and testing of the above-mentioned material.

Should you have any questions or concerns please contact the undersigned at (281) 848-0270 or by email at Donald.Selchow@bodycote.com, at your convenience.

Sincerely,

Bodycote Testing.



Donald H. Selchow
QA/H&S Manager Oil & Gas

Materials Supplied and Tested

Competitor #1 1.0 L Kit
Product ID: Competitor #1
R.G. Base Batch No.: 27100116 (01-16-2007)
Hardener Batch No. 26711208 (1-15-2007)

Competitor #2 1.0 L Kit
Product ID: Competitor #2
Protal Brush Grade Base (part "A") Batch No.: 061060 (use by Dec 2008)
Hardener Competitor #2 (part "B") Batch No.: 06L059 (use by Dec 2008)

Berry Plastics ½ L Kit
Product ID: Powercrete F1
Part "A" Batch No.: 045-60A
Part "B" Batch No.: 044-84B

Samples Prepared

The following blasted metal parts were prepared for each of the 3 materials tested:

24 – 2"x 2"x ≈1/4"
6 – 1"x 8" x ≈1/4"
3* – 6"x 6" x ≈1/4"
6 – 4"x 8" x ≈1/8"

All the blasted metal parts was preheated to a temperature of approximately 160°F prior to coating and the coated was applied within 3 minutes of the samples being removed from the warming oven.

* The Berry Plastics sample only had 2 of the 6"x 6" x ≈1/4" panels coated.

Coating Preparation

Because Competitor #1 and the Competitor #2 came in 1.0 liter kits that did not identify the actual ratio of the material (Part "A" to Part "B") these samples were thoroughly mixed and reloaded into new containers and weighed allowing the ratio of Part "A" to Part "B" to be calculated.

The same thing was done with the Part "B" Hardener to insure the ratio calculation was accurate. The Competitor #1 Part "A" weighed 1100 grams and the Part "B" weighed 265 grams. The Competitor #2 Part "A" weighed in at 1143 grams with the Part "B" weighing 246 grams.

The part "A" material was then measure and weighed to 100-gram batches into containers to be used for the mixing and coating process. The following are the 100-gram coating ratios used to prepare the samples:

Competitor #1	100gm Part "A" to 24.1gm Part "B"
Competitor #2	100gm Part "A" to 21.5gm Part "B"
Berry Plastics Powercrete F1	100gm Part "A" to 36gm Part "B"

Mixing Practice

All the mixing performed during this testing was done by hand. When the mixing process started the time was noted and a timer was started to control the mixing time. The mixing process was started after the Part "B" was added to the Part "A" and hand mixed for 90 seconds and then the coating was transferred to a new, clean container and mixed an additional 90 seconds. The use of a second container was to insure that the sample was completely mixed. Immediately after being mixed the coating was applied to the sample plates, which had just been removed from the warming oven about three (3) minutes previously.

Coating Process

The coating was applied by hand using a plastic applicator with the exception of the 6"x 6" x $\approx 1/4$ " panels which required a 6" wide putty knife. The material was spread first in one direction then the sample was rotated 180 degrees and a second application was laid down. The next sample(s) would then have the coating applied. The coating thickness of the first sample was measured using a hand held thickness gage. All the samples were coated to a thickness of 28 mils as indicated by the thickness gage. Typically this process would take two (2) to three (3) applications of the coating. Once the 28 mils thickness was obtained the time again was recorded and the sample were put aside to harden. 12 samples of the 2"x2"x $1/4$ " panels were placed into a refrigerator to duplicate the application of the material in cold climate environment. These samples were then tested Three (3) days later (see Table 3).

Hardness Testing

During the coating process for each material tested a sample was placed on a plastic sheet and spread out to a thickness of 50 to 100 mils. The time that the sample was mixed was recorded on the plastic sheet. At various times thereafter the Shore hardness was checked. Once the samples achieved Shore "D" Hardness reading of 75 the time was recorded again. This process took place at room temperature (75°F).

Material	Mix time	Last Check Time	Total Time	Result
Competitor #1	12:57 pm	3:00 pm	2 hrs 3 min	*Very soft
Competitor #2	12:08 pm	3:00 pm	2 hrs 52 min	*Soft
Berry Plastics Powercrete F1	12:18 pm	1:30 pm	1 hr 12min	Shore "D" 60
		1:47 pm	1 hr 29 min	Shore "D" 73
		2:00 pm	1 hr 42 min	Shore "D" 75

* Unable to take Shore Hardness reading

Sample Preparation

Table 1 (below) details the Coating Material, the Start Time of the mixing process, the End Time when the coating was applied to the sample at a thickness of 28 Mils, the Total Time to coat the samples and the Samples Coated.

Table 1

Coating Material	Ratio A/B (gms)	Start Time	End Time	Coating Time	Samples Coated
Competitor #1	100/24.1	9:15	9:36	21 min	24 - 2"x2"
Powercrete F1	100/36	9:47	9:59	12 min	24 - 2"x2"
Competitor #1	100/24.1	10:09	10:20	11 min	1-6"x 6" & 6-1"x8"
Competitor #2	100/21.5	10:56	11:03	7 min	24 - 2"x2"
Competitor #1	100/24.1	11:20	11:28	8 min	2 - 6"x6"
Competitor #2	100/21.5	11:50	11:59	9 min	1 -6"x6" & 6-1"x8"
Competitor #2	100/21.5	12:08	12:14	6 min	2 - 6"x6"
Powercrete F1	100/36	12:18	12:26	8 min	1 -6"x6" & 6-1"x8"
Powercrete F1	100/36	12:30	12:35	5 min	1 -6"x6"
Competitor #1	100/24.1	12:57	1:03	6 min	3 - 4"x 8" x 1/8"
Competitor #1	100/24.1	1:08	1:16	8 min	3 - 4"x 8" x 1/8"
Competitor #2	100/21.5	1:20	1:28	8 min	3 - 4"x 8" x 1/8"
Competitor #2	100/21.5	1:37	1:44	7 min	3 - 4"x 8" x 1/8"
Powercrete F1	100/36	1:51	1:59	8 min	3 - 4"x 8" x 1/8"

Impact Testing

Powercrete F1	100/36	2:02	2:10	8 min	3 – 4"x 8" x 1/8"
---------------	--------	------	------	-------	-------------------

The Impact Testing was performed in accordance with ASTM G14 Standard Test Method for Impact Resistance of Pipeline Coatings (Falling Weight Test). Tables 2 & 3 (below) list the results of that testing. Table 1 indicates when the individual coatings reached a Shore 75 reading in minutes after applying on the test plates.

Table 2

Material	Sample Number	Thickness Mils*	Height (inches)	Buzz No Buzz	Pass/ Fail	Comments
Friday 2/23/2007						
Competitor #1	#1	24	6		Fail	Cracked
Application Started: 9:36 am	#2	26	6		Fail	Cracked
Time Tested: 11:35 am	#3	26	5	No Buzz	Pass	Cracked
Set Time: 119 minutes	#4	27	6 ½	Buzz (delayed)	Fail	Crack lines
	#5	27	7	Buzz	Fail	Cracked
	#6	28	7	No Buzz	Pass	Crack lines
Powercrete F1	#1	24	6	No Buzz	Pass	
Application Started: 9:59 am	#2	22	6	Buzz	Fail	
Time Tested: 10:35 am	#3	21	6	No Buzz	Pass	
Set Time 36 minutes	#4	24	7	Buzz	Fail	
	#5	24	6 ½	No Buzz	Pass	1.08 in-lbs/mil
	#6	24	6 ¾	Buzz	Fail	
	#7	28	7 ½	Buzz	Fail	
	#8	30	7 ½	No Buzz	Pass	
Competitor #2	#1	28	7	No Buzz	Pass	
Application Started: 11:03 am	#2	28	7 ¼	No Buzz	Pass	
Time Tested: 2:50 pm	#3	29	7 ½	No Buzz	Pass	
Set Time 227 minutes	#4	23	6 ½	No Buzz	Pass	
	#5	23	6 ¾	Buzz	Fail	
	#6	22	6 ½	No Buzz	Pass	

Note: The weight of the falling ball indenter is 4lbs

* The thickness in Mils was taken prior to testing at the point of impact

Table 3

Material	Sample Number	Thickness Mils*	Height (inches)	Buzz No Buzz	Pass/ Fail	Comments
Monday 2/26/2007 (stored in refrigerator for 3 days @ 40°F)						
Competitor #1	#1	24	7	Buzz	Fail	Cracked & Shattered
	#2	24	6	Buzz	Fail	Cracked & Shattered
	#3	18	6	Buzz	Fail	Cracked & Shattered
	#4	22	4 ½	Buzz	Fail	Cracked & Shattered
Powercrete F1	#1	28	7	No Buzz	Pass	Cracked
	#2	25	6 ¼	No Buzz	Pass	Cracked
	#3	25	6 ½	Buzz	Fail	Cracked
	#4	31	8	Buzz	Fail	Cracked
Competitor #2	#1	21	5 ¼	Buzz	Fail	Cracked & Shattered
	#2	20	5	Buzz	Fail	Cracked & Shattered
	#3	23	5	Buzz	Fail	Cracked & Shattered
	#4	27	6	Buzz	Fail	Cracked & Shattered

* The thickness in Mils was taken prior to testing at the point of impact

Pot Life Test

The Pot Life Test consisted of mixing a typical sample amount (1/2 Liter Kit) for three (3) minutes and letting the sample sit until such time it was no longer useable for application. Table 4 (below) shows the results of this test.

Table 4

Material	Mix Ratio	Start time	Setup Time	Pot Life
Competitor #1	½ Liter Kit	2:21 pm	2:37 pm	16 min
Competitor #2	½ Liter Kit	2:31 pm	2:43 pm	12 min
Berry Plastics Powercrete F1	½ Liter Kit	2:37 pm	2:47 pm	10 min

Observations

Each of the three (3) materials use a different color to identify they're coating. The following are the colors used:

Competitor #1	Light Blue
Competitor #2	Dark Green
Berry Plastics Powercrete F1	Turquoise Green

The surface of the both the Competitor #1 and Competitor #2) appear to have pock-mocks (looks like paint "fish eye") on the surface of the coating which remain even after the coating has set. The Berry Plastics Powercrete F1 exhibited a very smooth clean surface (see Figures 1, 2 & 3 below).

Of the three (3) materials tested the Competitor #1 appeared to be the least viscous and the Berry Plastics Powercrete F1 most viscous (a consistency of peanut butter).

Test Certificate

Berry Plastics

REF No

0701004

: Issue 3

Coating Application**Photographs – Visual Reference**

	Location	Position	Magnification	
After Coating			X N/A	

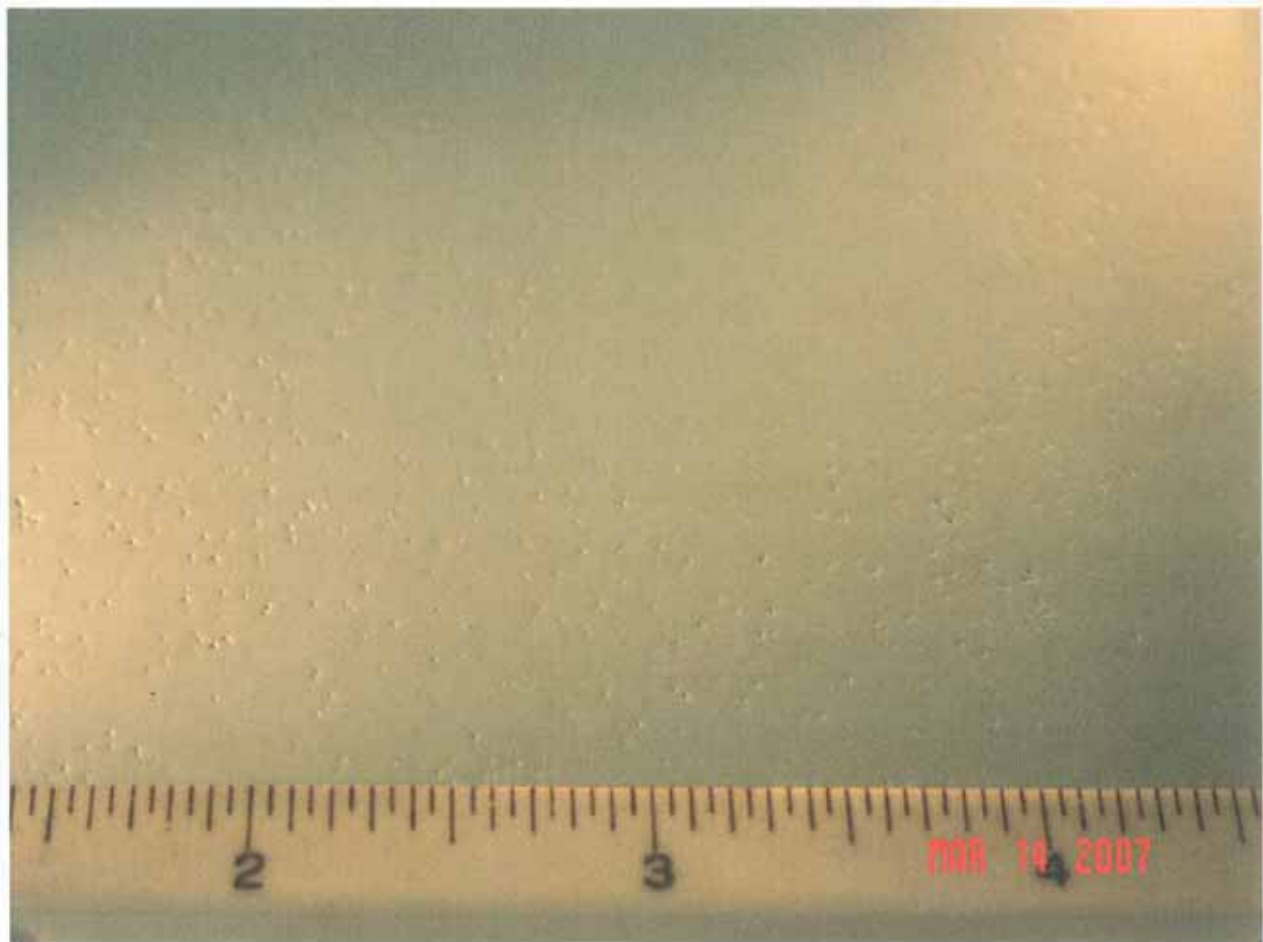


Figure 1.

This photograph depicts the surface of the Competitor #1 coating. Note what appear to be small pits on the surface.

Test Certificate

Berry Plastics

REF No

0701004

: Issue 3

Coating Application**Photographs – Visual Reference**

	Location	Position	Magnification	
After Coating			X N/A	

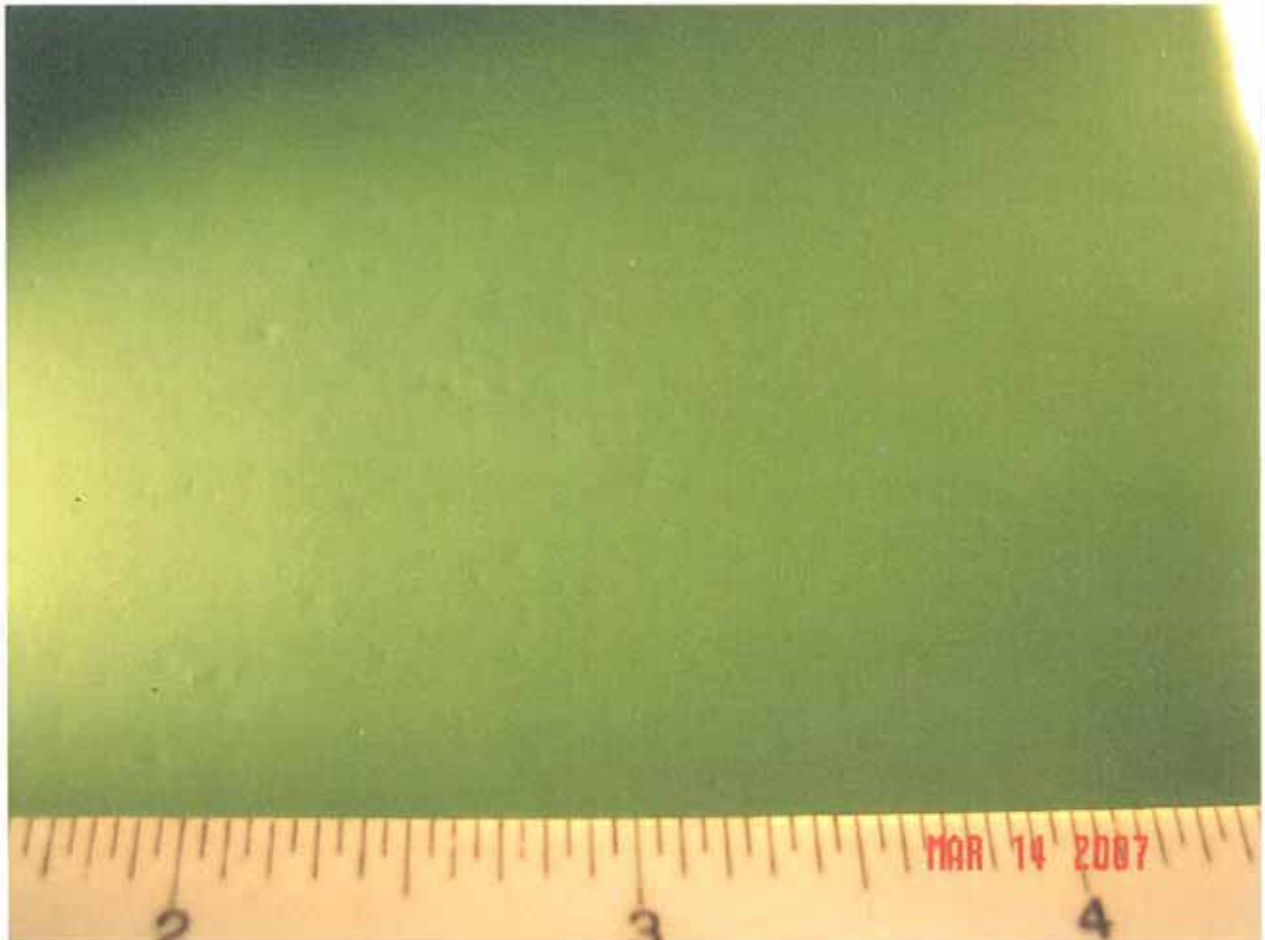


Figure 2.

This photograph shows the surface of the Competitor #2 coating. Note what appears to be “Fish Eye” on the surface.

Test Certificate

Berry Plastics

REF No

0701004

: Issue 3

Coating Application

Photographs – Visual Reference

	Location	Position	Magnification	
After Coating			X N/A	

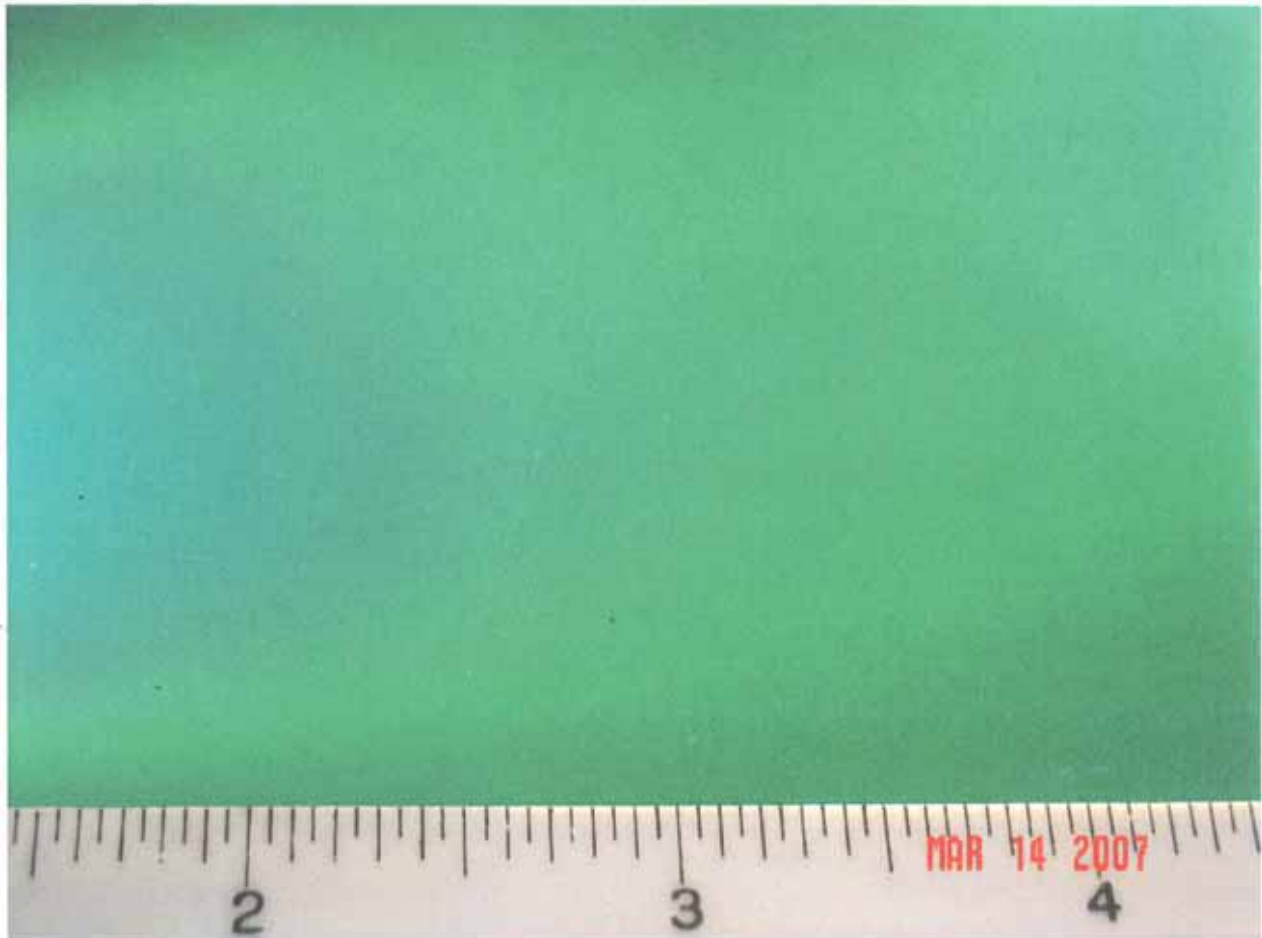


Figure 3.

This photograph displays the surface of the Berry Plastics Powercrete F1 coating. Note the surface of this coating is very smooth with no pits or “Fish Eye”.

Test Certificate

Berry Plastics
11010 Wallisville Road
Houston, TX 77013

REF No 701234 : Issue 3
Ord No

Date Tested 04/13/07
Date Reported 04/17/07

Phone: 713-676-0085
Fax: 713-676-0086
Attn: Bang Tran

Item 9 Coated Panels for CDT testing to ASTM G95 Modified

Specification ASTM G95 Modified

Nine (9) coated panels were supplied by Mr. Bang Tran to Bodycote for the purpose of Cathodic Disbondment Testing to a modified version of ASTM G95-87 (1998) e1.

ASTM G95-87 (1998) e1 Cathodic Disbondment Testing

The nine (9) sample provided by Berry Plastics were tested in accordance with ASTM G95-87 (1998) e1 but modified to the extent that instead of room temperature the samples were tested at 60°C for 30 days. The table below documents the results of this testing and the attached photographs illustrate the condition of the samples after testing (see Figure 1 – 3).

Item	Sample	Coating Thickness	Coating Disbondment
1	PCF-1-1	DFT: 33.3 Mils	Coating Disbondment to 4.0 mmr
2	PCF-1-2	DFT: 29.0 Mils	Coating Disbondment to 4.5 mmr
3	PCF-1-3	DFT: 28.1 Mils	Coating Disbondment to 4.6 mmr
4	Competitor #2-1	DFT: 25.2 Mils	Coating Disbondment to 5.6 mmr
5	Competitor #2-2	DFT: 25.8 Mils	Coating Disbondment to 7.8 mmr
6	Competitor #2-3	DFT: 27.4 Mils	Coating Disbondment to 5.5 mmr
7	Competitor #1-1	DFT: 22.1 Mils	Coating Disbondment to 6.7 mmr
8	Competitor #1-2	DFT: 27.0 Mils	Coating Disbondment to 7.1 mmr
9	Competitor #1-3	DFT: 24.2 Mils	Coating Disbondment to 5.3 mmr

Test Certificate

Berry Plastics

REF No

701234

: Issue 3

Cathodic Disbondment Testing

Photographs – Visual Reference

	Location	Position	Magnification	
After Exposure		After 336 Hours	X N/A	

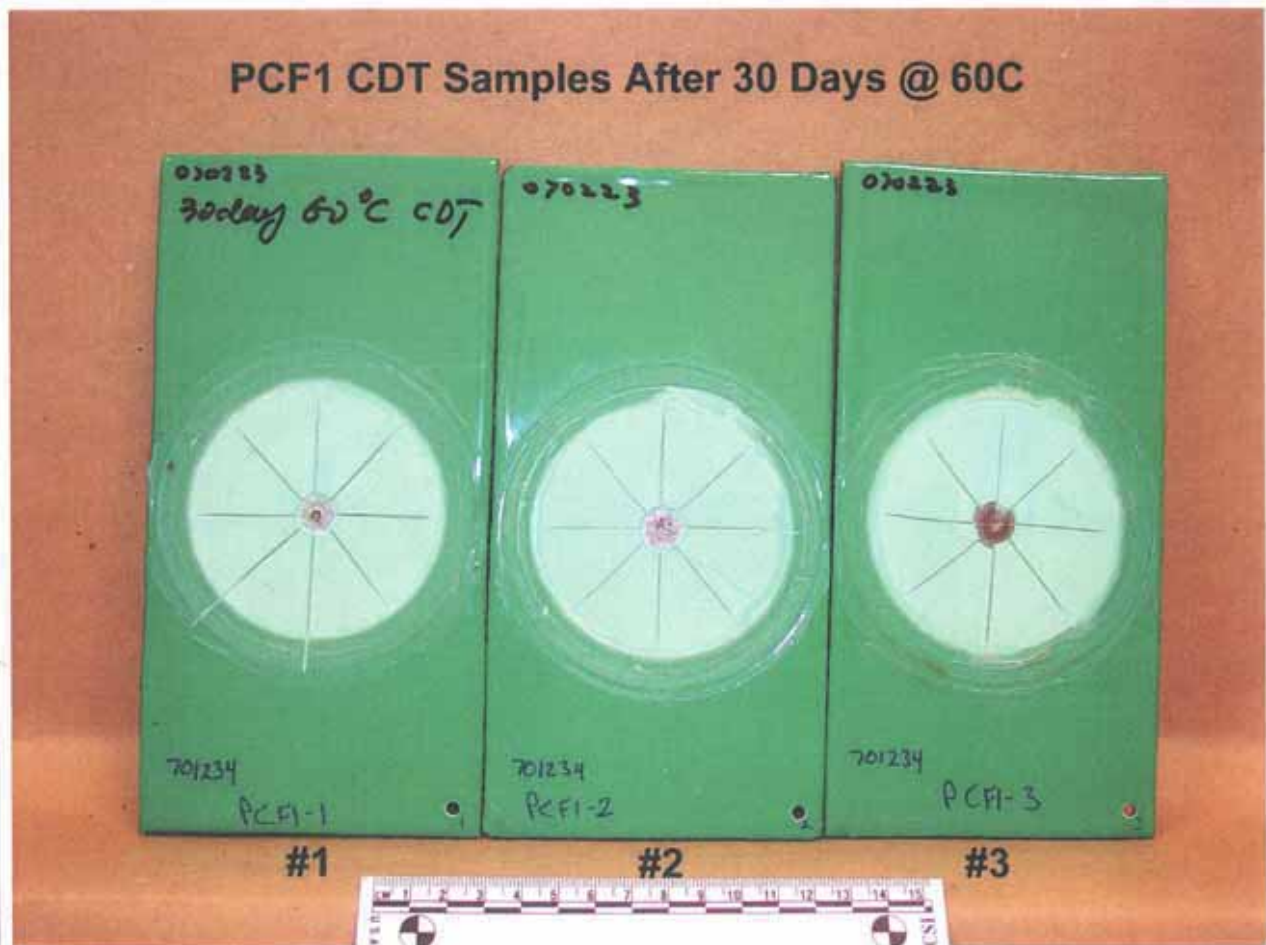


Figure 1
This is the Berry Plastics coating after testing

Test Certificate

Berry Plastics

REF No

701234

: Issue 3

Cathodic Disbondment Testing

Photographs – Visual Reference

	Location	Position	Magnification	
After Exposure		After 336 Hours	X N/A	



Figure 2

These are the Competitor #2 samples after testing

Test Certificate

Berry Plastics

REF No

701234

: Issue 3

Cathodic Disbondment Testing

Photographs – Visual Reference

	Location	Position	Magnification	
After Exposure		After 336 Hours	X N/A	

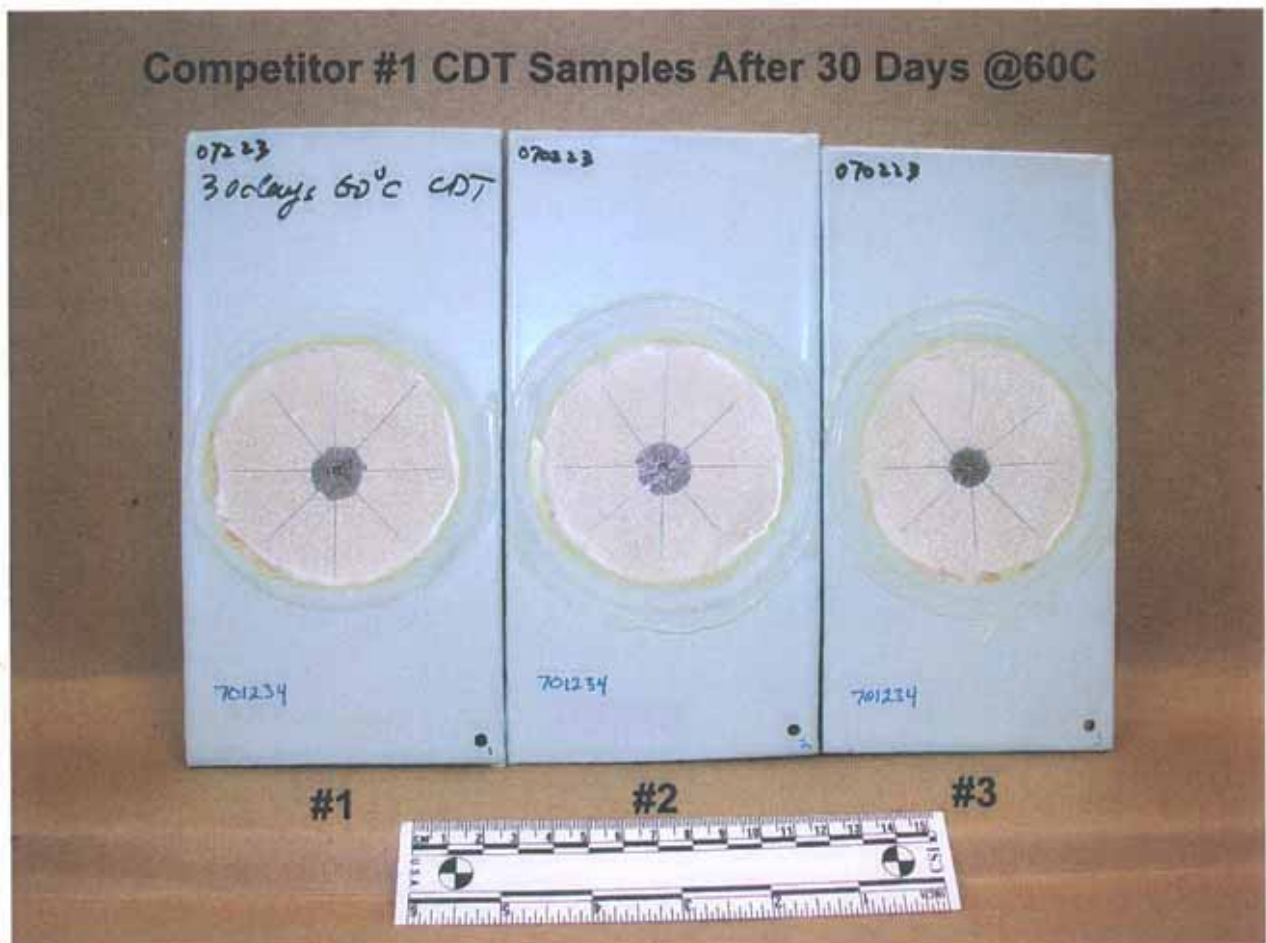


Figure 3

This photograph shows the Competitor #1 samples after testing

Test Certificate

Berry Plastics
11010 Wallisville Road
Houston, TX 77013

REF No 0701933: Issue 3

Ord No 124157

Date Tested 04-25-2007

Date Reported 04-30-2007

Phone: 713-676-0085

Fax: 713-676-0086

Attn: Bang Tran

Item Samples submitted to complete five (5) testing procedures

Specification ASTM D570, D4541, G14, D4060 and NACE RP0394 Appendix H
and Customer Requirement

Several samples were supply by Mr. Bang Tran of Berry Plastics to perform various tests on the Covalence Powercrete F1 pipeline coating as well as Competitor #2 and Competitor #1 pipeline coatings.

Materials Supplied and Tested

Berry Plastics Powercrete F1, Competitor #2 and Competitor #1 material was supplied to perform the following tests:

Water absorption *	ASTM D570	Free-Film (6)
Coating Adhesion	ASTM D4541	3-(6"x 6"x 1/4")
Flexibility	NACE RP0394	9 Pieces
Impact Resistance	ASTM G14	3-(6"x 6"x 1/4")
Abrasion Resistance *	ASTM D4060	6 Pieces

- Note: These samples were prepared by Berry Plastics at their facility.

Water absorption
ASTM D570
Free-Film (6)

Samples dried for 72 hours (over weekend) at 105C prior to immersion.
Immersion in DI water at 60C for 24 hours

Powercrete F1 Ref-045-93

Sample #	Length (in)	Width (in)	Thick (in)	Weight Before (g)	Weight After (g)	Weight Gain (g)	% Increase in Weight
467(001)-1	2 15/16	1.00	0.030	2.4469	2.4877	0.0408	1.67
467(001)-2	3.00	1.00	0.029	2.4451	2.4851	0.0400	1.64
467(001)-3	3.00	1.00	0.029	2.4680	2.5080	0.0400	1.62
467(001)-4	3.00	1 1/16	0.030	2.6002	2.6423	0.0421	1.62
467(001)-5	3.00	1 1/16	0.031	2.6530	2.6930	0.0400	1.51
Average				2.5226	2.5632	0.0406	1.61

Total percentage of water absorbed is 1.61%.

Specimens appeared slightly faded in color after water soak compared to before.

Competitor #2 Ref-045-93

Sample #	Length (in)	Width (in)	Thick (in)	Weight Before (g)	Weight After (g)	Weight Gain (g)	% Increase in Weight
468(002)-1	3	1.00	0.033	2.4606	2.5564	0.0958	3.89
468(002)-2	3.00	1.00	0.031	2.3499	2.4436	0.0937	3.99
468(002)-3	3.00	1.00	0.034	2.4496	2.5413	0.0917	3.74
468(002)-4	3.00	1.00	0.037	2.6613	2.7565	0.0952	3.58
468(002)-5	3.00	1.00	0.042	2.8927	2.9854	0.0927	3.20
Average				2.5628	2.6566	0.0938	3.66

Total percentage of water absorbed is 3.66%.

Specimens appeared slightly faded in color after water soak compared to before.

Competitor #1 Ref-045-93

Sample #	Length (in)	Width (in)	Thick (in)	Weight Before (g)	Weight After (g)	Weight Gain (g)	% Increase in Weight
469(003)-1	2 15/16	1.00	0.048	3.2261	3.2801	0.0540	1.67
469(003)-2	3.00	1.00	0.042	2.7831	2.8353	0.0522	1.88
469(003)-3	3.00	1.00	0.049	3.2806	3.3347	0.0541	1.65
469(003)-4	3.00	1.00	0.046	3.1176	3.1780	0.0604	1.94
469(003)-5	3.00	1.00	0.045	2.7718	2.8208	0.0490	1.77
Average				3.0358	3.0898	0.0539	1.78

Total percentage of water absorbed is 1.78%.

Specimens appeared considerably faded in color after water soak compared to before.

0

Coating Adhesion	ASTM D4541	3-(4"x 8"x 1/8") 1 of each coating
------------------	------------	------------------------------------

Sample	Mils	Average Mils	Failure Mode			Pull Off Strength (PSI)	Mean PSI
			%Glue	%Cohesion	%Adhesion		
Powercrete F1	27.6	27	0	100	0	1944	1893
Powercrete F1	26.2		0	100	0	1460	
Powercrete F1	26.6		5	95	0	2275	
Competitor #2	28.9	27	75	25	0	971	1786
Competitor #2	25.6		15	85	0	2112	
Competitor #2	27.5		40	60	0	2275	
Competitor #1	22.2	23	90	10	0	1460	1569
Competitor #1	24.5		85	15	0	1053	
Competitor #1	23.6		90	10	0	2194	

Flexibility
coating

NACE RP0394

9 Pieces- (1"x 8"x 1/4") 1 of each

Powercrete F1 Ref-070223

Sample #	t = Thickness (mils)					R = Bend	°/PD=
	Point 1	Point 2	Point 3	Point 4	Average	Radius	(57.3*t)/(R-(t/2))
701933 - 473(007)-1	0.273	0.274	0.278	0.279	0.276	48	0.330
701933 - 473(007)-2	0.268	0.268	0.274	0.276	0.272	48	0.325
701933 - 473(007)-3	0.272	0.276	0.277	0.277	0.275	48	0.330
Average	0.271	0.272	0.276	0.277	0.274	48.000	0.328

Competitor #2 Ref-070223

Sample #	t = Thickness (mils)					R = Bend	°/PD=
	Point 1	Point 2	Point 3	Point 4	Average	Radius	(57.3*t)/(R-(t/2))
701933 - 474(008)-1	0.278	0.274	0.274	0.276	0.275	24	0.661
701933 - 474(008)-2	0.277	0.277	0.276	0.277	0.277	36	0.442
701933 - 474(008)-3	0.276	0.274	0.274	0.275	0.275	36	0.439
Average	0.277	0.275	0.274	0.276	0.276	32.000	0.514

Competitor #1 Ref-070223

Sample #	t = Thickness (mils)					R = Bend	°/PD=
	Point 1	Point 2	Point 3	Point 4	Average	Radius	(57.3*t)/(R-(t/2))
701933 - 475(009)-1	0.270	0.270	0.274	0.279	0.273	7.5	2.124
701933 - 475(009)-2	0.279	0.272	0.273	0.274	0.275	6	2.684
701933 - 475(009)-3	0.269	0.268	0.267	0.266	0.267	9	1.728
Average	0.272	0.270	0.271	0.273	0.272	7.500	2.179

Impact Resistance
ASTM G14
3-(6"x 6"x 1/4") 1 of each coating

This testing was performed to a modified version of ASTM G-14. All the testing was performed at room temperature (75°F ± 3°F) using a four (4) pound weight.

Powercrete F1, Sample # 701933-476(010)

Drop Number	Coating Thickness Mils	Height of Drop (in.)	Failed (y/n)	In_lbs / Mil
3	19.4	6	no	1.24
7	22.5	7	no	1.24
4	20.2	7	no	1.39
5	21.2	8	yes	1.51
6	19.1	7.5	yes	1.57
2	20.4	10	yes	1.96
1	20.2	15	yes	2.97

Competitor #2, Sample # 701933-477(011)

Drop Number	Coating Thickness Mils	Height of Drop (in.)	Failed (y/n)	In_lbs / Mil
9	16.3			0.00
1	25.5	10	no	1.57
8	22.7	11	no	1.94
7	20.1	10.5	yes	2.09
2	27.5	15	no	2.18
6	19.1	11	yes	2.30
5	25.2	15.5	yes	2.46
4	22.6	16	yes	2.83
3	24.4	18	yes	2.95

Competitor #1, Sample # 701933-478(012)

Drop Number	Coating Thickness Mils	Height of Drop (in.)	Failed (y/n)	In_lbs / Mil
8	19			0.00
4	24.5	11.5	no	1.88
7	20	9.5	no	1.90
5	24.9	12.25	yes	1.97
1	24.3	12	no	1.98
3	24.2	12.5	yes	2.07
2	24.1	14	yes	2.32
6	20.3	12	yes	2.36

Abrasion Resistance**ASTM D4060****6-(4"x 4"x 1/32") 2 of each coating**

Specimen Powercrete F1 Ref-045-90	Weight Loss (mg)	Wear Index	Mils Loss	Cycles Per Mil
701933 - 479(013)	117.1	117.1	0.85	1176.5
701933 - 480(014)	108.0	108.0	1.05	952.4
Mean	112.55	112.55	0.95	1064.4

Specimen Competitor #2 Ref-045-90	Weight Loss (mg)	Wear Index	Mils Loss	Cycles Per Mil
701933 - 481(015)	59.5	59.5	0.73	1379.3
701933 - 482(016)	52.1	52.1	0.52	1904.8
Mean	55.8	55.8	0.63	1642.0

Specimen Competitor #1 Ref-045-90	Weight Loss (mg)	Wear Index	Mils Loss	Cycles Per Mil
701933 - 483(017)	62.1	62.1	0.92	1081.1
701933 - 484(018)	61.8	61.8	0.89	1126.8
Mean	61.95	61.95	0.91	1103.9

4

Powercrete F-1 Manual Application Guide

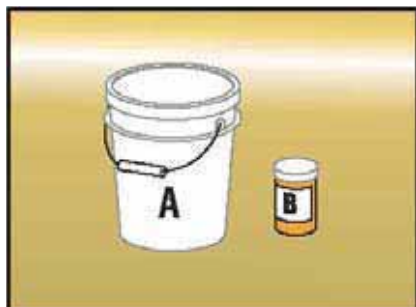
Powercrete® F-1 Girth Welds / Rehabilitation

Liquid Epoxy Coating with Quick Application and Long Term Corrosion Protection of Bare Steel

Powercrete F1 is a 100% solids liquid epoxy coating with quick cure time for efficient, user-friendly application to allow fast backfill. Along with excellent application productivity, F-1 provides sound long term corrosion protection of the bare steel substrate, outstanding adhesion, abrasion, and impact resistance. This two component epoxy can easily achieve a dry film thickness of up to 40+mils in a single application. Product can be applied on bare steel by spray or by hand (brush, roller, and trowel). Powercrete F-1 unique combination of handling and performance is best suited for corrosion protection of new girth welds and rehabilitation of an operational pipeline. For large diameter pipe, please consult a Berry Plastics CPG representative.

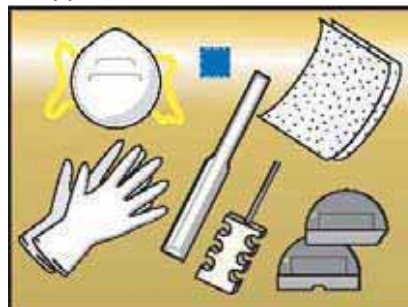
This application guide provides an explanation of the Manual application of Powercrete F-1. For spray application refer to application specifications for plant or field applied Powercrete F-1 over bare steel.

1. Product



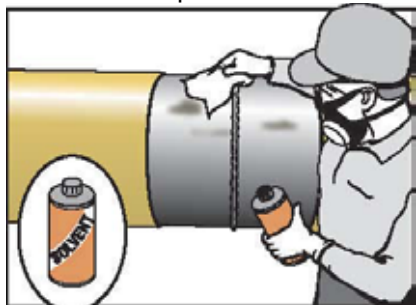
1. The two component epoxy coating is supplied in premeasured kits. Part A (large container) is the base and Part B (small container) is the curing agent. Prior to application ensure that the temperature of both parts is above 20° C (68° F).

2. Application Kit



2. The application kit contains latex gloves, trowels, mixer for electric drill, hand stirrer, wet mil gauge, and disposable face mask

3. Surface Preparation



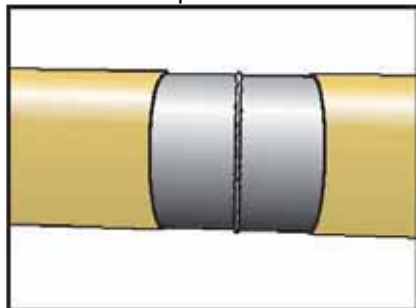
3. Ensure that the surface is clean of grease, oil, salts, and other contaminants. If necessary, use Acetone, MEK or other suitable solvent. Perform cleaning when pipe is 3° C (5° F) above dew point.

4. Surface Preparation



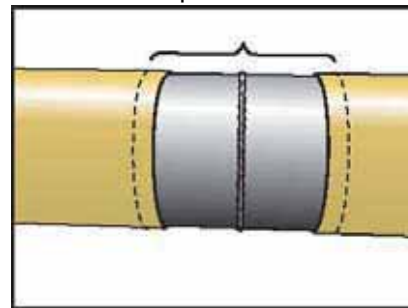
4. Blast clean surface to a near white ISO-8501, NACE No. 2, SA-2 1/2 (SSPC-SP 10) or better using particle blasting (sand or other). Sweep blast adjacent FBE coating 50 mm (2") to either side of bare steel area (cutback).

5. Surface Preparation



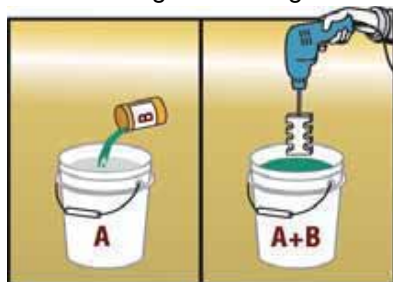
5. Establish a 2.5-4 mils (64-100 microns) surface profile with sharp angularity. Burnishing or polishing must be avoided. Surface preparation can be controlled using surface profile tape. Dry surface and insure ideal surface preparation.

6. Surface Preparation



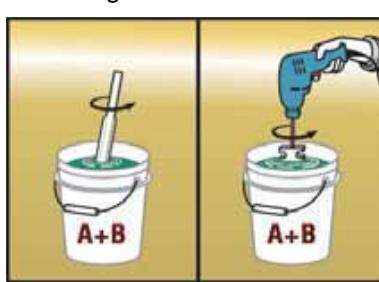
6. While not always necessary, preheating can be useful just prior to application:
 a) to eliminate moisture, preheat the cutback area to approximately 40° C (104° F);
 b) to accelerate curing, preheat the cutback area to approximately 82 ° C (180° F).

7. Combining and Mixing



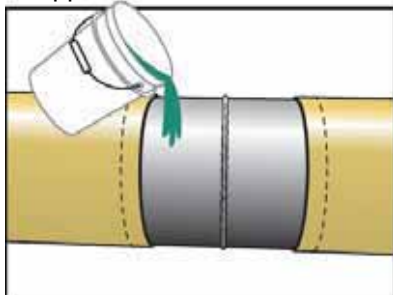
7. If necessary, warm parts A and B to 20° C (68° F). Agitate part B before mixing. Mix by pouring all of part B into part A. Thoroughly scrape container and lid of part B. Slowly begin mixing to avoid introducing air into the mixture.

8. Mixing



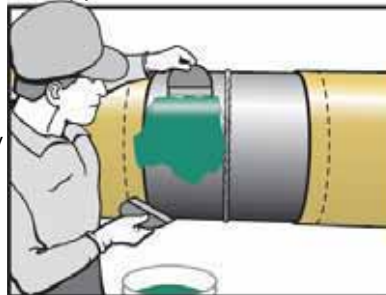
8. Use mixing speed that uniformly blends the 2 parts, but doesn't create a vortex in the mixture or spillage. Mix for 1-2 minutes with a drill mixer or 2-3 minutes with the hand stirrer. Blend both parts to create a uniform color with no streaks.

9. Application



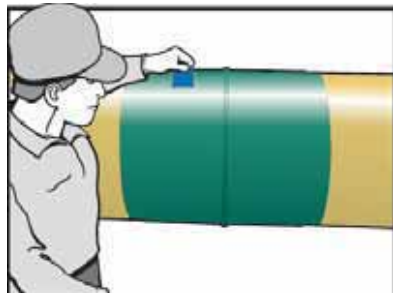
9. Reconfirm that the application temperature is above 10° C (50° F) and 3° C (5° F) above dew point. Slowly pour mixed epoxy onto the pipe. Apply thin film evenly to wet out substrate, then build coating to desired thickness. If the pipe is heated before and during application, F-1 can be applied at temperatures below 10° C (50° F).

10. Application



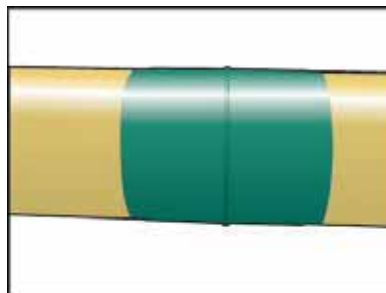
10. Use trowel, brush or roller to apply required minimum thickness of coating. Cover at least 50 mm (2") of the adjacent mainline coating.

11. Thickness Measurement



11. Use a wet mill gauge to measure that the desired minimum thickness has been achieved. Double check around the weld to insure minimum desired thickness.

12. Cure Times



12. The curing rate will vary according to pipe and ambient application temperature. Refer to Cure Chart to determine when to perform a shore D check.

Storage

For optimum performance, store Powercrete® Epoxy products in a dry, well-ventilated area. Maintain products in original packaging and sealed until just before use. Avoid exposure to direct sunlight, rain, snow, dust or other adverse environmental conditions or contaminants.

NOTE: Avoid prolonged storage at temperatures above 40°C (104°F) or below 5°C (40°F).

Safety Guidelines

Important: Read the MSDS prior to using the products. Product installation should be done in well-ventilated area and in accordance with local health and safety regulations. These application guidelines are intended as a guide for standard products. Consult your Berry Plastics CPG representative for specific projects or unique applications.

Berry Plastics warrants that the product conforms to its chemical and physical description and is appropriate for the use stated on the technical data sheet when used in compliance with Berry Plastics written instructions. Since many installation factors are beyond the control of Berry Plastics, the user shall determine the suitability of the products for the intended use and assume all risks and liabilities in connection herewith. Berry Plastics liability is stated in the standard terms and conditions of sale. Berry Plastics makes no other warranty either expressed or implied. All information contained in this technical data sheet is to be used as a guide and is subject to change without notice. This technical data sheet supersedes all previous data sheets on this product.

BERRY
PLASTICS
CORPORATION
AND SUBSIDIARIES
CORROSION PROTECTION GROUP
www.berrycpg.com

Local Distributor / Representative:

For contact details of local Distributors / Representatives
Please visit www.berrycpg.com.

Headquarters : Berry Plastics Tapes & Coatings Division, Franklin MA, USA

Franklin, MA, USA

Tel: +1 508 918 1714
US Toll Free: +1 800 248 0149
Fax: +1 508 918 1910
CPG@berrypastics.com

Houston, TX, USA

Tel: +1 713 676 0085
US Toll Free: 01 888 676 7202
Fax: +1 713 676 0086
CPGH@berrypastics.com

Tijuana, Mexico

Tel US: +1 866 9 CORROSION
Fax US: +1 619 424 4258
Tel Mexico: +52 664 607 0926
Fax Mexico: +52 664 623 6463
CPGTJ@berrypastics.com

Aarschot, Belgium

Tel: +32 16 55 36 00
Fax: +32 16 55 36 74
CPGE@berrypastics.com

Baroda, India

Tel: +91 2667 264721
Fax: +91 2667 264724
CPGIN@berrypastics.com

GEL, RE-COAT AND CURING TIME CHART

This chart provides approximate Gel, Re-coat, and Curing Time based on conditions and procedures outlined below:

1. Keep Part A at 77 °F (25°C) for hand application and 140°F (60°C) for spray application, keep Part B at 77°F (25°C) and warm/cool the High Density Polyethylene Sheet to be used as substrate to the designated temperature.
2. Mix Part A and Part B thoroughly, and pour the mixture on the substrate, spread to about 60 mils thick.
3. Set the mixtures in oven/refrigerator to maintain the temperature of testing.
4. Touch with finger to check gel time and dry time.
5. Cool down/warm up the coating mixture to room temperature 77° F (25° C) and measure the hardness with a Durometer Type "D" that has stabilized after 3 seconds and remains a constant reading of Shore 65 or Shore 75.

Testing Temperature	Application Procedure	Gel Time Unit in minutes	Re-coat Time Window (In minutes from application time of previous coating pass)	Dry Time Unit in minutes	65 Shore "D" Reading Unit in min. except indicated	75 Shore "D" Reading Unit in minutes except indicated
WARNING: UNDER 40°F (4°C) COATING MIXTURE IS FROZEN AND NO CHEMICAL REACTION WILL OCCUR.						
40 °F (4 °C)	Hand	MATERIAL IS TOO VISCOUS, FROZEN LIKE, HARD TO DIFFERENTIATE GELING AND DRYING.				72 hours (Passed Impact 1in-#/mil)
	Spray					72 hours (Passed Impact 1in-#/mil)
50 °F (10 °C)	Hand	40	35th-----85th	180	9 hrs	12 hrs; 16 hours (Shore 78)
	Spray	20	12th-----60th	135	7 hrs	10 hrs; 16 hours (Shore 82)
60 °F (18 °C)	Hand	23	20th-----70th	103	216	273
	Spray	13	10th-----50th	75	185	245
70 °F (21 °C)	Hand	17	15th-----30th	40	104	122
	Spray	11	9th-----28th	38	90	100
77 °F (25 °C)	Hand	12	10th-----27th	37	68	75
	Spray	10	8th-----17th	25	55	70
80 °F (27 °C)	Hand	13	9th-----27th	35	68	75
	Spray	8	6th-----13th	23	50	63
90 °F (32 °C)	Hand	12	9th-----16th	30	56	69
	Spray	7	5th-----10th	14	22	34
100 °F (38 °C)	Hand	11	8th-----14th	23	32	38
	Spray	6	4th-----9th	16	26	36
110 °F (43 °C)	Hand	10	7th-----12th	17	26	32
	Spray	5	3rd-----6th	9	17	20

* At 77° F (25° C) coating requires 7 days to reach fully cured. Coating temperatures lower than 77° F (25° C) will give a false hardness reading. Use a grinder with grinding disk, a cured coating will give out dust particles, while an uncured coating will melt like gum.

WORDRGELTIMEF1070507

Berry Plastics warrants that the product conforms to its chemical and physical description and is appropriate for the use stated on the technical data sheet when used in compliance with Berry Plastics written instructions. Since many installation factors are beyond the control of Berry Plastics, the user shall determine the suitability of the products for the intended use and assume all risks and liabilities in connection herewith. Berry Plastics liability is stated in the standard terms and conditions of sale. Berry Plastics makes no other warranty either expressed or implied. All information contained in this technical data sheet is to be used as a guide and is subject to change without notice. This technical data sheet supersedes all previous data sheets on this product.

5

Powercrete F-1 Spray Application Guide

APPLICATION SPECIFICATION FOR PLANT OR FIELD APPLIED POWERCRETE F-1 OVER BARE STEEL

1.0 Scope

- 1.1 This application guide details the spray application for coating the surface of bare steel pipe or over plant applied main line coatings with Powercrete F-1, a new generation of protective coating material.
- 1.2 Contactor shall furnish all labor, supervision, materials, equipment and related hardware required for completing and acceptable application.
- 1.3 Coating materials shall be plainly and permanently marked, stored, and applied in accordance with the manufacturer's specifications as directed by the Company's authorized representative.

2.0 Definitions

- 2.1 Company—The acceptor of the finished Powercrete F-1 coated pipe, it's employees, contracted inspector or other authorized personnel.
- 2.2 Coating Applicator—the Company responsible for the application of Powercrete F-1 coating.
- 2.3 Manufacturer—The supplier/manufacturer of the Powercrete F-1 materials to be applied.

3.0 Surface Preparation

- 3.1 The surface shall be cleaned of grease, oil, salts and other contaminants. If necessary use Acetone, MEK ,or other suitable solvent. Perform cleaning when pipe is 3°C (5°F) above dew point.
- 3.2 Following cleaning, the surface of the steel shall be particle-blasted (sand or other suitable material). The pipe surface shall not be burnished. Steel surface to be coated shall be cleaned to near-white, ISO-8501-1, NACENo.2, SA-2½, SSPS-SP-10 or better. Surface anchor profile to be 2.5–4mils (63.5–101.6 microns) with sharp angularity.
- 3.3 For tie in coatings or overcoating,sweep blast plant applied mainline coating and adjacent coating 50mm (2") to either side of bare steel area. Mainline coating shall be tapered,cleaned and abraded.
- 3.4 Before applying the Powercrete F-1 coating, the surface shall be subject to inspection for appropriate surface preparation.

4.0 Coating Application

- 4.1 Ensure that the surface is clean of grease, oil, salts and other contaminants. If necessary, use acetone, MEK or other suitable solvent. Perform cleaning when surface is 3°C (5°F) above dew point, with no surface moisture present. While not always necessary, preheating can be useful just prior to application. To eliminate moisture, preheat the area to approximately 40°C(104°F). To accelerate curing, preheat the area to approximately 80°C(175°F).
- 4.2 The dry, clean surface shall be coated with in 4 hours of abrasion.

4.3 Spray Application

- 4.3.1 The Powercrete F-1 components shall be adequately mixed with no air using a shut off valve manifold and 4 x 1/8" mixers connected by "L" bolts or equivalent, with a short whip hose and a 1-M airless gun.
- 4.3.2 Powercrete F-1 shall be spray applied to the abraded, dried, cleaned surface, using adequate atomization.
- 4.3.3 Powercrete F-1 shall be sprayed over the entire bare metal surface to a thin layer of 4-6 mils (101.6–152.4 microns) for better penetration, then shall be built up to the desired thickness.
- 4.3.4 Existing coating shall be overlapped at least 5cm (2").
- 4.3.5 Coated surface shall not be touched for at least 1.5 hours if ambient temperature is above 21°C (70°F), 3 hours at 16-21°C (60-70°F). This curing time can be reduced by applying heat with a heat gun or shrink sleeve torch. Do not raise the temperature in excess of 80°C (180°F). If torch or heat gun is used, keep it moving to avoid scorching the coating.
- 4.3.6 The wet coating shall not be contaminated with particles such as blowing sand, back fill, insects or other foreign materials.
- 4.3.7 Under no circumstances shall the pipe be installed before the Powercrete F-1 coating has reached a minimum Shore D hardness of 75.

5.0 Inspection

- 5.1 All work done shall be subject to inspection and acceptance by the Company's inspector.
- 5.2 The Coating Applicator's quality control inspector shall advise the Applicator's foreman when conditions exist which adversely affect the coating operation with respect to cleaning, application, or material performance, so that immediate corrective measures can be taken.
- 5.3 Holiday checks shall be made using a hot spark detector. The total voltage used for holiday checks will be 100 volts per mil (per NACE RP 0105-2005) and holidays shall be patched as per Section 6 of this guide. The patched holidays shall be retested.
- 5.4 Coating thickness checks shall be made at an ambient temperature with a magnetic pull-off film thickness gauge that has been calibrated within the previous 24 hours, or immediately if mishandled, using a U.S. Bureau of Standard certified coating calibration standard. The thickness of the calibration standard shall be at the upper and lower end of the specified thickness range. Thickness measurements shall be made in accordance with SSPC-PA2, Section 2. The thickness measurements shall be taken along the length of each joint of Powercrete F-1 coated pipe at the 12 o'clock and 6 o'clock positions.
- 5.5 Coating hardness checks shall be made at an ambient temperature with a Shore D Durometer (ASTMD2240), lab calibrated within the previous sixty (60) days and verified daily, in good working condition and with no obvious damage. The checks shall be made at the 12 o'clock and 6 o'clock positions on the surface.

Liquid Epoxy Coating with Quick Application and Long Term Corrosion Protection of Bare Steel

6.0 Repairs

- 6.1 All damage detected by visual and dielectric inspection shall be repaired by the Applicator. Company approved coating mixtures shall be used for patching holidays and damaged coating.
- 6.2 Any areas requiring patching shall be cleaned and abraded by hand tool, file or sandpaper. Steel surface area should be dry, cleaned, and patched with Powercrete F-1 (see manual / kit application guide) Steel surface shall maintain a minimum of 2.5 mil surface profile.
- 6.3 Patches shall overlap the surrounding coating by a minimum of 19 mm (3/4").
- 6.4 Repairs shall be subject to re-inspection at the discretion of the Company inspector.
- 6.5 Areas not meeting the hardness requirement shall be removed using a method that will not damage the pipe.

7.0 Storage

For optimum performance, store Powercrete® epoxy products in a dry, well-ventilated area. Maintain products in original packaging and sealed until just before use. Avoid exposure to direct sunlight, rain, snow, dust or other adverse environmental conditions or contaminants.

NOTE: Avoid prolonged storage at temperatures above 40°C (104°F) or below 5°C (40°F).

Safety Guidelines

Important: Read the MSDS prior to using the products. Product installation should be done in a well-ventilated area and in accordance with local health and safety regulations. These application guidelines are intended as a guide for standard products. Consult your Berry Plastics CPG representative for specific projects or unique applications.

Berry Plastics warrants that the product conforms to its chemical and physical description and is appropriate for the use stated on the technical data sheet when used in compliance with Berry Plastics written instructions. Since many installation factors are beyond the control of Berry Plastics, the user shall determine the suitability of the products for the intended use and assume all risks and liabilities in connection herewith. Berry Plastics liability is stated in the standard terms and conditions of sale. Berry Plastics makes no other warranty either expressed or implied. All information contained in this technical data sheet is to be used as a guide and is subject to change without notice. This technical data sheet supersedes all previous data sheets on this product.



Local Distributor / Representative:

For contact details of local Distributors / Representatives
Please visit www.berrycpg.com.

Headquarters : Berry Plastics Tapes & Coatings Division, Franklin MA, USA

Franklin, MA, USA
Tel: +1 508 918 1714
US Toll Free: +1 800 248 0149
Fax: +1 508 918 1910
CPG@berrypastics.com

Houston, TX, USA
Tel: +1 713 676 0085
US Toll Free: 01 888 676 7202
Fax: +1 713 676 0086
CPGH@berrypastics.com

Tijuana, Mexico
Tel US: +1 866 9 CORROSION
Fax US: +1 619 424 4258
Tel Mexico: +52 664 607 0926
Fax Mexico: +52 664 623 6463
CPGTJ@berrypastics.com

Aarschot, Belgium
Tel: +32 16 55 36 00
Fax: +32 16 55 36 74
CPGE@berrypastics.com

Baroda, India
Tel: +91 2667 264721
Fax: +91 2667 264724
CPGIN@berrypastics.com

6

Theoretical
Usage
Rates

Theoretical Usage Rates

A. Pounds Per Linear Foot Usage at Different Thicknesses and Pipe Diameters (No Waste Included)

OD Size	Pounds Per Linear Foot								
	20 mils	25 mils	30 mils	35 mils	40 mils	45 mils	50 mils	55 mils	60 mils
2" 3/8	0.19	0.22	0.25	0.28	0.31	0.34	0.37	0.40	0.44
2" 7/8	0.23	0.26	0.30	0.34	0.38	0.41	0.45	0.49	0.53
3" 1/2	0.27	0.32	0.37	0.41	0.46	0.50	0.55	0.60	0.64
4" 1/2	0.35	0.41	0.47	0.53	0.59	0.65	0.71	0.77	0.82
6" 5/8	0.52	0.61	0.69	0.78	0.87	0.95	1.04	1.13	1.21
8" 5/8	0.68	0.79	0.90	1.02	1.13	1.24	1.35	1.47	1.58
10" 3/4	0.84	0.99	1.13	1.27	1.41	1.55	1.69	1.83	1.97
12" 3/4	1.00	1.17	1.34	1.50	1.67	1.84	2.00	2.17	2.34
14"	1.10	1.28	1.47	1.65	1.83	2.02	2.20	2.38	2.57
16"	1.26	1.47	1.68	1.88	2.09	2.30	2.51	2.72	2.93
18"	1.41	1.65	1.88	2.12	2.36	2.59	2.83	3.06	3.30
20"	1.57	1.83	2.09	2.36	2.62	2.88	3.14	3.40	3.67
22"	1.73	2.02	2.30	2.59	2.88	3.17	3.46	3.74	4.03
24"	1.88	2.20	2.51	2.83	3.14	3.46	3.77	4.08	4.40
26"	2.04	2.38	2.72	3.06	3.40	3.74	4.08	4.42	4.76
30"	2.36	2.75	3.14	3.53	3.93	4.32	4.71	5.11	5.50
36"	2.83	3.30	3.77	4.24	4.71	5.18	5.65	6.13	6.60
42"	3.30	3.85	4.40	4.95	5.50	6.05	6.60	7.15	7.70
48"	3.77	4.40	5.03	5.65	6.28	6.91	7.54	8.17	8.80
54"	4.24	4.95	5.65	6.36	7.07	7.78	8.48	9.19	9.90
60"	4.71	5.50	6.28	7.07	7.85	8.64	9.42	10.21	11.00

Add Waste Factor: 10 % for Kits; 35% for 2"-12" pipe; 25% for 20" pipe and above

B. Liters Needed to Coat Different Girth Weld Sizes at 25 mils (No Waste Included)

Pipe diameter	Girth Weld Length (cut back + overlap)				
	6"	8"	10"	12"	14"
6"	0.05	0.07	0.09	0.11	0.12
12"	0.10	0.14	0.17	0.21	0.24
20"	0.16	0.22	0.27	0.32	0.38
24"	0.19	0.26	0.32	0.39	0.45
30"	0.24	0.32	0.40	0.48	0.56
36"	0.29	0.39	0.48	0.58	0.68
42"	0.34	0.45	0.56	0.68	0.79
48"	0.39	0.52	0.65	0.77	0.90

C. Theoretical Coverage in Sq. Ft. Per Package Size at Different Thicknesses (No Waste Included)

Package Size	Coverage in sq. ft. at:						
	20 mils	25 mils	30 mils	35 mils	40 mils	45 mils	50 mils
0.5 L Kit	10.1	8.1	6.7	5.8	5.1	4.5	4.0
1L Kit	20.3	16.2	13.5	11.6	10.1	9.0	8.1
2.5L Kit	50.8	40.6	33.8	29.0	25.4	22.6	20.3
Mixed 1 Drum Part A and 0.5 Drum Part B	4769.4	3815.5	3179.6	2725.4	2384.7	2119.7	1907.8

Berry Plastics warrants that the product conforms to its chemical and physical description and is appropriate for the use stated on the technical data sheet when used in compliance with Berry Plastics written instructions. Since many installation factors are beyond the control of Berry Plastics, the user shall determine the suitability of the products for the intended use and assume all risks and liabilities in connection herewith. Berry Plastics liability is stated in the standard terms and conditions of sale. Berry Plastics makes no other warranty either expressed or implied. All information contained in this technical data sheet is to be used as a guide and is subject to change without notice. This technical data sheet supersedes all previous data sheets on this product.

BERRY
PLASTICS
CORPORATION
AND SUBSIDIARIES
CORROSION PROTECTION GROUP
www.berrycpg.com

Local Distributor / Representative:

For contact details of local Distributors / Representatives
Please visit www.berrycpg.com.

Headquarters : Berry Plastics Tapes & Coatings Division, Franklin MA, USA

Franklin, MA, USA

Tel: +1 508 918 1714

US Toll Free: +1 800 248 0149

Fax: +1 508 918 1910

CPG@berryplastics.com

Houston, TX, USA

Tel: +1 713 676 0085

US Toll Free: 01 888 676 7202

Fax: +1 713 676 0086

CPGH@berryplastics.com

Tijuana, Mexico

Tel US: +1 866 9 CORROSION

Fax US: +1 619 424 4258

Tel Mexico: +52 664 607 0926

Fax Mexico: +52 664 623 6463

CPGTJ@berryplastics.com

Aarschot, Belgium

Tel: +32 16 55 36 00

Fax: +32 16 55 36 74

CPGE@berryplastics.com

Baroda, India

Tel: +91 2667 264721

Fax: +91 2667 264724

CPGIN@berryplastics.com

7

Powercrete F-1 Material Safety Data Sheet Part A

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name POWERCRETE F-1 PART A
Manufacturer/Supplier Berry Plastics Corrosion Protection Group
Address 11010 Wallisville Rd.
Houston, TX 77013
Phone Number (713) 676-0085 (Monday – Friday 8:00 am to 5:00 pm)
Chemtrec Number (800) 424-9300
Revision Date: March 27, 2007
MSDS Date: March 1, 2007
This MSDS has been compiled in accordance with - EC Directive 91/155/EC - OSHA's Hazcom Standard (29 CFR 1910.1200)

2. COMPOSITION/INFORMATION ON THE COMPONENTS

Component Name	CAS#/Codes	Concentration	R Phrases	Classification
Bisphenol A, epichlorohydrin polymer	28068-38-6 500-033-5	<45%	R36/38, R43, R51/53	Xi; N
Inorganic compounds	proprietary	>55%	None	None

3. HAZARD IDENTIFICATION

EU Main Hazards

R36/38 Irritating to eyes and skin.
R43 May cause sensitization by skin contact.
R51/53 Toxic to aquatic organisms may cause long-term adverse effects in the aquatic environment.

Routes of Entry

- Eye contact - Skin contact – Inhalation (if aerosolized)

Carcinogenic Status

Not considered carcinogenic by NTP, IARC, and OSHA.

Target Organs

Skin - Eye – Respiratory System (if aerosolized)

Health Effects - Eyes

Liquid, mist or vapor may cause pain, transient irritation and superficial corneal effects.

Health Effects - Skin

Repeated exposure may cause skin irritation. May cause skin sensitization.

Health Effects - Ingestion

If swallowed, may cause mild irritation to the GI tract.

Health Effects - Inhalation

Prolonged repeated exposure may cause irritation.

4. FIRST AID MEASURES

Eyes

Immediately flood the eye with plenty of water for at least 15 minutes, holding the eye open. Obtain medical attention if soreness or redness persists.

4. FIRST AID MEASURES

Skin

Immediately flood the skin with large quantities of water for at least 15 minutes, preferably under a shower. Remove contaminated clothing and continue washing. Contaminated clothing should be washed or dry-cleaned before re-use. Obtain medical attention if blistering occurs or redness persists.

Ingestion

Do not induce vomiting. Have victim drink 1-3 glasses of water to dilute stomach contents. If there is difficulty in breathing, give oxygen. Obtain medical attention immediately.

Inhalation

Remove from exposure. If there is difficulty in breathing, give oxygen. Obtain medical attention immediately.

5. FIRE FIGHTING MEASURES

Extinguishing Media

Use foam, dry chemical or carbon dioxide.

Unusual Fire and Explosion Hazards

Decomposition and combustion products may be toxic.

Protective Equipment for Fire-Fighting

Wear full protective clothing and self-contained breathing apparatus.

6. ACCIDENTAL RELEASE MEASURES

Contain and absorb using earth, sand or other inert material. Transfer into suitable containers for recovery or disposal. Wear appropriate protective clothing. Prevent the material from entering drains or watercourses. Notify authorities if spill has entered watercourse or sewer or has contaminated soil or vegetation. Dispose in accordance with federal, state and local regulations.

7. HANDLING AND STORAGE

Use in well ventilated area. Use local exhaust ventilation. Use appropriate protective clothing. If this product is sprayed, aerosolized or applied to hot surfaces, wear appropriate protective clothing to prevent contact with skin, eyes and respiratory system. Consider the use of respiratory protection, especially during application to hot surfaces. Avoid contact with eyes, skin and clothing. Keep container tightly closed when not in use.

Storage area should be: - cool - dry - well ventilated - away from incompatible materials - out of direct sunlight - away from sources of ignition

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Occupational Exposure Standards

Exposure limits are listed below, if they exist.

Bisphenol A, epichlorohydrin polymer

None established.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Control Measures

Engineering methods to prevent or control exposure are preferred. Methods include process or personnel enclosure, mechanical ventilation (dilution and local exhaust), and control of process conditions.

Respiratory Protection

Wear respiratory protection if there is a risk of exposure to high vapor concentrations, aerosols or if applied to hot surfaces. The specific respirator selected must be based on the airborne concentration found in the workplace and must not exceed the working limits of the respirator.

Hand Protection

Butyl gloves are recommended.

Eye Protection

Chemical goggles or safety glasses with side shields

Body Protection

If there is danger of splashing, wear: - overall or apron

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State	Viscous Liquid
Color	Off white
Odor	Slight
pH	Not applicable
Specific Gravity	1.92 +/- 0.03
Boiling Range/Point (°C/F)	>260°C/500°F
Melting Point (°C/F)	Not determined
Flash Point (PMCC) (°C/F)	Approx. 251°C/484°F (Pensky-Martens)
Vapor Pressure	Approx. 0.03 mbar at 77°C/171°F
Evaporation Rate	Not determined
Solubility in Water	Negligible
Vapor Density (Air = 1)	Not Applicable
Viscosity (cSt)	Not determined
VOC (g/l)	Not determined

10. STABILITY AND REACTIVITY

Stability

Stable under normal conditions.

Conditions to Avoid

- Heat, sparks, flames - contact with incompatibles

Materials to Avoid

Strong oxidizing agents – strong Lewis or mineral acids – strong mineral and organic bases – avoid contact with water

Hazardous Polymerization

Will not occur.

10. STABILITY AND REACTIVITY

Hazardous Decomposition Products

oxides of carbon - aldehydes

11. TOXICOLOGICAL INFORMATION

Acute Toxicity

Low order of acute toxicity.

Chronic Toxicity/Carcinogenicity

This product is not expected to cause long term adverse health effects.

Genotoxicity

This product is not expected to cause any mutagenic effects.

Reproductive/Developmental Toxicity

This product is not expected to cause adverse reproductive effects.

12. ECOLOGICAL INFORMATION

Mobility

No relevant studies identified.

Persistence/Degradability

No relevant studies identified.

Bio-accumulation

No relevant studies identified.

Ecotoxicity

No data available.

13. DISPOSAL

For disposal of residual product, mix (by volume) 2 parts Powercrete F-1 Part A with 1 part Powercrete F-1 Part B and allow to solidify in well ventilated area. Dispose of in accordance with all applicable local and national regulations. Labels should not be removed from containers until they have been cleaned. Empty containers may contain hazardous residues. Dispose of containers with care.

14. TRANSPORT INFORMATION

DOT CFR 172.101 Data

Not Regulated

UN Proper Shipping Name

Not Regulated

UN Class

None.

UN Number

None.

UN Packaging Group

None.

**Classification for Air
Transportation (IATA)**

Consult current IATA Regulations prior to shipping by air.

15. REGULATORY INFORMATION

EU Label Information

Classification and labelling have been performed according to EU directives 67/548/EEC and 99/45/EC including amendments.

EU Hazard Symbol and Indication of Danger

Xi, N Irritant and Dangerous to the Environment

R phrases

R36/38 – Irritating to eyes and skin

R43 – May cause sensitization by skin contact

R51/53 – Toxic to aquatic organisms. May cause long-term adverse effects in the aquatic environment.

S phrases

S(02) - Keep out of reach of children.

S24 – Avoid contact with skin.

S28 – After contact with skin, wash immediately with plenty of water and soap.

S37/39 – Wear suitable gloves and eye/face protection

S(46) – (If swallowed, seek medical advice immediately and show this container or label)

S61 – Avoid release to the environment.

US REGULATIONS (Federal, State) and INTERNATIONAL CHEMICAL REGISTRATION LAWS

TSCA Listing

All ingredients have been verified for inclusion on the EPA Toxic Substance Control Act Chemical Substance Inventory.

EINECS Listing

All ingredients in this product have been verified for inclusion on the European Inventory of Existing Commercial Chemical Substances (EINECS) or specifically exempted.

DSL (Canadian) Listing

All ingredients in this product have been verified for inclusion on the Domestic Substance List (DSL).

California Proposition 65

This product contains materials which the State of California has found to cause cancer, birth defects or other reproductive harm - Crystalline silica (14808-60-7) 0.004% - phenyl glycidyl ether (122-60-1) <6 ppm

SARA Title III Sect. 302 (EHS)

This product does not contain any chemicals subject to SARA Title III Section 302.

SARA Title III Sect. 304

The following chemicals have reportable quantities: none

SARA Title III Sect. 311/312 Categorization

Immediate (Acute) Health Hazard, Delayed (Chronic) Health Hazard

SARA Title III Sect. 313

This product does not contain any chemicals that are listed in Section 313 at or above de minimis concentrations.

16. OTHER INFORMATION

NFPA Ratings

NFPA Code for Flammability - 0

NFPA Code for Health - 1

NFPA Code for Reactivity - 0

NFPA Code for Special Hazards – None

16. OTHER INFORMATION

HMIS Ratings

HMIS Code for Flammability - 0

HMIS Code for Health - 1

HMIS Code for Reactivity - 0

HMIS Code for Personal Protection - See Section 8

Abbreviations

N/A: Denotes no applicable information found or available

CAS#: Chemical Abstracts Service Number

ACGIH: American Conference of Governmental Industrial Hygienists

OSHA: Occupational Safety and Health Administration

TLV: Threshold Limit Value

PEL: Permissible Exposure Limit

STEL: Short Term Exposure Limit

NTP: National Toxicology Program

IARC: International Agency for Research on Cancer

R: Risk

S: Safety

For further information email: Technical.Adhesives@berryplastics.com

Prepared By: EnviroNet LLC.

The information and recommendations presented in this MSDS are based on sources believed to be accurate. Berry Plastics Corrosion Protection Group assumes no liability for the accuracy or completeness of this information. It is the user's responsibility to determine the suitability of the **material** for their particular purposes. In particular, we make **NO WARRANTY OF MERCHANTABILITY OR ANY OTHER WARRANTY, EXPRESS OR IMPLIED**, with respect to such information, and we assume no liability resulting from its use. Users should ensure that any use **or disposal** of the material is in accordance with applicable Federal, State, and local laws and regulations.

Berry Plastics warrants that the product conforms to its chemical and physical description and is appropriate for the use stated on the technical data sheet when used in compliance with Berry Plastics written instructions. Since many installation factors are beyond the control of Berry Plastics, the user shall determine the suitability of the products for the intended use and assume all risks and liabilities in connection herewith. Berry Plastics liability is stated in the standard terms and conditions of sale. Berry Plastics makes no other warranty either expressed or implied. All information contained in this technical data sheet is to be used as a guide and is subject to change without notice. This technical data sheet supersedes all previous data sheets on this product.

8

Powercrete F-1
Material
Safety
Data Sheet
Part B

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name POWERCRETE F-1 PART B
Manufacturer/Supplier Berry Plastics Corrosion Protection Group
Address 11010 Wallisville Rd.
Houston, TX 77013
Phone Number (713) 676-0085 (Monday – Friday 8:00 am to 5:00 pm)
Chemtrec Number (800) 424-9300
Revision Date: March 27, 2007
MSDS Date: February 28, 2007
This MSDS has been compiled in accordance with - EC Directive 91/155/EC - OSHA's Hazcom Standard (29 CFR 1910.1200)

2. COMPOSITION/INFORMATION ON THE COMPONENTS

Component Name	CAS#/Codes	Concentration	R Phrases	Classification
Alkyl Amine	Proprietary	20-65%	R20/21/22 R34,R43,R68	C
Inorganic compounds	Proprietary	20-55%	None	None
Nitrate Compound	Proprietary	<3%	None	None
Ethanol	64-17-5 200-578-6	<3%	R11	F
Dye Compound	Proprietary	<3%	None	None

3. HAZARD IDENTIFICATION

EU Main Hazards

R20/21/22 Harmful by inhalation, in contact with skin and if swallowed
R34 Causes burns.
R43 May cause sensitization by skin contact.
R68 – Possible risk of irreversible effects.

Routes of Entry

- Eye contact - Ingestion - Skin contact – Inhalation - Absorption

Carcinogenic Status

Not considered carcinogenic by NTP, IARC, and OSHA.

Target Organs

Skin — Eye — Respiratory System – Nervous System - Liver

Health Effects - Eyes

Corrosive to eyes. Contact may cause severe damage including blindness. Vapors may be irritating.

Health Effects - Skin

Contact may cause severe irritation, dermatitis and chemical burns. May cause allergic skin reaction. Allergies, eczema and skin conditions may be aggravated by exposure to this product.

3. HAZARD IDENTIFICATION

Health Effects - Ingestion

Swallowing may cause severe burns and permanent damage to the mouth, throat and stomach. May be moderately toxic if swallowed. May cause central nervous system effects such as headache, nausea dizziness, confusion and breathing difficulties. Chronic exposure can result in liver damage.

Health Effects - Inhalation

Vapors may be severely corrosive to the respiratory tract. May cause respiratory tract burns. Repeated exposure may cause lung damage. May be toxic if inhaled. May cause central nervous system effects such as headache, nausea dizziness, confusion and breathing difficulties.

4. FIRST AID MEASURES

Eyes

Immediately flood the eye with plenty of water for at least 20 minutes, holding the eye open. Obtain medical attention if soreness or redness persists.

Skin

Immediately flood the skin with large quantities of water for at least 20 minutes, preferably under a shower. Remove contaminated clothing and continue washing. Contaminated clothing should be washed or dry-cleaned before re-use. Obtain medical attention if blistering occurs or redness persists.

Ingestion

Do not induce vomiting unless directed to do so by medical personnel. Have victim drink 1-3 glasses of water to dilute stomach contents. If there is difficulty in breathing, give oxygen. Obtain medical attention immediately.

Inhalation

Remove from exposure. If there is difficulty in breathing, give oxygen. Obtain medical attention immediately.

5. FIRE FIGHTING MEASURES

Extinguishing Media

Use foam, dry chemical or carbon dioxide.

Unusual Fire and Explosion Hazards

Decomposition and combustion products may be toxic.

Protective Equipment for Fire-Fighting

Wear full protective clothing and self-contained breathing apparatus.

6. ACCIDENTAL RELEASE MEASURES

Contain and absorb using earth, sand or other inert material. Transfer into suitable containers for recovery or disposal. Wear appropriate protective clothing. Prevent the material from entering drains or watercourses. Notify authorities if spill has entered watercourse or sewer or has contaminated soil or vegetation. Dispose in accordance with federal, state and local regulations.

7. HANDLING AND STORAGE

Use in well ventilated area. Use local exhaust ventilation. Use appropriate protective clothing. If this product is sprayed, aerosolized or applied to hot surfaces, wear appropriate protective clothing to prevent contact with skin, eyes and respiratory system. Consider the use of respiratory protection, especially during application to hot surfaces as volatile organic chemicals may be released. Avoid contact with eyes, skin and clothing. Keep container tightly closed when not in use.

Storage area should be: - cool - dry - well ventilated - away from incompatible materials - out of direct sunlight - away from sources of ignition

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Occupational Exposure Standards

Exposure limits are listed below, if they exist

Alkyl Amine

None established.

Ethanol

ACGIH: TLV 1000 ppm (1880 mg/m³) 8 hr TWA

OSHA : PEL 1000 ppm (1900 mg/m³) 8 hr TWA

Engineering Control Measures

Engineering methods to prevent or control exposure are preferred. Methods include process or personnel enclosure, mechanical ventilation (dilution and local exhaust), and control of process conditions.

Respiratory Protection

Wear respiratory protection if there is a risk of exposure to high vapor concentrations, aerosols or if applied to hot surfaces. A NIOSH approved full face respirator may be worn. The specific respirator selected must be based on the airborne concentration found in the workplace and must not exceed the working limits of the respirator.

Hand Protection

Butyl gloves are recommended.

Eye Protection

Chemical goggles or safety glasses with side shields. Consider the use of a face shield if splashing is possible.

Body Protection

If there is danger of splashing, wear: - overall or apron

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State	Viscous liquid
Color	Green
Odor	Amine odor
pH	Alkaline
Specific Gravity	1.38 +/-0.03
Boiling Range/Point (°C/F)	Not determined
Melting Point (°C/F)	Not determined
Flash Point (PMCC) (°C/F)	> 200/392
Vapor Pressure(mm HG)at (°C/F)	< 1 mm Hg at 20/68

9. PHYSICAL AND CHEMICAL PROPERTIES

Evaporation Rate	Not determined
Solubility in Water	Slightly miscible
Vapor Density (Air = 1)	Heavier than air.
VOC (g/l)	Not determined

10. STABILITY AND REACTIVITY

Stability

Stable under normal conditions.

Conditions to Avoid

- Heat, sparks, flames - contact with incompatible chemicals

Materials to Avoid

- strong oxidizing agents - acids

Hazardous Polymerization

Will not occur.

Hazardous Decomposition Products

- oxides of carbon - aldehydes – nitrogen oxides – organic compounds

11. TOXICOLOGICAL INFORMATION

Acute Toxicity

Alkyl amine: Oral LD50(rat): 400 < LD50 ≤ 2000 mg/kg

Dermal LD50: >2000 mg/kg

Inhalation LC50: 1 < LC50 ≤ 5 mg/l

Chronic Toxicity/Carcinogenicity

Not expected to cause long term adverse health effects.

Genotoxicity

This product is not expected to cause any mutagenic effects.

Reproductive/Developmental Toxicity

This product is not expected to cause adverse reproductive effects.

12. ECOLOGICAL INFORMATION

Mobility

No relevant studies identified.

Persistence/Degradability

Alkyl amine: Expected to be not readily biodegradable.

Bio-accumulation

Alkyl amine: Not expected to bioaccumulate significantly.

Ecotoxicity

Alkyl amine: Toxicity to fish: 10 < LC/EC/IC 50 ≤ 100 mg/l

Toxicity to algae: 10 < LC/EC/IC 50 ≤ 100 mg/l

Acute toxicity- in vertebrates: 10 < LC/EC/IC 50 ≤ 100 mg/l

13. DISPOSAL

For disposal of residual product, mix (by volume) 2 parts Powercrete F-1 Part A with 1 part Powercrete F-1 Part B and allow to solidify in well ventilated area. Dispose of in accordance with all applicable local and national regulations. Labels should not be removed from containers until they have been cleaned. Empty containers may contain hazardous residues. Dispose of containers with care.

14. TRANSPORT INFORMATION

DOT CFR 172.101 Data	Polyamines, liquid, corrosive, n.o.s. (polyalkyl amine) (8) UN2735, PGII
UN Proper Shipping Name	Polyamines, liquid, corrosive, n.o.s. (polyalkyl amine)
UN Class	8 (corrosive)
UN Number	UN2735
UN Packaging Group	II
Classification for AIR Transportation (IATA)	Consult current IATA Regulations prior to shipping by air.

15. REGULATORY INFORMATION-EU

EU Label Information

Classification and labelling have been performed according to EU directives 67/548/EEC and 99/45/EC including amendments.

EU Hazard Symbol and Indication of Danger

C - Corrosive

R phrases

R20/21/22 Harmful by inhalation, in contact with skin and if swallowed

R34 Causes burns.

R43 May cause sensitization by skin contact.

R68 – Possible risk of irreversible effects.

S phrases

S23 Do not breathe vapour.

S26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

S36/37/38 Wear suitable protective clothing, gloves and eye/face protection.

S45 In case of accident or if you feel unwell, seek medical advice.

15. REGULATORY INFORMATION-US

US REGULATIONS (Federal, State) and INTERNATIONAL CHEMICAL REGISTRATION LAWS

TSCA Listing

All ingredients have been verified for inclusion on the EPA Toxic Substance Control Act Chemical Substance Inventory.

EINECS Listing

All ingredients in this product have not been verified for inclusion on the European Inventory of Existing Commercial Chemical Substances (EINECS).

15. REGULATORY INFORMATION

DSL (Canadian) Listing

All ingredients in this product have not been verified for inclusion on the Domestic Substance List (DSL).

California Proposition 65

This product contains materials which the State of California has found to cause cancer, birth defects or other reproductive harm - Crystalline silica (14808-60-7) 0.003%

SARA Title III Sect. 302 (EHS)

The following chemicals have reportable quantities : None

SARA Title III Sect. 304

This product does not contain any chemicals subject to SARA Title III Section 304.

SARA Title III Sect. 311/312 Categorization

Immediate (Acute) Health Hazard, Delayed (Chronic) Health Hazard

SARA Title III Sect. 313

This product contains a chemical that is listed in Section 313 at or above de minimis concentrations. The following listed chemicals are present: None

16. OTHER INFORMATION

NFPA Ratings

NFPA Code for Flammability - 1

NFPA Code for Health - 3

NFPA Code for Reactivity - 0

NFPA Code for Special Hazards – None

HMIS Ratings

HMIS Code for Flammability - 1

HMIS Code for Health - 3

HMIS Code for Reactivity - 0

HMIS Code for Personal Protection - See Section 8

Abbreviations

N/A: Denotes no applicable information found or available

CAS#: Chemical Abstracts Service Number

ACGIH: American Conference of Governmental Industrial Hygienists

OSHA: Occupational Safety and Health Administration

TLV: Threshold Limit Value

PEL: Permissible Exposure Limit

STEL: Short Term Exposure Limit

NTP: National Toxicology Program

IARC: International Agency for Research on Cancer

R: Risk

R11: Highly Flammable

F: Highly Flammable

S: Safety

16. OTHER INFORMATION

For further Information email: Technical.Adhesives@berryplastics.com

Prepared By: EnviroNet LLC.

The information and recommendations presented in this MSDS are based on sources believed to be accurate. Berry Plastics Corrosion Protection Group assumes no liability for the accuracy or completeness of this information. It is the user's responsibility to determine the suitability of the **material** for their particular purposes. In particular, we make NO WARRANTY OF MERCHANTABILITY OR ANY OTHER WARRANTY, EXPRESS OR IMPLIED, with respect to such information, and we assume no liability resulting from its use. Users should ensure that any use **or disposal** of the material is in accordance with applicable Federal, State, and local laws and regulations.

Berry Plastics warrants that the product conforms to its chemical and physical description and is appropriate for the use stated on the technical data sheet when used in compliance with Berry Plastics written instructions. Since many installation factors are beyond the control of Berry Plastics, the user shall determine the suitability of the products for the intended use and assume all risks and liabilities in connection herewith. Berry Plastics liability is stated in the standard terms and conditions of sale. Berry Plastics makes no other warranty either expressed or implied. All information contained in this technical data sheet is to be used as a guide and is subject to change without notice. This technical data sheet supersedes all previous data sheets on this product.

Local Distributor / Representative:

For contact details of local Distributors / Representatives
Please visit www.berrycpg.com.

Headquarters : Berry Plastics Tapes & Coatings Division, Franklin MA, USA

Franklin, MA, USA
Tel: +1 508 918 1714
US Toll Free: +1 800 248 0149
Fax: +1 508 918 1910
CPG@berryplastics.com

Houston, TX, USA
Tel: +1 713 676 0085
US Toll Free: 01 888 676 7202
Fax: +1 713 676 0086
CPGH@berryplastics.com

Tijuana, Mexico
Tel US: +1 866 9 CORROSION
Fax US: +1 619 424 4258
Tel Mexico: +52 664 607 0926
Fax Mexico: +52 664 623 6463
CPGTJ@berryplastics.com

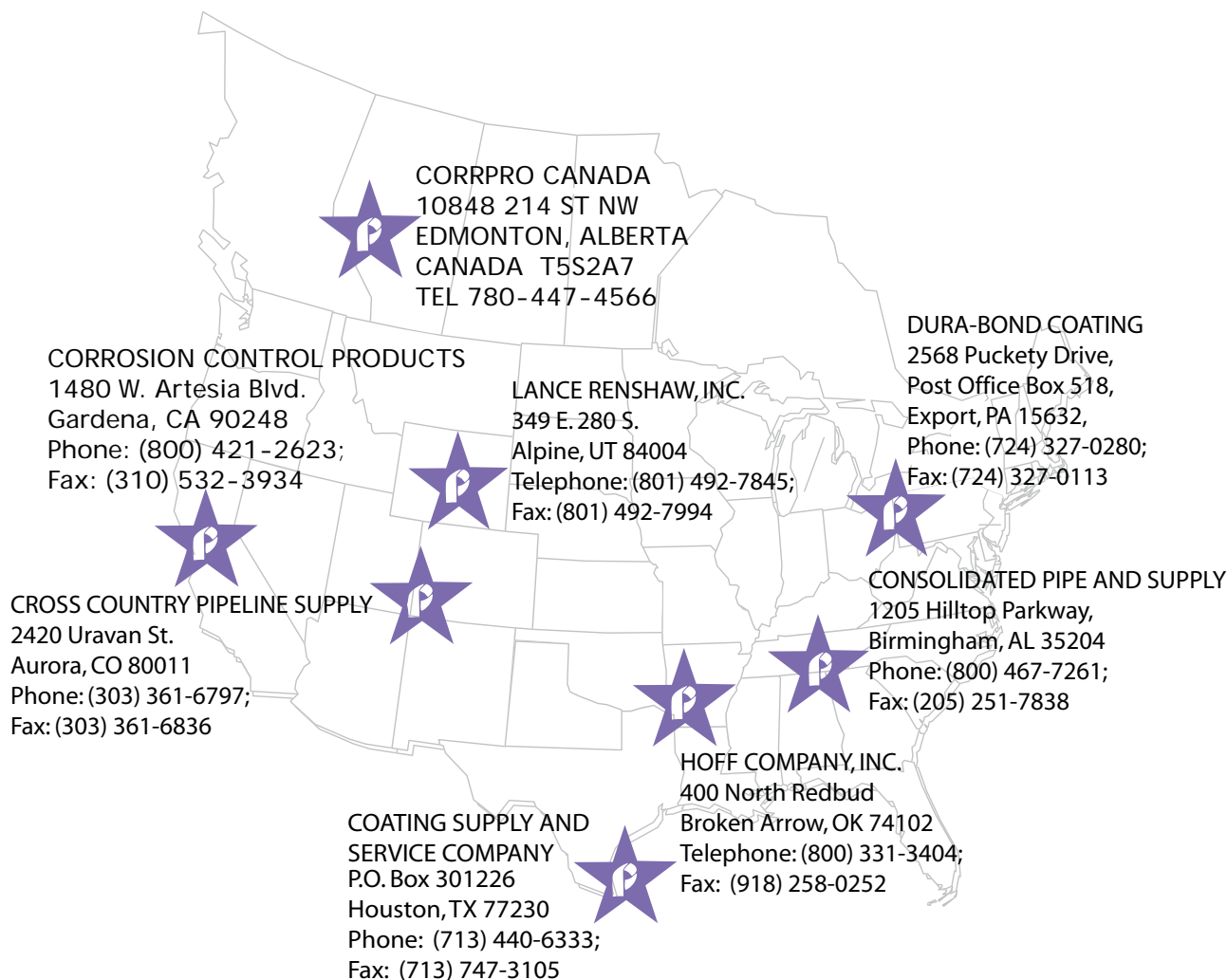
Aarschot, Belgium
Tel: +32 16 55 36 00
Fax: +32 16 55 36 74
CPGE@berryplastics.com

Baroda, India
Tel: +91 2667 264721
Fax: +91 2667 264724
CPGIN@berryplastics.com

9

North American
Distributors for
Powercrete F-1

Powercrete F-1 Distributors In North America



BERRYTM
PLASTICS
CORPORATION
AND SUBSIDIARIES
CORROSION PROTECTION GROUP
www.berrycpg.com

Headquarters : Berry Plastics Tapes & Coatings Division, Franklin MA, USA

Franklin, MA, USA
Tel: +1 508 918 1714
US Toll Free: +1 800 248 0149
Fax: +1 508 918 1910
CPG@berryplastics.com

Houston, TX, USA
Tel: +1 713 676 0085
US Toll Free: 01 888 676 7202
Fax: +1 713 676 0086
CPGH@berryplastics.com

Tijuana, Mexico
Tel US: +1 866 9 CORROSION
Fax US: +1 619 424 4258
Tel Mexico: +52 664 607 0926
Fax Mexico: +52 664 623 6463
CPGTJ@berryplastics.com

Aarschot, Belgium
Tel: +32 16 55 36 00
Fax: +32 16 55 36 74
CPGE@berryplastics.com

Baroda, India
Tel: +91 2667 264721
Fax: +91 2667 264724
CPGIN@berryplastics.com

10

Berry Plastics
Corrosion
Protection
Group
Locations

Global Berry CPG Locations



www.berrycpg.com

Franklin, MA, USA
Tel: +1 508 918 1714
US Toll Free: +1 800 248 0149
Fax: +1 508 918 1910
Email: CPG@berryplastics.com

Houston, TX, USA
Tel: +1 713 676 0085
US Toll Free: 01 888 676 7202
Fax: +1 713 676 0086
E-mail: CPGH@berryplastics.com

Tijuana, Mexico
Tel US: +1 866 9 CORROSION
Fax US: +1 619 424 4258
Tel Mexico: +52 664 607 0926
Fax Mexico: +52 664 623 6463
Email: CPGTJ@berryplastics.com

Latin America Regional Office
Buenos Aires, Argentina
Tel: +54 11 48 11 50 00
Fax: +54 11 48 14 50 20
E-mail: CPGA@berryplastics.com

Aarschot, Belgium
Tel: +32 16 55 36 00
Fax: +32 16 55 36 74
E-mail: CPGE@berryplastics.com

Germany
Westring 216
44579 Castrop-Rauxel
Germany
Tel: +49 2305 92341 14
Fax: +49 2305 92341 26

Baroda, India
Tel: +91 2667 264721
Fax: +91 2667 264724
E-mail: CPGIN@berryplastics.com

Sales Office New Delhi
Tel: +91 120 305 8035
Fax: +1 713 676 0086
E-mail: CPGIN@berryplastics.com

Sales Office Saudi Arabia
Tel: +966 3 812 2044
Fax: +966 3 812 2245
Email: CPIN@berryplastics.com

Raychem Beijing
North Tower of Grand Pacific Building
8A, Guanghau Road, Chao Yang District
100026 Beijing, China
Tel: 86 10 658 15 606 ext.3017
Fax 86 10 658 15 608