



Powercrete[®] DD

Abrasion Resistant Overlay



Directional Drilling



Thrust (Slick) Bore



Pipeline Protection in
Any Severe Handling
Application



BERRY
PLASTICS
CORPORATION
AND SUBSIDIARIES

CORROSION PROTECTION GROUP

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Product
Data Sheet of
Powercrete DD

Powercrete® DD Abrasion Resistant Overlay

Liquid Epoxy Coating for the Protection of Fusion Bonded Epoxy in Directional Drilling Applications



Product Description

Powercrete is a tough liquid epoxy ARO (Abrasion Resistant Overlay) coating designed to protect FBE coated pipe during directional drilling applications to the: thrust bore, slick bore, river crossings. The product is applied directly on corrosion protection coating (FBE) to form a strong high-performance to the system capable to withstand rough terrain conditions - in directional drilling projects. **Powercrete DD** offers exceptional abrasion, strong, hardness, impact resistance, and adhesion properties when tested in the lab and more importantly under severe field applications. Since 1990 Powercrete has played a vital part of any successful horizontal directional drilling application in the US .

Typical Applications

- Directional Drilling
- Thrust (Slick) Bore
- Pipeline Protection in Any Severe Handling Application

Product Benefits & Features

- 100% Solids Liquid Epoxy; No V.O.C.s and no isocyanates.
Safe to use
- Maximum FBE Protection in Severe Rocky Soil Conditions
Superb Abrasion Resistance
- Excellent Mechanical Properties
Can be used in directional drill and thrust bore applications
- Bisphenol A Chemistry
Suitable for pipeline operating temperatures to 55°C (130°F)

Physical Properties

Property	Condition	Test Method	Typical Value	
			US Imperial	Metric
Hardness	(Shore D)	ASTM D-2240	85	85
Thin Film Water Absorption	(Saturation)	ASTM D-570	1.21 %	1.21 %
Dielectric Strength	(Oil)	ASTM D-149	450 volts/mil	17.7 volts/micron
Resistance to Acids & Alkalies		ASTM C-581	Excellent	Excellent
Adhesion to FBE		ASTM D-4541	2,500 psi	17 MPa
Impact Resistance	(40 mils thickness)	ASTM G-14-88	66 inch lbs	7.7 Joules(7.7 Nm)
Flexibility	(@ -18° C (0° F))	NACE RP-0394	0.75 ° - 1.4 °	0.75 ° - 1.4 °
Abrasion	(CS-17 wheel, wear cycles)	ASTM D-4060-95	1,563 cycles/mil	63 cycles/micron
Holiday Detection	Holiday free	ISO :21809-3 & CSA Z245.20	125 Volts per mil	5 Volts per micron
		ASTM G 62 Method B	84 Volts per mil	3.3 Volts per micron

Product Selection Guide

Maximum Operating Temp:	55°C (130°F)	Color:	Tan or Black
Compatible Line Coatings:	FBE	@ 65°C, 150°F	11 - 14 minutes
Mixing Ratio		Typical Single Coat Thickness	
By Volume	9.75:1 Part A to B	Manually Applied	20 mils (0.5 mm)
By Weight	100:5.5 Part A to B	Spray Applied	20 mils (0.5 mm)
Surface Profile Recommended:	2.5 - 4.0 mils (64-102 microns)	Recoat Interval (Spray)	
		@ 21°C, 70°F	37 - 111 minutes
Surface Preparation:	FBE coated surface shall be sweep blasted and thoroughly cleaned with air	Clean Up	Acetone, MEK, Toluene

Temperature Considerations

Powercrete® DD

If the surface to be coated is below 10°C (50°F), preheating of the substrate is recommended. Preheat temperatures should not exceed 82°C (180°F) prior to the application. Note: The application should only be done when the temperature of the steel is at least 3°C (5°F) higher than the dew point, as recommended by NACE.

Storage & Handling

For optimum performance, store Powercrete® DD 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).

Cure Times

Pot Life: 4 Lbs (1.8 Kg) Kit, @ 25°C (77°F)	22 minutes
Spray application	
Gel Time: 40 mils, @ 27°C (80°F)	39 minutes
Dry Time: 40 mils, @ 27°C (80°F)	2.5 hours
65 Shore "D" Reading: 40 mils, @ 27°C (80°F)	7.75 hours
75 Shore "D" Reading: 40 mils, @ 27°C (80°F)	10 hours
Shelf Life (stored in specified conditions):	2 years

Ordering Information

Powercrete DD is available in three (3) packaging options:

Drum

Part A: 40 Gal / 151 L (600 Lbs/272 Kg)
Part B: 55 Gal / 208 L (450 Lbs/205 Kg)

Pail

Part A: 5 Gal / 19 L (75 Lbs/34 Kg)
Part B: 5 Gal / 19 L (40 Lbs/18 Kg)

Kit Options (Part A and B in proper mix ratio by weight)

20 Lbs / 9 Kg (1.3 Gal / 5 L)
10 Lbs / 4.5 Kg (0.67 Gal / 2.5 L)
4 Lbs / 1.8 Kg (0.27 Gal / 1 L)
2 Lbs / 0.9 Kg (0.13 Gal / 0.5 L)



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.



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Physical Properties of Powercrete DD

Powercrete® DD Abrasion Resistant Overlay

Liquid Epoxy Coating for the Protection of Fusion Bonded Epoxy in Directional Drilling Applications

PHYSICAL PROPERTIES OF POWERCRETE DD

Independent Laboratory Testing and Results



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Coatings & Inspection
Testing & Advisory Services

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Technical Report No. 95-231

Mr. Bang Tran
POWER LONE STAR
11010 Wallisville Rd.
Houston, Texas

Water Absorption Determinations

January 25, 1995



Prepared by Gary Cox

Water Absorption Determinations

Introduction

As requested by Mr. Bang Tran of Power Lone Star, I.T.I. Anti-Corrosion, Inc. has conducted laboratory testing to determine the water absorption properties of Powercrete.

Procedure

Procedure: Water Absorption of Plastics
Designation: ASTM D570
Specimens Tested: Black Powercrete
A. 7.000" x 0.956" x 0.109"
B. 7.000" x 0.969" x 0.104"
C. 7.000" x 0.979" x 0.121"
Conditioning: Samples were conditioned for 60 hrs. at 73°F in a dessicator.

Till saturation

Results

Specimen I.D.	Final Weight	Initial Weight	Weight Gained	Water Absorbed	Visual Observation
A	21.3327 g	21.0662 g	0.2665 g	1.26%	No warping, cracking
B	20.6872 g	20.4333 g	0.2539 g	1.24%	or other changes
C	23.7720 g	23.5056 g	0.2664 g	1.13%	in appearance were noted
Mean	21.9306 g	21.6684 g	0.2622 g	1.21%	



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I.T.I. ANTI-CORROSION, INC.

TECHNICAL REPORT # 91-038

POWER LONE STAR

FOR THE ATTENTION OF MR. TOM TUERNER

LABORATORY TESTING OF POWERCRETE

MAY 5, 1991

PREPARED BY GARY COX

Signed:

I.T.I. ANTI-CORROSION CONTRACT # 526

CHEMICAL RESISTANCE TESTS : POWERCRETE OVER FBE - 30 DAY EXPOSURE

Reagent	Results
Hydrochloric Acid, 10%	
A. Immersed Phase :	
1. General :	Surface blistering (size 4-8 dense) ; extreme softening of surface.
2. At Holiday :	Some delamination from FBE (average 4mm) at edge of holiday; no disbondment of FBE.
B. Vapor Phase :	
1. General :	No blistering or noticeable softening of material surface.
2. At Holiday :	No apparent effect.

Reagent	Results
Nitric Acid, 10%	
A. Immersed Phase :	
1. General :	Dense size 8 blisters and considerable softening of material surface.
2. At Holiday :	Considerable delamination of Powercrete from FBE.
B. Vapor Phase :	
1. General :	No blistering; mild softening of material surface with surface discoloration.
2. At Holiday :	Considerable delamination of Powercrete from FBE .

CHEMICAL RESISTANCE TESTS : POWERCRETE OVER FBE - 30 DAY EXPOSURE

Reagent	Results
Acetic Acid, 5%	
A. Immersed Phase :	
1. General :	Total decomposition of Powercrete material extending just past the interface.
2. At Holiday :	Extensive delamination of Powercrete from FBE.
B. Vapor Phase :	
1. General :	No decomposition, softening or blistering.
2. At Holiday :	Considerable delamination of Powercrete from FBE.

Reagent	Results
Sulfuric Acid, H₂SO₄ 25%	
A. Immersed Phase :	
1. General :	Bleaching of material from black to white to a depth of \approx 20 mils. No blistering or softening was observed.
2. At Holiday :	No delamination or disbondment.
B. Vapor Phase :	
1. General :	No visible effect.
2. At Holiday :	Some delamination from FBE \approx 5 mil average radius.

CHEMICAL RESISTANCE TESTS : POWERCRETE OVER FBE - 30 DAY EXPOSURE

Reagent	Results
Sodium Hydroxide, NaOH, 25%	
A. Immersed Phase :	
1. General	: Mild discoloration.
2. At Holiday	: No visible effect.
B. Vapor Phase :	
1. General	: Mild discoloration.
2. At Holiday	: No visible effect.

Reagent	Results
Sodium Carbonate, Na₂CO₃ 25%	
A. Immersed Phase :	
1. General	: Mild discoloration.
2. At Holiday	: 1mm average delamination from FBE.
B. Vapor Phase :	
1. General	: No visible effect.
2. At Holiday	: ≈ 2 mm delamination from FBE.

CHEMICAL RESISTANCE TESTS : POWERCRETE OVER FBE - 30 DAY EXPOSURE

Reagent	Results
Sodium Chloride, NaCl 10%	
A. Immersed Phase :	
1. General	: No visible effect.
2. At Holiday	: No visible effect.
B. Vapor Phase :	
1. General	: No visible effect.
2. At Holiday	: ≈ 1 mm average delamination from FBE.

Reagent	Results
Calcium Hydroxide Saturated Solution, Ca (OH) ₂	
A. Immersed Phase :	
1. General	: No visible effect.
2. At Holiday	: No visible effect.
B. Vapor Phase :	
1. General	: No visible effect.
2. At Holiday	: 5mm average delamination from FBE .

Discussion

Powercrete was unaffected by alkaline solution and salt water in both immersed and vapor phases but did not perform well in acidic immersion and was seen to delaminate extensively from the FBE in acetic acid vapor phase.

CHEMICAL RESISTANCE TESTS : POWERCRETE OVER FBE - 60 DAY EXPOSURE

Reagent	Results
Hydrochloric Acid 10%	
A. Immersed Phase :	
1. General :	Extensive surface blistering (size 4-8 dense); extreme softening of surface, and bleaching.
B. Vapor Phase :	
1. General :	Dense size 8 blisters at interface.
2. At Holiday :	No apparent effect.

Reagent	Results
Nitric Acid, 10%	
A. Immersed Phase :	
1. General :	Dense size 8 blisters, coating deterioration and rust breakthrough.
B. Vapor Phase :	
1. General :	Complete discoloration with some surface softening.

CHEMICAL RESISTANCE TESTS : POWERCRETE OVER FBE - 60 DAY EXPOSURE

Reagent	Results
Acetic Acid 5%	
A. Immersed Phase :	
1. General :	Complete decomposition of coating; peels away completely from FBE substrate.
B. Vapor Phase :	
1. General :	Dense size 8 blistering with softening of material surface.

Reagent	Results
Sulfuric Acid, H₂SO₄, 25%	
A. Immersed Phase :	
1. General :	Total bleaching of material from black to white; dense size 8 blisters; coating very friable and flakes easily.
B. Vapor Phase :	
1. General :	No visible effect..

CHEMICAL RESISTANCE TESTS : POWERCRETE OVER FBE - 60 DAY EXPOSURE

Reagent	Results
Sodium Hydroxide, NaOH, 25%	
A. Immersed Phase :	
1. General :	Mild discoloration.
2. At Holiday :	No visible effect.
B. Vapor Phase :	
1. General :	Mild discoloration.
2. At Holiday :	No visible effect.

Reagent	Results
Sodium Carbonate, Na₂CO₃, 25%	
A. Immersed Phase :	
1. General :	Mild discoloration.
2. At Holiday :	1 mm average delamination from FBE.
B. Vapor Phase :	
1. General :	No visible effect.
2. At Holiday :	≈ 2mm delamination from FBE.

CHEMICAL RESISTANCE TESTS : POWERCRETE OVER FBE - 60 DAY EXPOSURE

Reagent	Results
Sodium Chloride, NaCl, 10%	
A. Immersed Phase :	
1. General :	No visible effect.
2. At Holiday :	No visible effect.
B. Vapor Phase :	
1. General :	No visible effect.
2. At Holiday :	≈ 1mm average delamination from FBE

Reagent	Results
Calcium Hydroxide Saturated Solution, Ca (OH)₂	
A. Immersed Phase :	
1. General :	No visible effect.
2. At Holiday :	No visible effect.
B. Vapor Phase :	
1. General :	No visible effect.
2. At Holiday :	5 mm average delamination from FBE .

Discussion

Powercrete was unaffected by alkaline solution and salt water in both immersed and vapor phases but did not perform well in acidic immersion and was seen to delaminate extensively from the FBE in acetic acid vapor phase.



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Technical Report No. 94-229

Mr. Bang Tran
POWER LONE STAR
11010 Wallisville Rd.
Houston, Texas

Laboratory Testing - Pull-Off Strength

December 30, 1994



Prepared by Gary Cox

I.T.I. Contract No. 1114

LABORATORY TESTING - PULL-OFF STRENGTH

Introduction

As requested by Mr. Bang Tran of Power Lone Star, I.T.I. Anti-Corrosion, Inc. has conducted laboratory testing to determine pull-off strength of Powercrete when applied to fusion bonded epoxy which had undergone various periods of exposure to ultraviolet light and under different surface preparation procedures.

Test specimens were 4" x 4" x 3/8" panels

FBE conditioning and surface preparation prior to application of "Powercrete".

Specimen I.D.	U.V. Exposure*	F.B.E. Surface Preparation
OUV-SA-1 OUV-SA-2	None None	None None
OUV-BA-1** OUV-BA-2	None None	None None
16-UV-A-1 16-UV-A-2	16 hours 16 hours	None None
16-UV-B-1 16-UV-B-2	16 hours 16 hours	25 rubs with 3M Scouring Pad
16-UV-C-1 16-UV-C-2	16 hours 16 hours	Acetone Washed
32-UV-A-1 32-UV-A-2	32 hours 32 hours	None None
32-UV-B-1 32-UV-B-2	32 hours 32 hours	25 rubs with 3M Scouring Pad
32-UV-C-1 32-UV-C-2	32 hours 32 hours	Acetone Washed
48-UV-A-1 48-UV-A-2	48 hours 48 hours	None None
48-UV-B-1 48-UV-B-2	48 hours 48 hours	25 rubs with 3M Scouring Pad
48-UV-C-1 48-UV-C-2	48 hours 48 hours	Acetone Washed

* Ultraviolet exposure was by Q.U.V. per ASTM G53 using UVA 340 lamps cycling 8 hours light at 60°C followed by 4 hours dark (condensation) at 40°C (Results attached).

** Powercrete was brush applied to panels OUV-BA-1 & OUV-BA-2. Powercrete was spray applied to all other panels.



LABORATORY DATA SHEET

Procedure: Determination of Adhesive Strength

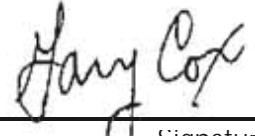
Specification: ASTM D4541-93 "Standard Test Method for Pull-Off Strength of Coating Using Portable Adhesion Testers"

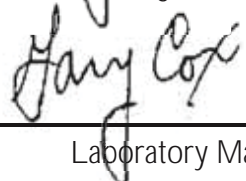
Test Material I.D. : Power Lone Star "Powercrete Black"

Test Instrument : SEMicro "Patt Jr" W/F-16 Piston

Date Last Calibrated: 5/20/94 by National Standard Testing Laboratory

Specimen I.D.	Pull-Off Strength, psi	Type of Failure
OUV-SA-1	2682	Cohesive at Powercrete to glue interface
OUV-SA-2	2764	Cohesive at Powercrete to glue interface
OUV-BA-1	3334	Cohesive at Powercrete to glue interface
OUV-BA-2	3253	Cohesive at Powercrete to glue interface
16-UV-A-1	4068	Adhesive to F.B.E.
16-UV-A-2	2682	Cohesive at Powercrete to glue interface
16-UV-B-1	4312	Cohesive at Powercrete to glue interface
16-UV-B-2	3253	Cohesive at Powercrete to glue interface
16-UV-C-1	3171	Cohesive at Powercrete to glue interface
16-UV-C-1	3416	Cohesive at Powercrete to glue interface

Tested by: 
 Signature


 Laboratory Manager

12/22/94
Date

12/22/94
Date



94M006C / 1114
Control No. Job No.

LABORATORY DATA SHEET

Procedure: Determination of Adhesive Strength

Specification: ASTM D4541-93 "Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers"

Test Material I.D. : Power Lone Star "Powercrete Black"

Test Instrument : SEMicro "Patt Jr" W/F-16 Piston

Date Last Calibrated : 5/20/94 by National Standard Testing Laboratory

Specimen I.D.	Pull-Off Strength, psi	Type of Failure
32-UV-A-1	2927	Cohesive at Powercrete to glue interface
32-UV-A-2	2438	Cohesive at Powercrete to glue interface
32-UV-B-1	3579	Cohesive at Powercrete to glue interface
32-UV-B-2	3416	Cohesive at Powercrete to glue interface
32-UV-C-1	3579	Cohesive at Powercrete to glue interface
32-UV-C-2	3334	Cohesive at Powercrete to glue interface
48-UV-A-1	4394	Cohesive at Powercrete to glue interface
48-UV-A-2	2519	Cohesive at Powercrete to glue interface
48-UV-B-1	3090	Cohesive at Powercrete to glue interface
48-UV-B-2	3660	Cohesive at Powercrete to glue interface
48-UV-C-1	3416	Cohesive at Powercrete to glue interface
48-UV-C-2	4475	Cohesive at Powercrete to glue interface

Tested by:

Gary Cox
Signature

12/29/94
Date

Gary Cox
Laboratory Manager

12/29/94
Date

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Houston, Texas 77034

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Telephone 713-947-6630
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Report # 05-1896-2

Testing Performed on 8" (Powercrete-Black
Over FBE) and 10" (Powercrete-J) Pipe
for Power Lone Star

For: Chaofeng Chen
Power Lone Star
11010 Wallisville Road
Houston, Texas 77013

By:



Karl Kelso
March 21, 1997

IMPACT TEST RESULTS

<u>Material</u>	<u>Average</u> <u>DFT (mils)</u>	<u>Avg. Pass</u>	<u>Avg. Fail</u>	<u>ASTM G14</u>
8" Diameter (Powercrete-black/FBE)	95	287 in-lbs	320 in-lbs	305 in-lbs
10" Diameter (Powercrete-J)	90	203 in-lbs	233 in-lbs	218 in-lbs
10" Diameter (Powercrete-J)	103	120 in-lbs	131 in-lbs	126 in-lbs

TECHNICAL INSPECTION SERVICES, INC.
Quality Audit - Quality Control
Houston, Texas 77034

5202 South Shaver
Telephone 713-947-6630
Fax 713-947-7796

Report # 05-2141-2

Flexibility Testing Performed
on Black Powercrete Over FBE
Power Lone Star, Inc

For: Chaofeng Chen
Power Lone Star
11010 Wallisville Road
Houston, Texas 77013

By:



Karl Kelso
March 21, 1997

INTRODUCTION

Two 4" wide by 8" long panels, coated with black Powercrete over FBE, were received at this laboratory for flexibility testing. The first panel was received June 26, 1998 and the other was received at a later date. Three straps measuring 1" wide by 8" long were cut from each panel and bent to failure at 32°F on a four-point bending apparatus.

TEST RESULTS FOR PANEL REC. 6-26-98

<u>Specimen</u>	<u>Strap</u>	<u>D.F.T.</u>	<u>%pd</u>	<u>Pass/Fail</u>
Black PC	1	26-28	0.564	Tears
Over FBE	2	23-27	0.282	Tears @ Contact Points
	3	29-31	1.010	Tears

TEST RESULTS FOR PANEL REC. 6-26-98

<u>Specimen</u>	<u>Strap</u>	<u>D.F.T.</u>	<u>%pd</u>	<u>Pass/Fail</u>
Black PC	1	40	1.670	Tears
Over FBE	2	35	1.090	Tears

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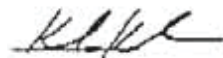
5202 South Shaver
Telephone 713-947-6630
Fax 713-947-7796

Report # 05-1932-A

Abrasion Resistance
Testing on Powercrete J, Powercrete JT,
and Powercrete (Black)

For: Chaofeng Chen
Power Lone Star
11010 Wallisville Road
Houston, Texas 77013

By:



Karl Kelso
March 8, 1999

INTRODUCTION

Panels coated with Powercrete-J and Powercrete JT, along with a free-film sample of Powercrete (black), were received at this laboratory on March 28 and April 4, 1997. The materials were tested for abrasion resistance.

TEST DESCRIPTION AND RESULTS

Abrasion Test

The panels were tested for abrasion resistance, similar to the method described in ASTM D4060, on a Taber abrasion machine. The Powercrete (black) was tested using a weight of 1000 grams for 1000 cycles with H-18 wheels. The Powercrete-J and Powercrete-JT were tested for 5000 cycles with a 1000 grams using CS-17 wheels. The wheels were resurfaced every 500 cycles on all three specimens.

<u>Sample</u>	<u>Weight Loss</u>	<u>Wear Index</u>	<u>Cycles Per Mil</u>
Powercrete-black free-film (140 mils) H18/1000cyc./1000 grams	2.0375 g	2.0375 g	66.6667
Powercrete-J direct to steel CS-17/5000 cyc./1000 grams	0.6194 g	0.1239 g	1250
Powercrete-JT direct to steel CS-17/5000cyc./1000 grams	0.5624 g	0.1125 g	1250



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ITI Anti-Corrosion, Inc.
10175 Harwin, Suite 110
Houston, TX 77036
Telephone (713) 771-0688
Fax: (713) 776-9634

Technical Report No. 94-222

Mr. Bang Tran
POWER LONE STAR
11010 Wallisville Rd.
Houston, Texas

Laboratory Testing

November 28, 1994



Prepared by Gary Cox

I.T.I. Contract No. 1091

LABORATORY TESTING

Introduction

As requested by Mr. Bang Tran of Power Lone Star, I.T.I. Anti-Corrosion, Inc. has conducted laboratory testing of three Power Lone Star coating materials.

Test Materials & Procedure

4- 4" x 6" x 1/8" plates coated with black Powercrete CDT per ASTM G95

1- 2" dia. x 8" L pipe with "Black Formula 2215" over FBE, bendability

1- 2" dia. x 8" L pipe with "Gray Formula 941011" over FBE, bendability

Results

1. Cathodic Disbondment ASTM G95

Duration: 30 days

Electrolyte: NaCl, 3%

Potential: -1.5 VDC

Sample I.D.	Temperature	Disbondment Radius, mm	Comments
Black Powercrete - 1	90°F	5.750 mm	
Black Powercrete - 2	110°F	7.625 mm	
Black Powercrete - 3	125°F	7.750 mm	
Black Powercrete - 4	140°F	12.250 mm	2 large blisters



Corrosion Technology
Coatings & Inspection
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Technical Report No. 95-234

Mr. Bang Tran
POWER LONE STAR
11010 Wallisville Rd.
Houston, Texas

**Impact Resistance of Powercrete over Fusion
Bonded Epoxy at Sub-Zero Temperatures**

January 26, 1995

A handwritten signature in black ink that reads "Gary Cox". The signature is written in a cursive style with a large, looped 'G' and 'C'.

Prepared by Gary Cox

I.T.I. Contract No. 1125

IMPACT RESISTANCE OF POWERCRETE OVER FUSION BONDED EPOXY AT SUB-ZERO TEMPERATURES

Introduction

As requested by Mr. Bang Tran of Power Lone Star, I.T.I. Anti-Corrosion, Inc. has conducted impact resistance testing of "Powercrete over F.B.E. at sub-freezing temperatures.

Test Procedure

ASTM G14 modified as "Impact to Failure Only"

Results

Sample No.	Temperature °C	Impact at Failure	Impact at Pass
1. Powercrete over F.B.E.	-46°C	No Failure	40 in-lbs
2 . Powercrete over bare steel	-50°C	50 in-lbs	
3. Powercrete over F.B.E.	-56°C	-----	100 in-lbs
4. Powercrete over F.B.E.	-74°C	60 in-lbs	50 in-lbs

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

Client

Power Lone Star, Inc
11010 Wallisville Road
Houston, TX 77013

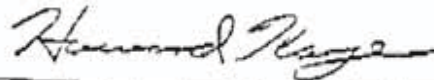
Attn: Mr Bang Tran

April 26, 1999

PO: 4104

Dielectric Strength by ASTM D 149

<u>Sample</u>	<u>Thicness (in)</u>	<u>Breakdown Voltage (kv)</u>	<u>Dielectric Strength (V/mil)</u>
Powercrete - 990329 3" x 3"			
J Fast Cure "Light Grey"	.055	32	581.8
	.062	32	516.1
	.055	31	563.6
	.062	33	532.3
	.063	33	523.8
			AV = $\frac{523.8}{5} = 543.5 \pm 28.0$
"Black"	.052	28	538.5
	.051	27.5	539.2
	.050	29	580.0
	.051	30	588.2
	.030	20	666.7
			AV = $\frac{666.7}{5} = 582.5 \pm 52.3$



Howard Kaye, Ph.D., FAIC

Director



POLYHEDRON LABORATORIES® , INC

1210 Hamblen Road • Suite 200 • Kingwood • Texas 77339 • (713) 359-6431

Test Report

Project: Power Lone Star Cube Tests
Client: Power Lone Stra, Inc
Contractor: N/A

Project No.: 333076
Date of Test: 12/13/93
Test Method: ASTM C-109

COMPRESSIVE STRENGTH OF 2" CUBES
ASTM C-109

SET # 1

<u>Specimen (#)</u>	<u>Dimensions (in)</u>	<u>Area (in²)</u>	<u>Load (lbs)</u>	<u>Compressive Strangth (psi)</u>
P.C. Stand-1	1.95 x 2.00	3.90	39200	10,050
P.C. Stand-2	1.96 x 2.00	3.92	40100	10,230
P.C. Stand-3	1.94 x 2.00	3.88	39800	10,260
Average:				10.180

SET # 2

<u>Specimen (#)</u>	<u>Dimensions (in)</u>	<u>Area (in²)</u>	<u>Load (lbs)</u>	<u>Compressive Strangth (psi)</u>
931209-1	1.94 x 2.00	3.88	6200	1,600
931209-2	1.96 x 2.00	3.92	6400	1,630
931209-3	1.96 x 2.00	3.92	6300	1,610
Average:				1.610

Tested by :

Neil Jaegers

Reviewed by:

David W. Knight. P.E.



Powercrete[®] DD Abrasion Resistant Overlay

Liquid Epoxy Coating for the Protection of Fusion Bonded Epoxy in Directional Drilling Applications



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Certificate of Registration



This is to certify that the Quality Management System of:

Berry Plastics Corporation

11010 Wallisville Road
Houston, TX 77013

applicable to:

Manufacturing and distribution of epoxy coatings servicing domestic and international oil, gas and water industries

has been assessed and approved by
National Quality Assurance, U.S.A., against the provisions of:

ISO 9001:2008

A handwritten signature in black ink that reads 'K M Beard'.

For and on behalf
of NQA, USA, Acton, MA 01720

Certificate Number: 11265/44

EAC Code: 14

First Issued: September 27, 2010

Valid Until: October 8, 2012



3

Manual
Applications
Guide of
Powercrete DD

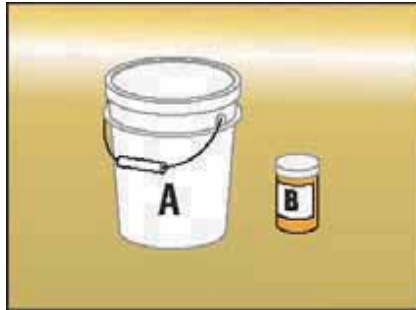
Application Guide

Manual / Kit Application

Powercrete® DD

Powercrete DD is a 100% Solids Epoxy used for corrosion and abrasion protection. This coating is applied over clean, bare steel and adjacent plant applied or mainline coatings. The application is fast and easy. Simply follow these guidelines.

1. Product



1. The 2-component epoxy coating is supplied in pre-measured kits. Part A (large container) is the Base and Part B (small container) is the curing agent.

2. Application Kit (ordered separately)



2. The "Application Kit"* contains a mask, Wet Film Gauge, Gloves, trowels, a PE stir stick, and abrasive paper.

3. Surface Preparation



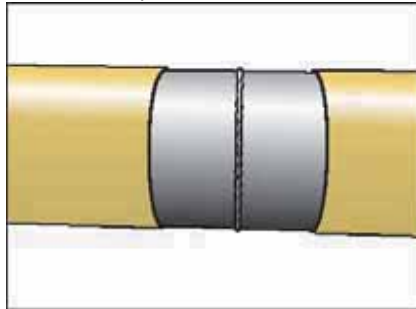
3. Insure that surfaces are clean of grease, oil, salts and other contaminants. If necessary, use Acetone, MEK or other suitable solvent. Perform cleaning when pipe is 3°C (5°F) above dew point.

4. Surface Preparation



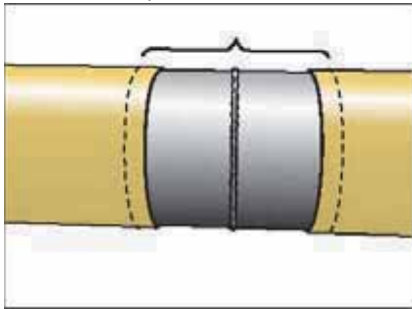
4. Blast clean surfaces to a near white ISO-8501, NACE No. 2, SA-21/2 (SSPC-SP 10) or better using particle blasting (sand or other). Sweep blast adjacent FBE or CTE coating. 50 mm (2") to either side of cutback (the bare steel area)

5. Surface Preparation



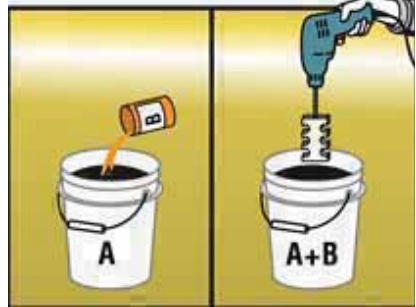
5. A 2.5-4 mil (63.5-101.6 micron) surface profile with sharp angularity. Burnishing or polishing must be avoided. Surface preparation can be controlled using surface profile tape. Dry surface and insure ideal surface preparation.

6. Surface Preparation



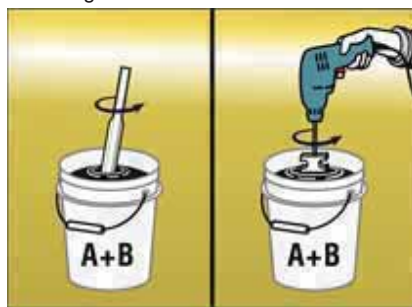
6. While not always necessary, preheating can be useful just prior to application.
A. To eliminate moisture, preheat the cutback area to approximately 40°C (104°F).
B. To accelerate curing, preheat the cutback area to approximately 90°C (194°F).

7. Combinina & Mixina



7. Warm parts A & B to 20°C (68°F) and mix by pouring all of part B into part A. Thoroughly scrape container and lid of B. Slowly begin mixing to avoid introducing air into the mixture.

8. Mixing

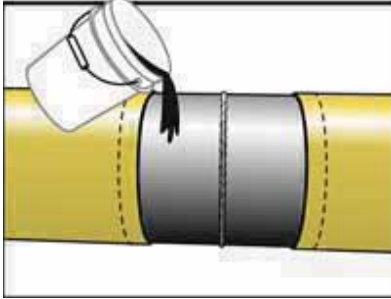


8. Use a mixing speed that uniformly blends the 2 parts, but does not create a vortex in the mixture or spillage.

Note: Between 20°C (68°F) & 40°C (105°F), mix for 2 - 3 minutes with a drill mixing paddle or 4 - 5 minutes with the stir stick. Blend both parts to create a uniform color with no streaks.

*: Berry Plastics does not supply these kits.

9



9. Reconfirm that the application temperature is above 10°C (50°F)* & 3°C (5°F)* above the dew point. Then slowly pour mixed epoxy onto pipe. See "Tips" below for additional suggestions.

10

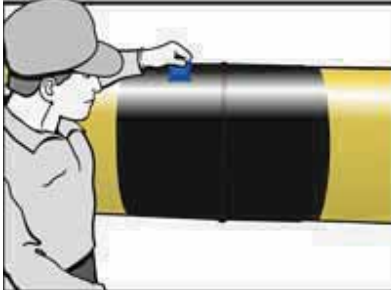


10. Use trowels, brush or roller to apply required minimum thickness of coating to the Field Joint. Cover at least 50mm (2") of the adjacent mainline coating.

Tip: Masking tape may be applied to left & right 50mm (2") beyond cutback (see dotted lines) and later removed while the coating is still tacky to create a straight edge and neat appearance

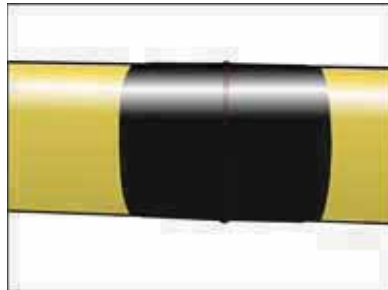
***Note:** Powercrete DD may be applied and cured at colder environmental temperatures if the pipe is heated during the application and cure..

11



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

12



12. The curing rate* will vary according to pipe and ambient application temperature. Refer to curing rate 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 Covalece Specialty Materials representative for specific projects or unique applications.



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4

Spray
Applications
Guide of
Powercrete DD

**SPECIFICATION FOR THE EXTERNAL COATING OF YARD APPLIED POWERCRETE
OVER FUSION BONDED EPOXY OR OTHER APPROVED PRIMARY COATINGS**

1.0 Scope

- 1.1 This specification covers the requirements for the spray application of Powercrete, a polymer concrete coating.
- 1.2 Contractor shall furnish all labor, supervision, materials, equipment and related hardware required for completing an acceptable coating.
- 1.3 Coating materials shall be plainly and permanently marked, stored, and applied in accordance with the manufacturer's specification as directed by the Company's authorized representative.

2.0 Surface Preparation

- 2.1 When the primary coating has been applied less than six (6) days prior, the surface shall be cleaned and free of all contaminants. If solvent is used, it shall be without residue and should not leave any traces. Following cleaning, the coating shall be examined for U. V. degradation ((fading, chalking, cracking or crazing)). If degradation is observed, see 2.2 for correction.
- 2.2 If the primary coating was applied six (6) or more days prior and the coated pipe was exposed to sunlight (or other U. V. source) the U. V. affected FBE surface shall be removed before Powercrete can be applied. The damaged surface shall be removed by lightly blasting (sweep blasting) with an air or rotary blaster using an appropriate angular blast media (not shot).
- 2.3 As an alternative to blasting, the coating shall be thoroughly abraded using an abrasive coated organic pad, equivalent to 3M scrubbing pad or medium grit emery cloth. Following blasting or abrading, the FBE coating shall be thoroughly cleaned using compressed air or water. If water is used on the coated pipe, the pipe shall be completely dry.
- 2.4. Following cleaning, no dust or any other particles shall be visible on the surface. A clear adhesive tape that shall be pressed on the surface of the FBE coating and removed for observation.
- 2.5 Immediately prior to the application of Powercrete the primary pipe coating shall be 100% inspected for holidays, pinholes, and other damage, subject to the same procedure for holiday inspection of the original coating. The repair procedure for discontinuous primary coating shall be identical to the repair during

3.0 Coating Application

- 3.1 The pipe shall be preheated to ensure that no surface moisture is present during the actual coating application. Under no conditions shall the coating be applied to a pipe surface temperature above 160°F (71°C).
- 3.2 The freshly coated areas shall be protected from being contaminated with dust or other foreign debris. Excessive particle contamination shall require stripping, reblasting, and recoating (see 4.0)
- 3.3 Pipe shall be coated immediately after heating using a spray gun or other acceptable methods.
- 3.4 The first layer shall be applied uniformly to a thickness that will not cause running/sagging of material. Applications shall be facilitated with a hand trowel or other tools if necessary.
- 3.5 Successive layers of 20-40 mils shall be applied allowing 10 minutes between applications until desired thickness is achieved.

-
- 3.6 Cured coating shall be of uniform color, gloss, and thickness and shall be free of blisters, pinholes, fish eyes, sags, pimples, craters, and other irregularities. It is understood that contact with moisture after application may cause discoloration with out affecting the quality of the coating.
 - 3.7 The Powercrete coatings shall reach a minimum hardness of 65 (Type D Durometer—ASTM D2240) prior to handling.
 - 3.8 The Powercrete coating shall reach a minimum hardness of 75 (Type D Durometer—ASTMD2240) prior to installation.
 - 3.9 Any joint of pipe having less than the specified minimum hardness shall, at the Company's option be retested after 24 hours,or have the defective coating removed and reapplied as per this specification.

4.0 Inspection

- 4.1. All work done under this specification shall be subject to inspection and acceptance by the Company's inspector. All parts of the Coating Applicator's facilities associated with this work shall be accessible to the inspector. The Coating Applicator shall correct work which is found defective under this specification or with in the obvious intent of this specification.
- 4.2 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.
- 4.3 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 Standards Certified Coating Calibration Standard. The thickness of the calibration standard shall beat 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 at the 12 o'clock and 6 o'clock positions.
- 4.4 Coating hardness checks shall be made at an ambient temperature with a Type D Durometer(ASTM D2240), lab calibrated with in the previous sixty (60) working days and verified daily, in good working condition and with no obvious damage. The checks shall be made at the12 o'clock and 6 o'clock positions.

5.0 Repairs

- 5.1. All damage detected by visual inspection shall be repaired by the Applicator.
- 5.2 Scars, dents, damaged areas, and large holidays shall be cleaned by removing all rust, scale, dirt or other foreign material and loose coating by using hand or power driven wire brush.The area to be patched (holiday plus at least 3/4 inch {19 mm} of surrounding coating) shall be suitably roughened before patching with 120 grit "wet" or "dry" sandpaper or similar. Files shall not be used. Dust generated by the sanding shall be removed with a clean, dry cloth or brush prior to patching.
- 5.3 Areas not meeting hardness requirements shall be removed using a method that will not damage the primary coating or pipe.
- 5.4 Powercrete DD or any other Powercrete material (in consultation with manufacturer) shall be used for patching holidays and damaged coating. If not available at the time, repairs shall be made with liquid epoxies that are compatible with Powercrete. In all cases, end user specification shall supersede this specification.
- 5.5. The surface to be patched shall be heated with a small torch until it is thoroughly dry, without damaging surrounding surface/coating.
The Powercrete shall be mixed and applied over the heated surface.
- 5.6 Patches shall overlap the surrounding undamaged coating by a minimum of 3/4inch (19 mm).
- 5.7 Repairs shall be reinspected at the discretion of the Company inspector.

6.0 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 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 - Corrosion Protection Group representative for specific projects or unique applications.



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5

Cure Time
Chart for
Powercrete DD

Gel, Re-Coat and Curing Time Chart

Testing Temperature	Application Procedure	Gel Time	Re-coat Time Window (In minutes from application time of previous coating pass)	Dry Time	65 Shore "D" Reading	75 Shore "D" Reading
40 °F (4 °C)	Hand	210 min	200 th -----465 th	12 hr	160 hr	180 hr
	Spray	170 min	160 th -----385 th	10 hr	130 hr	165 hr
50 °F (10 °C)	Hand	135 min	125 th -----308 th	8 hr	144 hr	168 hr
	Spray	100 min	90 th -----260 th	7 hr	120 hr	144 hr
60 °F (16 °C)	Hand	90 min	90 th -----225 th	6 hr	38 hr	48 hr
	Spray	50 min	45 th -----175 th	5 hr	31 hr	42 hr
70 °F (21 °C)	Hand	80 min	70 th -----145 th	3hr 30 min	17 hr	22 hr
	Spray	42 min	37 th -----111 th	3 hr	13 hr	16 hr
80 °F (27 °C)	Hand	61 min	56 th -----121 st	3 hr	9 hr	12 hr
	Spray	39 min	36 th -----95 th	2hr 30 min	7 hr 45 min	10 hr
90 °F (32 °C)	Hand	35 min	32 nd -----93 rd	2hr 30 min	8 hr	10 hr
	Spray	32 min	29 th -----76 th	2 hr	7 hr	8 hr 40 min
100 °F (38 °C)	Hand	32 min	29 th -----61 st	1hr 50 min	6 hr	7 hr 30 min
	Spray	28 min	25 th -----62 nd	1hr 35 min	5 hr 40 min	7 hr 30 min
110 °F (43 °C)	Hand	23 min	20 th -----42 nd	1 hr	3 hr 15 min	4 hr 30 min
	Spray	26 min	23 rd -----36 th	45 min	2 hr 45 min	3 hr 30 min
120 °F (49 °C)	Hand	22 min	19 th -----34 th	45 min	2 hr 15 min	3 hr 15 min
	Spray	20 min	17 th -----30 th	40 min	1 hr 35 min	2 hr
130 °F (54 °C)	Hand	18 min	16 th -----25 th	35 min	1 hr 20 min	2 hr
	Spray	17 min	15 th -----20 th	30 min	46 min	1 hr
140 °F (60 °C)	Hand	16 min	14 th -----25 th	35 min	1 hr	1 hr 30 min
	Spray	16 min	14 th -----15 th	25 min	42 min	48 min
150 °F (66 °C)	Hand	13 min	11 th -----15 th	23 min	45 min	1 hr
	Spray	13 min	11 th -----14 th	18 min	32 min	40 min

WARNING: UNDER 40° F (4° C) COATING MIXTURE IS FROZEN AND NO CHEMICAL REACTION WILL OCCUR

This chart provides an approximate gel and curing times based on conditions outlined above



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6

Material Safety
Data Sheet of
Powercrete DD
Part-A



SAFETY DATA SHEET

Based on Regulation (EC) No 1907/2006 (REACH) Article 31 and Annex II

POWERCRETE DD, PART A

1. Identification of the substance/preparation and of the company/undertaking

1.1 Identification of the substance or preparation:

Product name : POWERCRETE DD,PART A
 Synonyms : none

CAS No. : N.A.
 EC index No. : N.A.
 EINECS No. : N.A.
 RTECS No. : N.A.

NFPA code : N.D.
 Molecular weight : N.A.
 Formula : N.A.

1.2 Use of the substance/preparation:

- Epoxy resin for coating

1.3 Company/undertaking identification:

Berry Plastics BVBA
 Nieuwlandlaan B15
 B-3200 Aarschot
 Tel: +32 16 55 36 00
 Fax: +32 16 55 36 74
 e-mail address: cpge@berryplastics.com

1.4 Emergency telephone:

+32 14 58 45 45 (24h/24h)
 Information centre on dangerous goods (BIG)
 Technische Schoolstraat 43A, B-2440 Geel, Belgium

USA: 800 424 9300 (24h/24h) Chemtrec or 888 767 7200 (during working hours)
 Berry Plastics Corrosion Protection Group Houston

2. Hazards identification

- Irritating to eyes and skin
- May cause sensitisation by skin contact
- Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment

3. Composition/information on ingredients

Hazardous ingredients	CAS No. EINECS/ELINCS No.	Conc. (%)	Hazards (R-phrases)	Hazard symbol
polypropylene glycol, (chloromethyl)oxirane polymer	9072-62-2	5-15	36/38-43 (1)(2)	Xi
reaction product: bisphenol-A- (epichlorhydrin); epoxy resin (number average molecular weight <=700)	25068-38-6 500-033-5	10-20	36/38-43-51/53 (1)(2)	Xi;N

(1) For R-phrases in full: see heading 16
 (2) Substance with a Community workplace exposure limit
 (3) PBT-substance

4. First aid measures

4.1 After inhalation:

- Remove the victim into fresh air
- Respiratory problems: consult a doctor/medical service

4.2 Skin contact:

- Wash immediately with lots of water
- Soap may be used
- Take victim to a doctor if irritation persists

Printing date : 08-Oct-2009 1/8
 Compiled by : Brandweerinformatiecentrum voor Gevaarlijke Stoffen vzw (BIG)

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 ☎ +32 14 58 45 47 <http://www.big.be> e-mail address: info@big.be

Date of issue : 11-June-2002 Revision : 25-Aug-2009
 Reference number : BIG\38283GB Revision number : 003
 Reason for revision : 9

POWERCRETE DD, PART A

4.3 Eye contact:

- Rinse immediately with plenty of water
- Take victim to an ophthalmologist if irritation persists

4.4 After ingestion:

- Rinse mouth with water
- Immediately give lots of water to drink
- Do not induce vomiting
- Consult a doctor/medical service if you feel unwell

5. Fire-fighting measures

5.1 Suitable extinguishing media:

- Water spray
- Polyvalent foam
- BC powder
- Carbon dioxide

5.2 Unsuitable extinguishing media:

- N.D.

5.3 Special exposure hazards:

- On heating/burning: release of toxic and corrosive gases/vapours e.g.: hydrogen chloride, carbon monoxide - carbon dioxide

5.4 Instructions:

- Dilute toxic gases with water spray
- Take account of environmentally hazardous firefighting water
- Use fire-fighting water moderately and contain it

5.5 Special protective equipment for firefighters:

- Heat/fire exposure: compressed air/oxygen apparatus
- Protective clothing

6. Accidental release measures

6.1 Personal precautions:

See heading 8.2

6.2 Environmental precautions:

- Prevent soil and water pollution
- Prevent spreading in sewers
- Contain released substance, pump into suitable containers
- Plug the leak, cut off the supply
- Dam up the liquid spill
- See heading 13

6.3 Methods for cleaning up:

- Take up liquid spill into a non combustible material e.g.: sand
- Scoop absorbed substance into closing containers
- Carefully collect the spill/leftovers
- Clean contaminated surfaces with an excess of water
- Wash clothing and equipment after handling

7. Handling and storage

7.1 Handling:

- Observe very strict hygiene - avoid contact
- Do not discharge the waste into the drain
- Remove contaminated clothing immediately
- Clean contaminated clothing

7.2 Storage:

- Keep container tightly closed
- Store in a dry area
- Provide for a tub to collect spills
- Meet the legal requirements
- Keep away from: heat sources, oxidizing agents, acids, bases

POWERCRETE DD, PART A

Storage temperature	: < 38	°C
Quantity limits	: N.D.	kg
Storage life	: > 730	days
Materials for packaging	:	
- suitable	: N.D.	
- to avoid	: N.D.	

7.3 Specific use(s):

- Polymerizing with Powercrete DD part B with mixing ratio 100 g part A to 5,5 g part B

8. Exposure controls/Personal protection

8.1 Exposure limit values:

8.1.1 Occupational exposure:

TLV-TWA	: not listed
TLV-STEL	: not listed
TLV-Ceiling	: not listed
WEL-LTEL	: not listed
WEL-STEL	: not listed
TRGS 900	: not listed
MAK	: not listed
GWBNI 8 h	: not listed
GWKNI 15 min.	: not listed
Ceiling	: not listed
VME-8 h	: not listed
VLE-15 min.	: not listed
GWBB-8 h	: not listed
GWK-15 min.	: not listed
Momentary value	: not listed
EC	: not listed
EC-STEL	: not listed

8.1.2 Sampling methods:

- N.D.

8.2 Exposure controls:

8.2.1 Occupational exposure controls:

- Work under local exhaust/ventilation

Personal protective equipment:

a) Respiratory protection:

- High vapour concentration: gas mask with filter A

b) Hand protection:

- Gloves
- Suitable materials: N.D.
- Breakthrough time: N.D.

c) Eye protection:

- Face shield

d) Skin protection:

- Protective clothing
- Suitable materials: N.D.

8.2.2 Environmental exposure controls: see headings 6.2, 6.3 and 13

POWERCRETE DD, PART A

9. Physical and chemical properties

9.1 General information:

Appearance (at 20°C) : Very viscous liquid
Odour : Mild
Colour : Black or tan

9.2 Important health, safety and environmental information:

pH value (at %) : N.D.
Boiling point/boiling range : > 200 °C
Flash point/flammability : > 149 °C
Explosion limits (explosive properties) : N.D. vol%
Oxidising properties : N.D.
Vapour pressure (at 20°C) : N.D. hPa
Vapour pressure (at 50°C) : N.D. hPa
Relative density (at 25°C) : 1.85
Water solubility : insoluble
Soluble in : acetone, methyl ethyl ketone
Relative vapour density : > 2
Viscosity (at °C) : N.D. Pa.s
Partition coefficient n-octanol/water : N.D.
Evaporation rate : N.D.
ratio to butyl acetate : N.D.
ratio to ether : N.D.

9.3 Other information:

Melting point/melting range : N.D. °C
Auto-ignition temperature : N.D. °C
Saturation concentration : N.D. g/m³
Specific conductivity : N.D. pS/m

10. Stability and reactivity

10.1 Conditions to avoid:

- Stable under normal conditions

10.2 Materials to avoid:

- Keep away from: heat sources, oxidizing agents, acids, bases

10.3 Hazardous decomposition products:

- On heating/burning: release of toxic and corrosive gases/vapours e.g.:
hydrogen chloride, carbon monoxide - carbon dioxide

11. Toxicological information

11.1 Acute toxicity:

LD50 oral rat : > 4000 mg/kg
LD50 dermal rat : N.D. mg/kg
LD50 dermal rabbit : > 2000 mg/kg
LC50 inhalation rat : N.D. mg/l/4 h
LC50 inhalation rat : N.D. ppm/4 h

11.2 Chronic toxicity:

EC carc. cat. : not listed
EC muta. cat. : not listed
EC repr. cat. : not listed

Carcinogenicity (TLV) : not listed
Carcinogenicity (MAC) : not listed
Carcinogenicity (VME) : not listed
Carcinogenicity (GWBB) : not listed

Carcinogenicity (MAK) : not listed
Mutagenicity (MAK) : not listed
Teratogenicity (MAK) : not listed

IARC classification : not listed

POWERCRETE DD, PART A

11.3 Routes of exposure: ingestion, inhalation, eyes and skin

11.4 Acute effects/symptoms:

AFTER SKIN CONTACT

- Tingling/irritation of the skin

AFTER EYE CONTACT

- Irritation of the eye tissue

11.5 Chronic effects:

- May cause sensitization by skin contact
- Not listed in carcinogenicity class (IARC,EC,TLV,MAK)
- Not listed in mutagenicity class (EC,MAK)
- Not classified as toxic to reproduction (EC)

ON CONTINUOUS/REPEATED EXPOSURE/CONTACT:

- Skin rash/inflammation

12. Ecological information

12.1 Ecotoxicity:

reaction product: bisphenol-A-(epichlorhydrin); epoxy resin (number average molecular weight <=700):

- LC50 (96 h) : 1.5/7.7 mg/l (SALMO GAIRDNERI/ ONCORHYNCHUS MYKISS)
- EC50 (24 h) : 1.1/3.6 mg/l (DAPHNIA MAGNA)
- EC50 (96 h) : 220 mg/l (CHLOROPHYTA)

- Effect on waste water purification : N.D.

12.2 Mobility:

- Volatile organic compounds (VOC): 0%
- Insoluble in water
- Substance sinks in water

For other physicochemical properties see heading 9

12.3 Persistence and degradability:

- biodegradation BOD₅ : N.D. % ThOD
- water : N.D.
- soil : T ½: N.D. days

12.4 Bioaccumulative potential:

- log P_{ow} : N.D.
- BCF : N.D.

12.5 Results of PBT assessment:

- Not applicable, based on available data

12.6 Other adverse effects:

- WGK : 2 (Classification based on the components in compliance with Verwaltungsvorschrift wassergefährdender Stoffe (VwVwS) of 17 May 1999)
- Effect on the ozone layer : Not dangerous for the ozone layer (1999/45/EC)
- Greenhouse effect : N.D.

13. Disposal considerations

13.1 Provisions relating to waste:

- Waste material code (91/689/EEC, Council Decision 2001/118/EC, O.J. L47 of 16/2/2001): 11 01 98* (other wastes containing dangerous substances)
- LWCA (the Netherlands): KGA category 04
- Hazardous waste (91/689/EEC)
- Mix well, set outdoor, next day dispose as solid waste, follow local regulations.
- Remove waste in accordance with local and/or national regulations

POWERCRETE DD, PART A

13.2 Disposal methods:

- Recycle/reuse
- Allow waste to solidify
- Dehydrate
- Remove to an authorized dump (Class I)
- Do not discharge into the sewer

13.3 Packaging/Container:

- Waste material code packaging (91/689/EEC, Council Decision 2001/118/EC, O.J. L47 of 16/2/2001): 15 01 10* (packaging containing residues of or contaminated by dangerous substances)

14. Transport information

14.1 Classification of the substance in compliance with UN Recommendations

UN number : -
CLASS :
SUB RISKS :
PACKING GROUP :

14.2 ADR (transport by road)

CLASS : Not subject
PACKING GROUP :
CLASSIFICATION CODE :
DANGER LABEL TANKS :
DANGER LABEL PACKAGES :
PROPER SHIPPING NAME :

14.3 RID (transport by rail)

CLASS : Not subject
PACKING GROUP :
CLASSIFICATION CODE :
DANGER LABEL TANKS :
DANGER LABEL PACKAGES :
PROPER SHIPPING NAME :

14.4 ADNR (transport by inland waterways)

CLASS : Not subject
PACKING GROUP :
CLASSIFICATION CODE :
DANGER LABEL TANKS :
DANGER LABEL PACKAGES :

14.5 IMDG (maritime transport)

CLASS : Not subject
SUB RISKS :
PACKING GROUP :
MFAQ :
EMS :
MARINE POLLUTANT :

14.6 ICAO (air transport)

CLASS : Not subject
SUB RISKS :
PACKING GROUP :
PACKING INSTRUCTIONS PASSENGER AIRCRAFT :
PACKING INSTRUCTIONS CARGO AIRCRAFT :

14.7 Special precautions

: Not restricted for any mode of international transport

POWERCRETE DD, PART A

15. Regulatory information

15.1 EU legislation:

Classification according to directives 67/548/EEC, 1999/45/EC and 2006/8/EC



Irritant

contains: polypropylene glycol, (chloromethyl)oxirane polymer; reaction product: bisphenol-A-(epichlorhydrin); epoxy resin (number average molecular weight <=700). See information supplied by the manufacturer.

R36/38	:	Irritating to eyes and skin
R43	:	May cause sensitisation by skin contact
R52/53	:	Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment
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
S61	:	Avoid release to the environment. Refer to special instructions/safety data sheets.

15.2 National provisions:

The Netherlands:

Waterbezwaarlijkheid: 8

Germany:

WGK : 2 (Classification based on the components in compliance with Verwaltungsvorschrift wassergefährdender Stoffe (VwVwS) of 17 May 1999)

16. Other information

Users are advised that they may have additional disclosure obligations under other national and local laws. Users are advised to ensure that this information is brought to the attention of all employees, agents, and contractors handling this product. Users of Berry Plastics BVBA products should make their own evaluation to determine the suitability of each such product for the specific application and to establish safe handling and installation procedures. Distributors of this product are advised to forward this document, or the information contained herein, to every purchaser of this product.

Berry Plastics BVBA makes no warranties as to the accuracy or completeness of this information and disclaims any liability in connection with its use. Berry Plastics BVBA obligations shall be only as set forth in Berry Plastics BVBA standard terms and conditions of sale for this product. In no case will Berry Plastics BVBA be liable for any incidental, indirect or consequential damages arising out of the sale, resale, use or misuse of this product.

N.A. = NOT APPLICABLE
N.D. = NOT DETERMINED
(*) = INTERNAL CLASSIFICATION (NFPA)

PBT-substances = persistent, bioaccumulative and toxic substances

Exposure limits:

TLV : Threshold Limit Value - ACGIH USA
WEL : Workplace Exposure Limits - United Kingdom
TRGS 900 : Technische Regel für Gefahrstoffe 900 (Arbeitsplatzgrenzwerte) - Germany
MAK : Maximale Arbeitsplatzkonzentrationen - Germany
GWBNL : Grenswaarde voor blootstelling - The Netherlands
GWKNL : Grenswaarde korte duur - The Netherlands
VME : Valeurs limites de Moyenne d'Exposition - France
VLE : Valeurs limites d'Exposition à court terme - France
GWBB : Grenswaarde beroepsmatige blootstelling - Belgium
GWK : Grenswaarde kortstondige blootstelling - Belgium
EC : Indicative occupational exposure limit values

POWERCRETE DD, PART A

I : Inhalable fraction = **T**: Total dust = **E**: Einatembarer Aerosolanteil
R : Respirable fraction = **A**: Alveolengängiger Aerosolanteil/Alveolar dust
C : Ceiling limit

a:	aerosol		r:	rook/Rauch	(fume)
d:	damp	(vapour)	st:	stof/Staub	(dust)
du:	dust		ve:	vezel	(fibre)
fa:	Faser	(fibre)	va:	vapour	
fi:	fibre		om:	oil mist	
fu:	fume		on:	olienevel/Ölnebel	(oil mist)
p:	poussière	(dust)	part:	particles	

Chronic toxicity:

K : List of the carcinogenic substances and processes - The Netherlands

Full text of any R phrases referred to under headings 2 and 3:

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

7

Material Safety
Data Sheet of
Powercrete DD
Part-B

POWERCRETE DD, PART B

1. Identification of the substance/preparation and of the company/undertaking

1.1 Identification of the substance or preparation:

Product name : POWERCRETE DD, PART B
 Synonyms : none

CAS No. : N.A.
 EC index No. : N.A.
 EINECS No. : N.A.
 RTECS No. : N.A.

NFPA code : N.D.
 Molecular weight : N.A.
 Formula : N.A.

1.2 Use of the substance/preparation:

- Hardener for Epoxy Resin, Powercrete DD, Part A

1.3 Company/undertaking identification:

Berry Plastics BVBA
 Nieuwlandlaan B15
 B-3200 Aarschot
 Tel: +32 16 55 36 00
 Fax: +32 16 55 36 74
 e-mail address: cpge@berryplastics.com

1.4 Emergency telephone:

+32 14 58 45 45 (24h/24h)
 Information centre on dangerous goods (BIG)
 Technische Schoolstraat 43A, B-2440 Geel, Belgium

2. Hazards identification

- Harmful in contact with skin and if swallowed
- Causes burns
- Irritating to respiratory system
- May cause sensitisation by skin contact
- Possible risk of impaired fertility

3. Composition/information on ingredients

Hazardous ingredients	CAS No. EINECS/ELINCS No.	Conc. (%)	Hazards (R-phrases)	Hazard symbol
diethylenetriamine	111-40-0 203-865-4	30-70	21/22-34-43 (1) (2)	C
3-aminomethyl-3,5,5-trimethylcyclohexylamine (=isophoronediamine)	2855-13-2 220-666-8	5-10	21/22-34-43-52/53 (1) (2)	C
4,4'-isopropylidenediphenol	80-05-7 201-245-8	<35	37-41-43-62-52 (1) (2)	Xn
Amine compounds	- -	<25	43-62 (1)	Xn

(1) For R-phrases in full: see heading 16

(2) Substance with a Community workplace exposure limit

(3) PBT-substance

4. First aid measures

4.1 After inhalation:

- Remove the victim into fresh air
- Respiratory problems: consult a doctor/medical service

Printing date : 22-April-2010 1/9
 Compiled by : Brandweerinformatiecentrum voor Gevaarlijke Stoffen vzw (BIG)
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Date of issue : 11-May-2009 Revision : 22-April-2010
 Reference number : BIG\48348GB Revision number : 001
 Reason for revision : 14

POWERCRETE DD, PART B

4.2 Skin contact:

- Wash immediately with lots of water (15 minutes)/shower
- Remove clothing while washing
- Do not remove clothing if it sticks to the skin
- Cover wounds with sterile bandage
- Consult a doctor/medical service
- If burned surface > 10%: take victim to hospital

4.3 Eye contact:

- Rinse immediately with plenty of water for 15 minutes
- Do not apply neutralizing agents
- Take victim to an ophthalmologist

4.4 After ingestion:

- Rinse mouth with water
- Immediately give lots of water to drink
- Do not induce vomiting
- Immediately consult a doctor/medical service

5. Fire-fighting measures

5.1 Suitable extinguishing media:

- Polyvalent foam
- BC powder
- Carbon dioxide

5.2 Unsuitable extinguishing media:

- N.D.

5.3 Special exposure hazards:

- Combustible
- On burning: release of toxic and corrosive gases/vapours (nitrous vapours, carbon monoxide - carbon dioxide)

5.4 Instructions:

- Cool tanks/drums with water spray/remove them into safety
- Dilute toxic gases with water spray
- Take account of toxic fire-fighting water
- Use fire-fighting water moderately and contain it

5.5 Special protective equipment for firefighters:

- Heat/fire exposure: compressed air/oxygen apparatus
- Corrosionproof suit

6. Accidental release measures

6.1 Personal precautions:

See heading 8.2

6.2 Environmental precautions:

- Prevent soil and water pollution
- Prevent spreading in sewers
- Contain released substance, pump into suitable containers
- Plug the leak, cut off the supply
- Dam up the liquid spill
- See heading 13

6.3 Methods for cleaning up:

- Take up liquid spill into inert absorbent material, e.g.: sand/earth
- Scoop absorbed substance into closing containers
- Carefully collect the spill/leftovers
- Clean contaminated surfaces with an excess of water
- Take collected spill to manufacturer/competent authority
- Wash clothing and equipment after handling

7. Handling and storage

7.1 Handling:

- Observe very strict hygiene - avoid contact
- Do not discharge the waste into the drain
- Remove contaminated clothing immediately
- Clean contaminated clothing

POWERCRETE DD, PART B

7.2 Storage:

- Keep container tightly closed
- Keep out of direct sunlight
- Store in a cool area
- Store in a dry area
- Keep away from: heat sources, oxidizing agents, acids, bases

Storage temperature	:	N.D.	°C
Quantity limits	:	N.D.	kg
Storage life	:	N.D.	days
Materials for packaging	:		
- suitable	:	N.D.	
- to avoid	:	N.D.	

7.3 Specific use(s):

- See information supplied by the manufacturer for the identified use(s)

8. Exposure controls/Personal protection

8.1 Exposure limit values:

8.1.1 Occupational exposure:

diethylenetriamine

TLV-TWA	:		mg/m ³	1	ppm
TLV-STEL	:		mg/m ³	-	ppm
WEL-LTEL	:	4.3	mg/m ³	1	ppm
WEL-STEL	:	-	mg/m ³	-	ppm
GWBNI-TGG 8 h	:	4	mg/m ³	(indicatief)	
VME-8 h	:	4	mg/m ³	1	ppm
VLE-15 min.	:	-	mg/m ³	-	ppm
GWBB-8 h	:	4.3	mg/m ³	1	ppm
GWK-15 min.	:	-	mg/m ³	-	ppm

3-aminomethyl-3,5,5-trimethylcyclohexylamine

MAK	:	-	mg/m ³	-	ppm
-----	---	---	-------------------	---	-----

4,4'-isopropylidenediphenol

TRGS 900	:	5 E	mg/m ³		ppm
MAK	:	5 E	mg/m ³		ppm
GWBNI-TGG 8 h	:	5 R/10 I	mg/m ³	(indicatief)	

8.1.2 Sampling methods:

- Diethylenetriamine NIOSH 2540-2
- Diethylene Triamine OSHA 60
- Diethylenetriamine OSHA CSI
- diethylenetriamine NIOSH 2540-deta
- Isophorone Diamine OSHA CSI
- Bisphenol A OSHA CSI
- Bisphenol A NIOSH 6(333)

8.2 Exposure controls:

8.2.1 Occupational exposure controls:

- Measure the concentration in the air regularly
- Work under local exhaust/ventilation

Personal protective equipment:

a) Respiratory protection:

- Wear gas mask with filter type A if conc. in air > exposure limit

b) Hand protection:

- Gloves
- Suitable materials: Butyl rubber

- Breakthrough time: N.D.

POWERCRETE DD, PART B

c) Eye protection:

- Face shield

d) Skin protection:

- Corrosionproof clothing
- Suitable materials: Butyl rubber

8.2.2 Environmental exposure controls: see headings 6.2, 6.3 and 13

9. Physical and chemical properties

9.1 General information:

Appearance (at 20°C)	: Liquid
Odour	: Amine
Colour	: Colourless to light-brown

9.2 Important health, safety and environmental information:

pH value (at %)	: N.D.	
Boiling point/boiling range	: N.D.	°C
Flash point/flammability	: >93	°C (199F)
Explosion limits (explosive properties)	: N.D.	vol%
Oxidising properties	: N.D.	
Vapour pressure (at 20°C)	: N.D.	hPa
Vapour pressure (at 50°C)	: N.D.	hPa
Relative density (at 20°C)	: 0.98-1.0	
Water solubility	: N.D.	g/100 ml
Soluble in	: N.D.	
Relative vapour density	: N.D.	
Viscosity (at °C)	: N.D.	Pa.s
Partition coefficient n-octanol/water	: N.D.	
Evaporation rate		
ratio to butyl acetate	: N.D.	
ratio to ether	: N.D.	

9.3 Other information:

Melting point/melting range	: N.D.	°C
Auto-ignition temperature	: N.D.	°C
Saturation concentration	: N.D.	g/m ³
Specific conductivity	: N.D.	pS/m

10. Stability and reactivity

10.1 Conditions to avoid:

- Stable under normal conditions

10.2 Materials to avoid:

- Keep away from: heat sources, oxidizing agents, acids, bases

10.3 Hazardous decomposition products:

- On burning: release of toxic and corrosive gases/vapours (nitrous vapours, carbon monoxide - carbon dioxide)

11. Toxicological information

11.1 Acute toxicity:

diethylenetriamine

LD50 oral rat	: 1080	mg/kg
LD50 dermal rabbit	: 1090	mg/kg

3-aminomethyl-3,5,5-trimethylcyclohexylamine

LD50 oral rat	: 1030	mg/kg
---------------	--------	-------

POWERCRETE DD, PART B

4,4'-isopropylidenediphenol

LD50 oral rat : 3250 mg/kg
LD50 dermal rabbit : 3600 mg/kg

11.2 Chronic toxicity:

4,4'-isopropylidenediphenol

EC carc. cat. : not listed
EC muta. cat. : not listed
EC repr. cat. : 3

Carcinogenicity (TLV) : not listed
Carcinogenicity (MAC) : not listed
Carcinogenicity (VME) : not listed
Carcinogenicity (GWBB) : not listed

Carcinogenicity (MAK) : not listed
Mutagenicity (MAK) : not listed
Teratogenicity (MAK) : C

IARC classification : not listed

11.3 Routes of exposure: ingestion, inhalation, eyes and skin

11.4 Acute effects/symptoms:

AFTER INHALATION

- Irritation of the respiratory tract
- Irritation of the nasal mucous membranes
- EXPOSURE TO HIGH CONCENTRATIONS:
- Lung tissue affection/degeneration
- Symptoms similar to those listed under ingestion

AFTER INGESTION

- Possible esophageal perforation
- Burns to the gastric/intestinal mucosa
- Impairment of the nervous system
- Headache
- Nausea
- Dizziness
- Mental confusion
- Respiratory difficulties

AFTER SKIN CONTACT

- Caustic burns/corrosion of the skin

AFTER EYE CONTACT

- Corrosion of the eye tissue
- Blindness

11.5 Chronic effects:

- May cause sensitization by skin contact
- Possible risk of impaired fertility
- Not listed in carcinogenicity class (IARC, EC, TLV, MAK)
- Not listed in mutagenicity class (EC, MAK)

ON CONTINUOUS/REPEATED EXPOSURE/CONTACT:

- Enlargement/affection of the liver
- Affection of the renal tissue
- Spleen enlargement/affection

12. Ecological information

12.1 Ecotoxicity:

diethylenetriamine:

- LC50 (96 h) : 430 mg/l (LEUCISCUS IDUS)
- EC50 (48 h) : 17/64 mg/l (DAPHNIA MAGNA)
- EC50 (72 h) : 1164 mg/l (SELENASTRUM CAPRICORNUTUM)

3-aminomethyl-3,5,5-trimethylcyclohexylamine:

- LC50 (96 h) : 110 mg/l (BRACHYDANIO RERIO)
- EC50 (24 h) : 42/44 mg/l (DAPHNIA MAGNA)
- EC50 (72 h) : 37 mg/l (SCENEDESMUS SUBSPICATUS)

4,4'-isopropylidenediphenol:

- LC50 (96 h) : 9.9 mg/l (BRACHYDANIO RERIO)
- EC50 (48 h) : 3.9 mg/l (DAPHNIA MAGNA)
- EC50 (96 h) : 2.7/3.1 mg/l (SELENASTRUM CAPRICORNUTUM)

- **Effect on waste water purification** : N.D.

12.2 Mobility:

- **Volatile organic compounds (VOC):** 30/70%
- N.D.

For other physicochemical properties see heading 9

12.3 Persistence and degradability:

- **biodegradation BOD₅** : N.D. % ThOD
- **water** : N.D.
- **soil** : T ½: N.D. days

12.4 Bioaccumulative potential:

- log P_{ow} : N.D.
- BCF : N.D.
- Contains non readily biodegradable component(s)

12.5 Results of PBT assessment:

- Not applicable, based on available data.

12.6 Other adverse effects:

- **WGK** : 2 (Classification based on the components in compliance with Verwaltungsvorschrift wassergefährdender Stoffe (VwVwS) of 17 May 1999)
- **Effect on the ozone layer** : Not dangerous for the ozone layer (1999/45/EC)
- **Greenhouse effect** : N.D.

13. Disposal considerations

13.1 Provisions relating to waste:

- The EURAL code must be assigned by the user, preferably in consultation with the (environmental) authorities concerned
- LWCA (the Netherlands): KGA category 03
- Hazardous waste (91/689/EEC)
- Remove waste in accordance with local and/or national regulations

13.2 Disposal methods:

- Remove to an authorized plant for the destruction, neutralization and elimination of hazardous waste
- Contains a component for which a prohibition exists against discharge into surface water

13.3 Packaging/Container:

- Waste material code packaging (91/689/EEC, Council Decision 2001/118/EC, O.J. L47 of 16/2/2001): 15 01 10* (packaging containing residues of or contaminated by dangerous substances)

14. Transport information

14.1 Classification of the substance in compliance with UN Recommendations

UN number : 2735
 CLASS : 8
 SUB RISKS : -
 PACKING GROUP : II

14.2 ADR (transport by road)

CLASS : 8
 PACKING GROUP : II
 CLASSIFICATION CODE : C7
 DANGER LABEL TANKS : 8
 DANGER LABEL PACKAGES : 8
 PROPER SHIPPING NAME :
 Amines, liquid, corrosive, n.o.s. (diethylenetriamine, isophoronediamine)

14.3 RID (transport by rail)

CLASS : 8
 PACKING GROUP : II
 CLASSIFICATION CODE : C7
 DANGER LABEL TANKS : 8
 DANGER LABEL PACKAGES : 8
 PROPER SHIPPING NAME :
 Amines, liquid, corrosive, n.o.s. (diethylenetriamine, isophoronediamine)

14.4 ADNR (transport by inland waterways)

CLASS : 8
 PACKING GROUP : II
 CLASSIFICATION CODE : C7
 DANGER LABEL TANKS : 8
 DANGER LABEL PACKAGES : 8
 PROPER SHIPPING NAME :
 Amines, liquid, corrosive, n.o.s. (diethylenetriamine, isophoronediamine)

14.5 IMDG (maritime transport)

CLASS : 8
 SUB RISKS : -
 PACKING GROUP : II
 MFBG : -
 EMS : F-A, S-B
 MARINE POLLUTANT : -
 PROPER SHIPPING NAME :
 Amines, liquid, corrosive, n.o.s. (diethylenetriamine, isophoronediamine)

14.6 ICAO (air transport)

CLASS : 8
 SUB RISKS : -
 PACKING GROUP : II
 PACKING INSTRUCTIONS PASSENGER AIRCRAFT : 808/Y808
 PACKING INSTRUCTIONS CARGO AIRCRAFT : 812
 PROPER SHIPPING NAME :
 Amines, liquid, corrosive, n.o.s. (diethylenetriamine, isophoronediamine)

14.7 Special precautions : none

14.8 Limited quantities (LQ) :

When substances and their packaging meet the conditions established by ADR/RID/ADNR in chapter 3.4, **only** the following prescriptions shall be complied with:
 each package shall display a diamond-shaped figure with the following inscription:
 - 'UN 2735'
 or, in the case of different goods with different identification numbers within a single package:
 - the letters 'LQ'

POWERCRETE DD, PART B

15. Regulatory information

15.1 EU legislation:

Classification according to directives 67/548/EEC, 1999/45/EC and 2006/8/EC



Corrosive

contains:	diethylenetriamine; 4,4'-isopropylidenediphenol; 3-aminomethyl-3,5,5-trimethylcyclohexylamine, amine compounds
R21/22	: Harmful in contact with skin and if swallowed
R34	: Causes burns
R37	: Irritating to respiratory system
R43	: May cause sensitisation by skin contact
R62	: Possible risk of impaired fertility
S(01/02)	: (Keep locked up and out of reach of children)
S26	: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice
S36/37/39	: Wear suitable protective clothing gloves, and eye/face protection
S45	: In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible)

15.2 National provisions:

The Netherlands:
Waterbezwaarlijkheid: 8

Germany:
WGK : 2 (Classification based on the components in compliance with Verwaltungsvorschrift wassergefährdender Stoffe (VwVwS) of 17 May 1999)

16. Other information

Users are advised that they may have additional disclosure obligations under other national and local laws. Users are advised to ensure that this information is brought to the attention of all employees, agents, and contractors handling this product. Users of Berry Plastics BVBA products should make their own evaluation to determine the suitability of each such product for the specific application and to establish safe handling and installation procedures. Distributors of this product are advised to forward this document, or the information contained herein, to every purchaser of this product.

Berry Plastics BVBA makes no warranties as to the accuracy or completeness of this information and disclaims any liability in connection with its use. Berry Plastics BVBA obligations shall be only as set forth in Berry Plastics BVBA standard terms and conditions of sale for this product. In no case will Berry Plastics BVBA be liable for any incidental, indirect or consequential damages arising out of the sale, resale, use or misuse of this product.

N.A. = NOT APPLICABLE
N.D. = NOT DETERMINED
(*) = INTERNAL CLASSIFICATION (NFPA)

PBT-substances = persistent, bioaccumulative and toxic substances

POWERCRETE DD, PART B

Exposure limits:

TLV : Threshold Limit Value - ACGIH USA
WEL : Workplace Exposure Limits - United Kingdom
TRGS 900 : Technische Regel für Gefahrstoffe 900 (Arbeitsplatzgrenzwerte) - Germany
MAK : Maximale Arbeitsplatzkonzentrationen - Germany
GWBNL : Grenswaarde voor blootstelling - The Netherlands
GWKNL : Grenswaarde korte duur - The Netherlands
VME : Valeurs limites de Moyenne d'Exposition - France
VLE : Valeurs limites d'Exposition à court terme - France
GWBB : Grenswaarde beroepsmatige blootstelling - Belgium
GWK : Grenswaarde kortstondige blootstelling - Belgium
EC : Indicative occupational exposure limit values

I : Inhalable fraction = **T**: Total dust = **E**: Einatembarer Aerosolanteil
R : Respirable fraction = **A**: Alveolengängiger Aerosolanteil/Alveolar dust
C : Ceiling limit

a:	aerosol	r:	rook/Rauch	(fume)
d:	damp (vapour)	st:	stof/Staub	(dust)
du:	dust	ve:	vezel	(fibre)
fa:	Faser (fibre)	va:	vapour	
fi:	fibre	om:	oil mist	
fu:	fume	on:	olienevel/Ölnebel	(oil mist)
p:	poussière (dust)	part:	particles	

Chronic toxicity:

K : List of the carcinogenic substances and processes - The Netherlands

Full text of any R phrases referred to under headings 2 and 3:

R21/22 : Harmful in contact with skin and if swallowed
R34 : Causes burns
R37 : Irritating to respiratory system
R41 : Risk of serious damage to eyes
R43 : May cause sensitisation by skin contact
R52 : Harmful to aquatic organisms
R52/53 : Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment
R62 : Possible risk of impaired fertility

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Powercrete DD

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Nicolas Grenier
8 Markham Street, Mawson, ACT 2607, Australia
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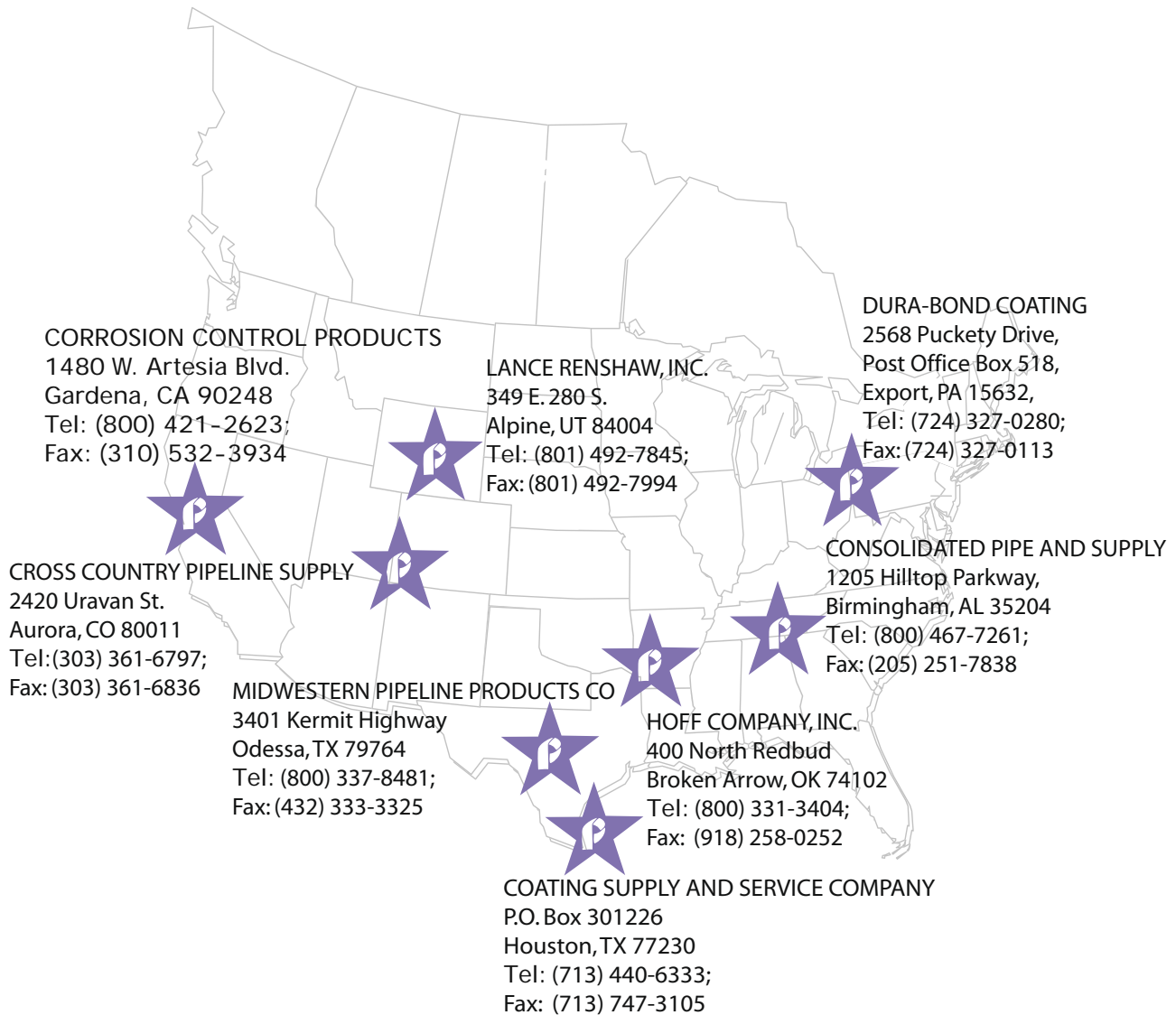
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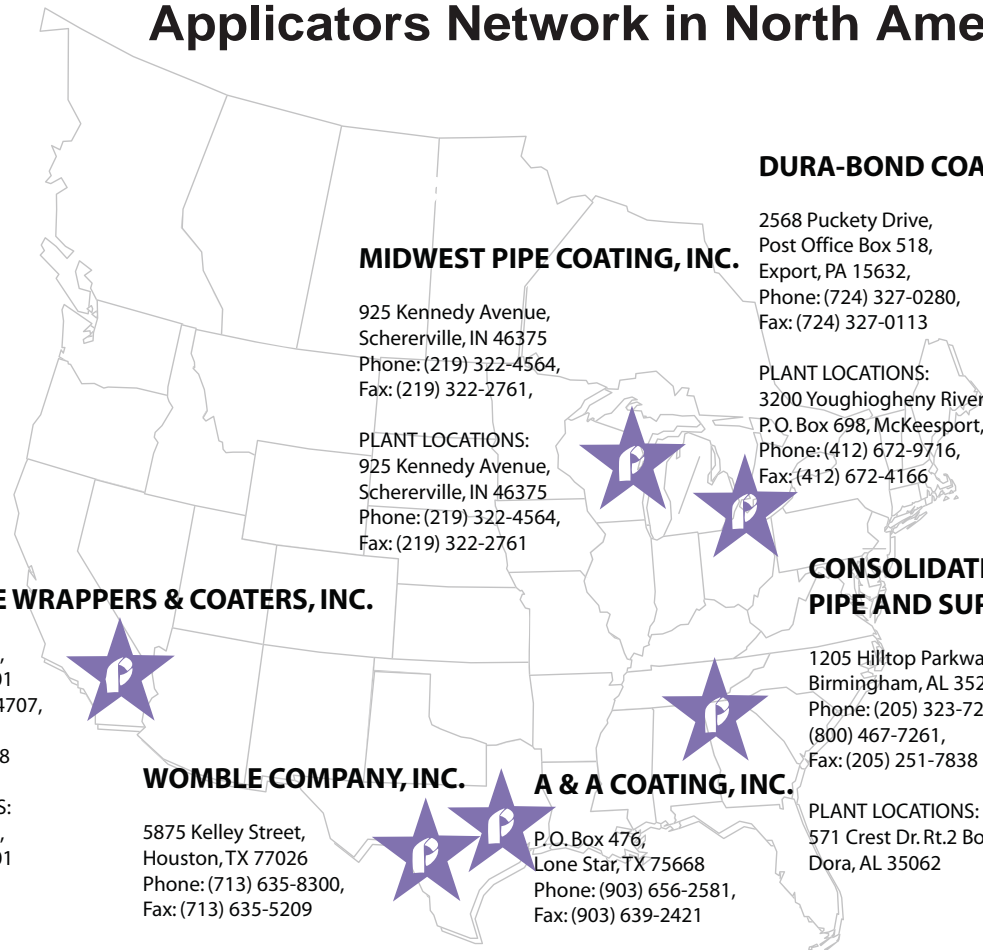
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2568 Puckety Drive,
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Export, PA 15632,
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Fax: (724) 327-0113
PLANT LOCATIONS:
3200 Youghiogheny River Road,
P. O. Box 698, McKeesport, PA 15134
Phone: (412) 672-9716,
Fax: (412) 672-4166

MOBILE PIPE WRAPPERS & COATERS, INC.
12766 Violet Road,
Adelanto, CA 92301
Phone: (760) 246-4707,
(800) 245-9727,
Fax: (760) 246-4348
PLANT LOCATIONS:
12766 Violet Road,
Adelanto, CA 92301

WOMBLE COMPANY, INC.
5875 Kelley Street,
Houston, TX 77026
Phone: (713) 635-8300,
Fax: (713) 635-5209
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5875 Kelley Street,
Houston, TX 77026

A & A COATING, INC.
P.O. Box 476,
Lone Star, TX 75668
Phone: (903) 656-2581,
Fax: (903) 639-2421
PLANT LOCATIONS:
Highway 250,
Lone Star, TX 75668
Phone: (903) 656-2581
Served by T&N Railway

**CONSOLIDATED
PIPE AND SUPPLY CO., INC.**
1205 Hilltop Parkway,
Birmingham, AL 35204
Phone: (205) 323-7261,
(800) 467-7261,
Fax: (205) 251-7838
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