

Powercrete[®] R-95

Girth Welds



Pipeline Repair



Rehabilitation



Pipe Bends, Fittings, Valves, Odd Shapes



BERRY
PLASTICS
CORPORATION
AND SUBSIDIARIES

CORROSION PROTECTION GROUP

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Product
Data Sheet
of Powercrete
R-95

Powercrete® R-95 Liquid Epoxy



Product Description

Powercrete R-95 is a single coat, 100% solids, high build epoxy novolac that coats, repairs and rehabilitates pipelines operating at maximum temperatures up to 95°C (203°F). As an abrasion resistant overlay (ARO) it is compatible with FBE and CTE mainline coatings and can be used on any metal structure. This 2-component, solvent-free epoxy can easily achieve a dry film thickness of up to 40 mils in a single application and can be hand or spray applied.

Typical Applications

- Pipeline Repair & Rehabilitation
- Girth Welds / Field Joints
- Pipe Bends, Fittings, Valves & Odd Shapes
- Any bare steel structure in need of protection

Product Features & Benefits

- 100% Solids Epoxy; No V.O.C.s and no isocyanates
Safe to use
- Novolac Chemistry
Greater surface tolerance and chemical resistance
- Excellent Wetting Properties to Bare Steel
Exceptional adhesion and cathodic disbondment resistance
- Same Formula for Hand or Spray Application
Reduce inventory
Easy selection to avoid errors
- High Build in a Single Application
Save time by applying 40+ mils in a single pass
- Excellent Mechanical Properties
Used in directional drill and thrust bore applications

Physical Properties

Property	Condition	Test Method	Typical Value	
			US Imperial	Metric
Specific Gravity	(Mixed)	ASTM D-3289-03	1.64	1.64
Compressive Strength		ASTM C-109	14,660 psi	110 MPa
Hardness	(Shore D)	ASTM D-2240	85	85
Thin Film Water Absorption	24 Hrs	ASTM D-570	0.15 %	0.15 %
Dielectric Strength	(Oil)	ASTM D-149	690 volts/mil	27 volts/micron
Resistance to Acids & Alkalies		ASTM C-581	Excellent	Excellent
Adhesion to				
FBE		ASTM D-4541	3,400 psi	23.44 MPa
Bare Steel		ASTM D-4541	3,550 psi	24.48 MPa
Impact Resistance	(40 mils thickness)	ASTM G-14-88	57 inch lbs	6.4 Nm/6.4 Joules
Flexibility	(Degrees per pipe diameter)	NACE RP-0394	0.15° to 0.19°	0.15° to 0.19°
Tabor Abrasion	(CS-17 wheel, wear cycles)	ASTM D-4060-95	780 cycles/mil	30 cycles/micron
Cathodic Disbondment	30 days			
23°C (73°F)		ASTM G-8	0.2 inch	4.0 mm
95°C (203°F)		ASTM G-42	0.3 inch	8.0 mm
Holiday Detection	Holiday free	ISO :21809-3 & CSA Z245.20 ASTM G 62 Method B	125 Volts per mil 84 Volts per mil	5 Volts per micron 3.3 Volts per micron

Product Selection Guide

Maximum Operating Temp	95°C (203°F)	Color	Gray
Compatible Line Coatings	FBE, CTE	Typical Single Coat Thickness	
Mixing Ratio		Manually Applied	40 mils (1.0 mm)
By Volume	3.6:1 Part A to B	Spray Applied	40 mils (1.0 mm)
By Weight	100:16 Part A to B	Recoat Interval (Spray)	
Surface Profile Recommended	2.5 - 4.0 mils 63.5 - 101.6 microns	@ 21°C, 70°F	34 - 60 minutes
Surface Preparation	SA 2 1/2 SSPC-10 - Near-White SSPC-SP5 - White	@ 65°C, 150°F	4 - 7 minutes
		Clean Up	Acetone, MEK

Typical Application

Hand Apply

Spray Apply

Waste Factor



Theoretical Coverage Rates

425 mil-sq. ft./litre
1605 mil-sq. ft./US gallon
1.0 mm-m²/litre

Recommended Tip Sizes

Tip Size	Pipe Size (DN)	Flow Rates (approx.)
331	to 12" (DN300)	19tip = 1.1 L / min.
419/431	12"-16" (DN300-400)	31tip = 2.8 L / min.
519/531	16"-24" (DN400-600)	
619/631	24"-48" (DN600-1200)	

Note: Fluid pressure at tip
Approx. 3,500 psi.



(approx.)

Waste Factor	Kit Application
10%	20" + pipe OD
15%	14"-18" pipe OD
25%	2"-12" pipe OD

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 100°C (212°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® R-95 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 Kit (1.82 Kg), @ 25°C (77°F)	14 minutes
Spray Application	
Gel Time: 40 mils, @ 27°C (80°F)	31 minutes
Dry Time: 40 mils, @ 27°C (80°F)	77 minutes
65 Shore "D" Reading: 40 mils, @ 27°C (80°F)	2.2 hours
75 Shore "D" Reading: 40 mils, @ 27°C (80°F)	5 hours
Application Temp Range	-30 to 100°C -20 to 212°F
Shelf Life (stored in specified conditions):	2 years

Ordering Information

Powercrete R-95 is available in three (3) packaging options:

Drum

Part A: 40 Gal / 153 L (625 Lbs / 283.5 Kg)
Part B: 46 Gal / 176 L (400 Lbs / 181.4 Kg)

Pail

Part A: 4 Gal / 15.1 L (61.7 Lbs / 28 Kg)
Part B: 4.6 Gal / 17.4 L (39.5 Lbs / 18 Kg)

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

20 Lbs / 9.08 Kg (1.44 Gal / 5.44 L)
10 Lbs / 4.53 Kg (0.72 Gal / 2.7 L)
4 Lbs / 1.82 Kg (0.29 Gal / 1.09 L)
2 Lbs / 0.91 Kg (0.14 Gal / 0.54 L)



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Berry Plastics warrants that the product(s) represented within conform(s) to its/their chemical and physical description and is appropriate for the use as stated on the respective 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 is obligated to 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 the respective technical data sheet(s) should be used as a guide and is subject to change without notice. This document supersedes all previous revisions. Please see revision date on the right.

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Physical
Properties
of Powercrete
R-95



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Report No. 05-1738

For

Mr. Bang Tran
TYCO ADHESIVES CORROSION PROTECTION GROUP
11010 Wallisville Road
Houston, Texas 77013

Laboratory Testing:
Performed on
Powercrete® R95

P.O. No. 98592

Prepared by

Karl Kelso

Thursday, September 01, 2005

I.T.I Contract No. 9268

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Introduction

Friday, July 22, 2005 a 4" x 8" x 0.250" steel plate, encapsulated with Powercrete® R95, was delivered to ITI Anti-Corrosion, Inc., for hot water soak immersion testing followed by an adhesion test.

Test Parameters

Hot Water Soak – NACE RP0394-2002; Appendix J

Duration : 30 Days, July 25, 2005 to August 24, 2005 (modified from 24 hours)
Water : Tap Water (modified from deionized water)
Method : Full immersion
Temperature : 203±5 °F (modified from 150±5 °F)
Adhesion : Rating per Appendix J Scale J4.4.3.1 through J4.4.3.5

Adhesion – ASTM D 4541-02; Annex A4 (Performed after the 30 day hot water soak)

Test Date : September 1, 2005
Tester / Type : Patti-Jr. (pneumatic) / Type IV
Capacity : F-16 Piston with 8100psi maximum
Adhesive/Glue : Two-part liquid epoxy allowed to cure a minimum of 16 hours
Adhesion Stub : Coating around stub was not scored
Conditioning : Minimum of seven days @ 73.4±3.6 °F & 50±5% R.H.
Test Conditions : 73.4±3.6 °F & 50±5% R.H.

Test Results

Hot Water Soak; NACE RP0394-2002, Appendix J

Panel	Average Coating Thickness	Adhesion Rating
R95	51mils	Rating 1; After three attempts at each corner, the coating pieces removed are the same size as, or smaller than, the size of the inserted knife point.



Test Results – Continued

Adhesion; ASTM D 4541-02

Pull (mils)	Pull Strength (psi)	Mode of Failure		
		Adhesive	Cohesive	Glue
1 (51)	3090	0%	100%	0%
2 (51)	3253	0%	100%	0%
3 (52)	2845	0%	100%	0%
Average	3063			

Adhesion Failure Terminology

Adhesive Strength: Refers to the bond between two separate materials such as one coating to another coating or the bond of a coating to a substrate such as wood, concrete, steel, etc. The term “***Adhesive Failure***” in this program would be used to describe the loss of bond that might have occurred between the R95 coating and the steel substrate.

Cohesive Strength: Refers to the characteristic of a single coating or material to stay intact within itself. The term “***Cohesive Failure***” in this program was used to describe the separation or tearing apart that occurred within the R95 coating itself.

Glue Failure: Refers to the loss of bond that might have occurred between the glue used to attach the pull stub and the R95 coating being tested.

Failure Percentages: The failures are rated in percentages based upon the 0.196in² contact surface area of the pull stub.



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TEST CERTIFICATE

Client : Berry Plastics BVBA
P.O. Box 46800

Exova Ref : A 905926 Rev 1

Date Reported: 19 November 2009

Specification / Code : ASTM D2370-98 (2002)

Material Description as provided by client: ID: Powercrete R-95 Sample
Customer: Berry Plastics Pvt. Ltd., Vadodara, India
Customer Order: Informed by an E-mail (by Pranav Purani)
Product: Powercrete R - 95
Part A – Batch No: 09110425, Part B - Batch No: 09101408

TENSILE TEST				Test Method: ASTM D2370-98 (2002)			
Mark #	Type	Dimensions mm	Area mm ²	UTL N	UTS		EL %
					N/mm ²	psi	
020	Parent	0.632 x 19.8	12.51	285	23	3336	4.0
021	Parent	0.344 x 19.6	6.74	223	33	4786	2.4
022	Parent	0.678 x 20.0	13.56	291	21	3046	4.2
023	Parent	0.355 x 20.5	7.28	196	27	3916	2.0
024	Parent	0.362 x 20.5	7.38	166	23	3336	2.5
025	Parent	0.643 x 19.3	12.41	244	20	2901	2.8
026	Parent	0.664 x 19.7	13.08	277	21	3046	4.0
027	Parent	0.699 x 19.5	13.63	243	18	2611	3.2
028	Parent	0.345 x 19.7	6.80	176	26	3771	2.2
029	Parent	0.372 x 19.9	7.40	177	24	3481	2.8

Certificate Comments:

- Tensile Test rate of loading is 12.5mm/min (Cross head travel).
- Percentage Elongation calculated based on machine travel as final gauge length and 125mm as initial gauge length.

Tested by : Amer A.M
Date Tested : 18 November 2009
For and on behalf of Exova limited (Abu Dhabi) – Umm Al Naar Laboratory

D. R. Vickers
I Eng. A.M.I.M³
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(35)



Corrosion Technology
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Report No. 05-1767

For

Mr. Bang Tran
TYCO ADHESIVES CORROSION PROTECTION GROUP
11010 Wallisville Road
Houston, Texas 77013

Laboratory Testing:
Performed on
Powercrete® R95

Prepared by

Karl Kelso

Friday, December 02, 2005

I.T.I Contract No. 9459

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Introduction

Various sizes of steel plates coated with *Powercrete*[®] *R95*, as well as free films of the same material, were delivered to ITI Anti-Corrosion, Inc., for testing.

Requested Tests

- | | | |
|-------------------------------|---|------------------------------------|
| 1. Chemical Resistance | : | ASTM G 20-88 (modified) |
| 2. Water Absorption | : | ASTM D 570-98 |
| 3. Impact Resistance | : | ASTM G 14-88 (modified) |
| 4. Flexibility | : | NACE RP0394-2002 (modified) |
| 5. Abrasion Resistance | : | ASTM D 4060-01 |
| 6. Adhesion | : | ASTM D 4541-95 (modified) |
| 7. UV/Condensation Resistance | : | ASTM G 154-00 (formerly ASTM G 53) |
| 8. Cathodic Disbondment | : | ASTM G 8-96 |
| 9. Cathodic Disbondment | : | ASTM G 95-87 (modified) |
| 10. Hardness | : | ASTM D 2240-86 (modified) |
| 11. Hardness | : | ASTM D 2583-95 |
| 12. Hardness | : | ASTM D 3363-00 (modified) |
| 13. Hot Water Soak | : | NACE RP0394-2002 (modified) |



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Test Parameters

Chemical Resistance – ASTM G 20-88

Duration : 6 Months; 8-14-03 to 2-13-04 (modified from 90 days)
Temperature : 75±5 °F / 24±3 °C
Specimen Size : 1" x 8" x 0.250" Straps (modified from pipe specimens)

Water Absorption – ASTM D 570-98

Duration : 24 Hours; 7-8-03 to 7-9-03
Conditioning : 1 Hour @ 230 °F prior to immersion
Temperature : 75±5 °F / 24±3 °C
Specimen Size : 1" x 3" By thickness of free film

Impact Resistance – ASTM G 14-88

Tup Weight : 4 pounds (modified from 3 pounds)
Tup Nose : 0.625"Ø
Test Voltage : 67.5 VDC – Wet Sponge

Flexibility – NACE RP0394-2002; Procedure B

Method : Four-point
Temperature : 0 °F / -18 °C (modified from 32 °F / 0 °C)
Results : Calculations based on arc-matching method, Figures H2-H5

Abrasion Resistance – ASTM D 4060-01

Load : 1000grams
Cycles : 1000
Wheels : CS-17 (resurfaced after 500cycles)
Conditioning : Minimum of 24 hours @ 75±5 °F / 24±3 °C & 50±5% R.H.
Test Conditions : 75±5 °F / 24±3 °C & 50±5% R.H.

Adhesion – ASTM D 4541-95; Annex A4

Tester / Type : Patti-Jr. (pneumatic) / Type IV
Capacity : F-16 Piston with 8100psi maximum
Adhesive/Glue : Two-part liquid epoxy allowed to cure a minimum of 24 hours
Adhesion Stub : Coating/adhesive around stub was not scored
Conditioning : Minimum of 24 hours @ 75±5 °F / 24±3 °C & 50±5% R.H.
Test Conditions : 75±5 °F / 24±3 °C & 50±5% R.H.

Adhesion – ASTM D 4541-02; Annex A4

Test Date : October 20, 2005
Tester / Type : Patti-Jr. (pneumatic) / Type IV
Capacity : F-16 Piston with 8100psi maximum
Adhesive/Glue : R95 Used as Glue
Adhesion Stub : Coating around stub was not scored
Temperature : 185±5 °F / 85±3 °C (modified from 75±5 °F / 24±3 °C)



Test Parameters – Continued

Adhesion – ASTM D 4541-02; Annex A4 (Performed after 30 day 203±5 °F / 95±3 °C water soak)

Test Date : September 1, 2005
Tester / Type : Patti-Jr. (pneumatic) / Type IV
Capacity : F-16 Piston with 8100psi maximum
Adhesive/Glue : Two-part liquid epoxy allowed to cure a minimum of 16 hours
Adhesion Stub : Coating around stub was not scored
Conditioning : Minimum of seven days @ 75±5 °F / 24±3 °C & 50±5% R.H. after a 30 day hot tap water soak at 203±5 °F / 95±3 °C
Test Conditions : 75±5 °F / 24±3 °C & 50±5% R.H.

Accelerated UV/Condensation – ASTM G 154-00

Duration : 21 Days with alternating dry/wet cycles; 7-21-03 to 8-11-03
Condensation : Four (4) hours @ 122 °F / 50 °C
Ultraviolet : Four (4) hours @ 140 °F / 60 °C
Lamps : UV-B 313

Cathodic Disbondment – ATM G 8-96

Duration : 30 Days; 6-16-04 to 7-16-04
Holidays : Two (2) 0.250"Ø holidays per sample
Temperature : 70 to 77 °F / 21 to 25 °C
Potential : -1.5±0.05 VDC vs. SCE
Electrolyte : Per ASTM G 8-96 requirement

Cathodic Disbondment – ASTM G 95-87

Duration : 30 Days; 8-2-04 to 9-1-04 (modified from 90 days)
Cell Size : 3" ID x 6" Tall (modified from 4"Ø)
Holiday Size : 0.250"Ø (modified from 0.125"Ø)
Temperature : 203±5 °F / 95±3 °C (modified from 70 to 75 °F / 21 to 24 °C)
Electrolyte : 3 Mass % of NaCl added to deionized water
Electrolyte Level: 5.5"
Anode : Platinum (fritted glass filter tube not used)
Potential : -1.5±0.07 VDC vs. SCE (modified from -3.0 VDC)

Hardness – ASTM D 2240-86

Test Date : 12-24-03
Durometer : PTC Instruments, Model 307L
Type : D
Reading Interval: 1 Second
Conditioning : Minimum of 24 hours @ 75±5 °F / 24±3 °C & 50±5% R.H.
Test Conditions : 75±5 °F / 24±3 °C & 50±5% R.H.



Test Parameters – Continued

Hardness – ASTM D 2240-86

Test Date : 10-20-05
Durometer : PTC Instruments, Model 307L
Type : D
Reading Interval: 1 Second
Temperature : 185±5 °F / 85±3 °C (modified from 75±5 °F / 24±3 °C & 50±5% R.H.)

Hardness – ASTM D 2583-95

Test Date : 12-24-03
Impressor Type : Barber-Coleman
Model : 934-1
Results : Average of five hardness readings
Conditioning : Minimum of 24 hours @ 75±5 °F / 24±3 °C & 50±5% R.H
Test Conditions : 74±5 °F / 24±3 °C & 50±5% R.H

Hardness – ASTM D 3363-00

Test Date : 10-20-05
Pencil : Berol Turquoise
Temperature : 185±5 °F / 85±3 °C (modified from 75±5 °F / 24±3 °C & 50±5% R.H.)

Hot Water Soak – NACE RP0394-2002; Appendix J

Duration : 24 Hours; 3-31-05 to 4-1-05
Water : Deionized
Method : Full immersion
Temperature : 150±5 °F / 66±3 °C
Adhesion : Rating per Appendix J Scale

Hot Water Soak – NACE RP0394-2002; Appendix J

Duration : 30 Days, 7-25-05 to 8-24-05 (modified from 24 hours)
Water : Tap Water (modified from deionized water)
Method : Full immersion
Temperature : 203±5 °F / 95±3 °C (modified from 150±5 °F / 66±3 °C)
Adhesion : Rating per Appendix J Scale J4.4.3.1 through J4.4.3.5



Test Results

Chemical Resistance; ASTM G 20-88; 6 Months at 75±5°F

Reagent	Average DFT	Swelling V / R	Fading V / R	Softening V / R	Blistering V / R
25% Sodium Hydroxide; pH 12.2	24mils	NC / NC	NC / S	NC / NC	NC / NC
10% Sodium Chloride; pH 8.0	42mils	NC / NC	NC / M	NC / NC	NC / NC
25% Sodium Carbonate; pH 11.4	36mils	NC / NC	NC / S	NC / NC	NC / NC
25% Sulfuric Acid; pH 0.0	21mils	NC / NC	NC / SV	NC / S	NC / 8M
10% Nitric Acid; pH 0.0	30mils	NC / NC	SVY / SVY	S / SV	NC / 6M
5% Acetic Acid; pH 1.7	37mils	NC / NC	M / M	M / SV	8D / 6D
10% Hydrochloric Acid; pH 0.0	29mils	NC / NC	SV / SV	S / M	6F / 6F
Gasoline; pH 8.0	33mils	NC / NC	NC / NC	NC / NC	NC / NC
Diesel; pH 8.1	37mils	NC / NC	NC / NC	NC / NC	NC / NC
Kerosene; pH 8.0	25mils	NC / NC	NC / NC	NC / NC	NC / NC

Key:

NC: No Change **M:** Moderate **S:** Slight **SV:** Severe **8M:** No. 8 Size, Medium Blisters

8D: No. 8 Size, Dense Blisters **6F:** No. 6 Size, Few Blisters

6M: No. 6 Size, Medium Blisters **6D:** No. 6 Size, Dense Blisters **SVY:** Severe Yellowing

(Blistering Rated in General Accordance with ASTM D 714-87)



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Test Results – Continued

Water Absorption; ASTM D 570-98

Specimen	Weight Gain	Average Weight Gain	% Weight Gain	Average % Weight Gain
1	0.0049grams	0.0049grams	0.170	0.152
2	0.0047grams		0.149	
3	0.0051grams		0.136	

Impact Resistance; ASTM G 14-88

Average DFT	Impact Strength (in-lbs)	Std. Deviation (in-lbs)	Impact Strength (Joules)	Std. Deviation (Joules)
44mils	39.2	2.84	4.43	0.32

Flexibility; NACE RP0394-2002

Strap	Temp. °F	Average DFT	Arc Radius	%pd*	Failure Mode
1	0	40mils	>28"	<0.617	Crack
2	0	30mils	>28"	<0.586	Crack
3	0	50mils	>28"	<0.628	Crack
4	0	30mils	>28"	<0.590	Crack
				Average	<0.605

**An actual value was not available due to the arc of the bent straps being larger than 28", which was the limit of the NACE arc charts.*

Abrasion Resistance; ASTM D 4060-01

Sample	Panel	Weight Loss	Average Mils Lost	Wear Index (mg/1000cycles)	Cycles Per Mil
R95	1	94.6mg	1.1	94.6	885
	2	88.8mg	1.5	88.8	676
	Average	91.7mg	1.3	91.7	781



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Test Results - Continued

Adhesion; ASTM D 4541-95 (75±5 / 24±3°C)

Pull	Pull Strength (psi)	Mode of Failure		
		Adhesive	Cohesive	Glue
1	3742	0%	0%	100%
2	3905	0%	0%	100%
Average	3824			

Adhesion; ASTM D 4541-02 (185±5 / 85±3°C)

Pull	Pull Strength (psi)	Mode of Failure	
		Adhesive	Cohesive
1	3253	60%	40%
2	3416	60%	40%
3	3090	0%	100%
Average	3253		

Adhesion; ASTM D 4541-02 (After 30 Day Hot Water Soak)

Pull	Pull Strength (psi)	Mode of Failure		
		Adhesive	Cohesive	Glue
1	3090	0%	100%	0%
2	3253	0%	100%	0%
3	2845	0%	100%	0%
Average	3063			

Adhesion Failure Terminology

Adhesive Strength: Refers to the bond between two separate materials such as one coating to another coating or the bond of a coating to a substrate such as wood, concrete, steel, etc. The term “***Adhesive Failure***” in this program would be used to describe the loss of bond that occurred between the R95 outer/top layer and the R95 coating applied to the steel substrate.

Cohesive Strength: Refers to the characteristic of a single coating or material to stay intact within itself. The term “***Cohesive Failure***” in this program was used to describe the separation or tearing apart that occurred within the R95 coating itself.

Glue Failure: Refers to the loss of bond between the glue used to attach the pull stub and the R95 coating being tested.

Failure Percentages: The failures are rated in percentages based upon the 0.196in² contact surface area of the pull stub.



Test Results – Continued

UV/Condensation Resistance; ASTM G 154-00

Gloss at 60°	Panel 1	Panel 2
Initial	87.4	95.4
Final	1.3	1.3
% Change	98.5	98.6
Chalking; Method A of ASTM D 4214-98	4	4

Cathodic Disbondment; ASTM G 8-96

Pipe	Disbondment		Combined Average Disbondment and DFT*
	Holiday 1 (Average DFT)	Holiday 2 (Average DFT)	
1	3.0mmr (64mils)	3.1mmr (46mils)	3.1mmr (55mils)
2	3.1mmr (43mils)	2.3mmr (69mils)	2.7mmr (56mils)
3	2.9mmr (53mils)	2.7mmr (44mils)	2.8mmr (49mils)
Average of Three Pipe			2.9mmr (53mils)

**Note: A reference holiday was drilled, on each pipe section/test specimen, through the coating in an area that was not immersed during the test and evaluated in the same manner as the intentional holidays. The coating around the reference holidays was securely bonded and was not readily removed from the steel substrate. Thus, the above values are calculated upon the actual disbondment as measured from the edge of each intentional holiday.*

Cathodic Disbondment; ASTM G 95-87

Panel	Dry Film Thickness (mils) Low / High / Average	Average Panel Radial Disbondment	Average Combined Radial Disbondment
1	47 / 55 / 51	9.7mmr	9.4mmr
2	45 / 48 / 47	8.4mmr	
3	48 / 53 / 51	10.2mmr	

Hardness – ASTM D 2240-86; Durometer Hardness (75±5°F / 24±3°C)

Temperature	Average Coating Thickness	Average Hardness
75±5°F / 24±3°C	57mils	D / 89 / 1
185±5°F / 85±3°C	40mils	D / 84 / 1



Test Results - Continued

Hardness – ASTM D 2583-95; Barcol Hardness (75±5°F / 24±3°C)

Impressor Type	Average Coating Thickness	Average Hardness
Barber-Coleman; Model 934-1	57mils	58

Hardness – ASTM D 3363-00; Pencil Hardness

Temperature	Average Coating Thickness	Average Hardness
185±5°F / 85±3°C	40mils	H – Scratch Hardness

Hot Water Soak; NACE RP0394-94, Appendix J

Duration/Temperature	Average Coating Thickness	Adhesion Rating
24 Hours 150±5°F / 66±3°C	44mils	Rating 1; After three attempts at each corner, the coating pieces removed are the same size as, or smaller than, the size of the inserted knife point.
30 Days 203±5°F / 95±3°C	51mils	Rating 1; After three attempts at each corner, the coating pieces removed are the same size as, or smaller than, the size of the inserted knife point.



Photographs



An Affiliate of





Chemical Resistance Panels; ASTM G 20-88



Adhesion Panel; NACE RP0394-2002 30 Day/203°F H₂O Soak and ASTM D 4541-02 Test After the 30 Day/203°F H₂O Soak



**Hot Water Soak Panel; NACE RP0394-2002
(24 Hours @ 150±5°F / 66±3°C)**



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3

Manual
Applications
Guide of
Powercrete
R-95

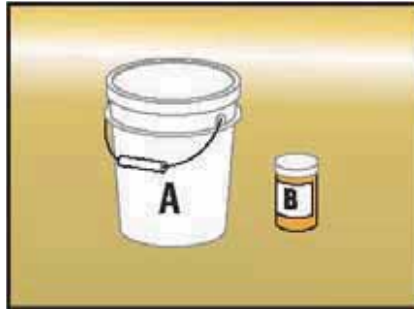
Application Guide

Manual / Kit Application

Powercrete® R-95

Powercrete R-95 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



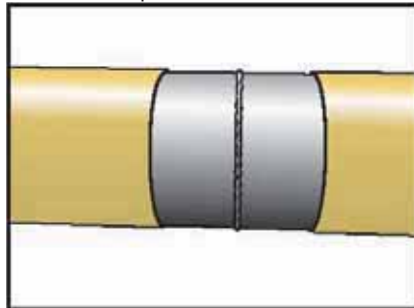
3. Insure that surfaces are clean of grease, oil, salts and other contaminants. If necessary, use Acetone, MEK or other suitable solvent. Perform cleaning when pipe is 3°C (5°F) above dew point.

4. Surface Preparation



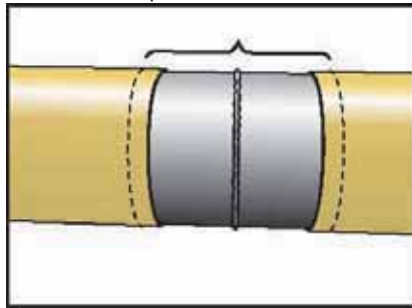
4. Blast clean surfaces to a near white ISO-8501, NACE No. 2, SA-21/2 (SSPC-SP 10) or better using particle blasting (sand or other). Sweep blast adjacent FBE or CTE coating. 50 mm (2") to either side of cutback (the bare steel area)

5. Surface Preparation



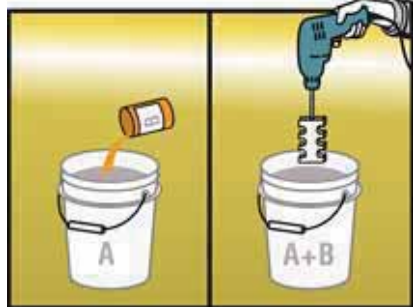
5. A 2.5-4 mil (63.5-101.6 micron) surface profile with sharp angularity. Burnishing or polishing must be avoided. Surface preparation can be controlled using surface profile tape. Dry surface and insure ideal surface preparation.

6. Surface Preparation



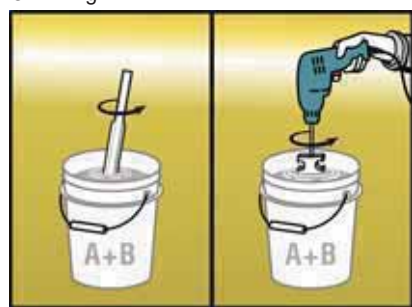
6. While not always necessary, preheating can be useful just prior to application.
A. To eliminate moisture, preheat the cutback area to approximately 40°C (104°F).
B. To accelerate curing, preheat the cutback area to approximately 90°C (194°F).

7. Combining & Mixing



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

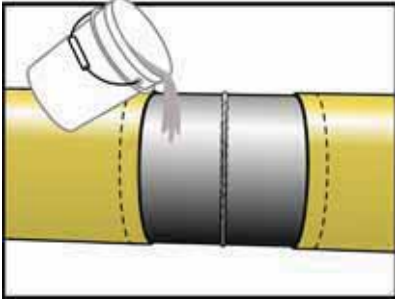


8. Use a mixing speed that uniformly blends the 2 parts, but does not create a vortex in the mixture or spillage.

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

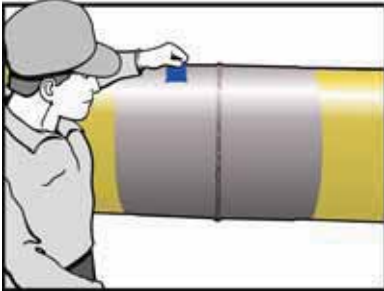


10. Use trowels, brush or roller to apply required minimum thickness of coating to the Field Joint. Cover at least 50mm (2") of the adjacent mainline coating.

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

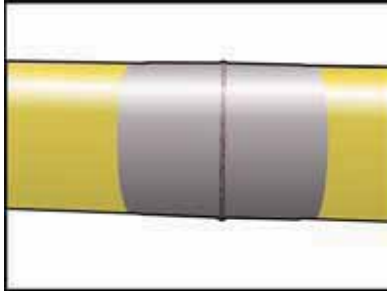
***Note:** Powercrete R-95 may be applied and cured at colder environmental temperatures if the pipe is heated during the application and cure..

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 Berry Plastics representative for specific projects or unique applications.



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4

Spray
Applications
Guide of
Powercrete
R-95

Application Guide

Spray Application



Powercrete R-95 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.

1.0 Scope

- 1.1 This application guide details the spray application for coating the surface of bare steel pipe or over plant applied or mainline coatings with Powercrete R-95, a new generation of protective coating material.
- 1.2 Contractor shall furnish all labor, supervision, materials, equipment and related hardware required for completing an acceptable application.
- 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 Definitions

- 2.1 Company - The acceptor of the finished Powercrete R-95 coated pipe, its employees, contracted inspector, or other authorized personnel.
- 2.2 Coating Applicator - The company responsible for the application of Powercrete R-95 coating.
- 2.3 Manufacturer - The supplier/manufacturer of the Powercrete R-95 material / product.

3.0 Surface Preparation

- 3.1 The surface to be coated shall be cleaned of all coatings and free of all contaminants. Following cleaning, the surface of the steel shall be abrasive-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, NACE No.2, SA-2 1/2, SSPS-SP-10 or better. Surface anchor profile to be 2.5 - 4 mils (63.5 - 101.6 microns) with sharp angularity, creating peaks & valleys.
- 3.2 Before applying the Powercrete R-95 coating, the surface shall be subject to inspection for appropriate surface preparation.
- 3.3 The surface of the existing coating that will be overlapped, if present, shall be tapered, cleaned and abraded. Sweep blast cleaning (brush-off blasting) is also recommended.

4.0 Coating Application

- 4.1 Insure that the surface is clean of grease, oil, salts and other contaminants. If necessary, use Acetone, MEK or other suitable solvent. Solvent used for cleaning should be without moisture/water contents and should not leave its residue on the surface. 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 approx. 40°C (104°F). To accelerate curing, preheat the area to approx. 90°C (194°F).
- 4.2 The dry, clean surface shall be coated within 4 hours after blast cleaned.

4.3 Spray Application

- 4.3.1 The Powercrete R-95 components shall be adequately mixed 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 R-95 shall be spray applied to the abraded, dried, cleaned surface, using adequate atomization.
- 4.3.3 Powercrete R-95 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 2.54 cm (1").
- 4.3.5 Coated surface shall not be touched for at least 4 hours if ambient temperature is above 21°C (70°F), 5 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 71°C (160°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, backfill, insects or other foreign materials.
- 4.3.7 Under no circumstances shall the pipe be installed before the Powercrete R-95 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 125 volts per mil and holidays found 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 (or other) 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 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 R-95 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 (ASTM D2240), 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.

6.0 Repairs

6.1 All damage detected by visual and electrical 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 of coating by hand or power tools. Remove oil, grease, loosely adhering particles or any other contaminants. Steel surface area should be dry, cleaned, and patched with Powercrete R-95. (see manual/kit application guide)

6.3 For small repairs to scratches or other holidays, Powercrete R-95 cartridge applicator kit may be used. Assemble and load Powercrete R-95 Part-A and Part-B cartridge into gun. Trim end of mixer and attach to the nozzle. Dispense small amount of Powercrete R-95 onto repair area. And apply it to a desired thickness.

6.4 Patches shall overlap the surrounding undamaged coating by a minimum of 19 mm (3/4").

6.5 Repairs shall be subject to reinspection at the discretion of the Company inspector.

6.6 Areas not meeting the hardness requirement shall be removed using a method that will not damage the pipe. And then after suitable cleaning, Powercrete R-95 is to be re-applied.

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 representative for specific projects or unique applications



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5

Cure Time
Chart for
Powercrete
R-95



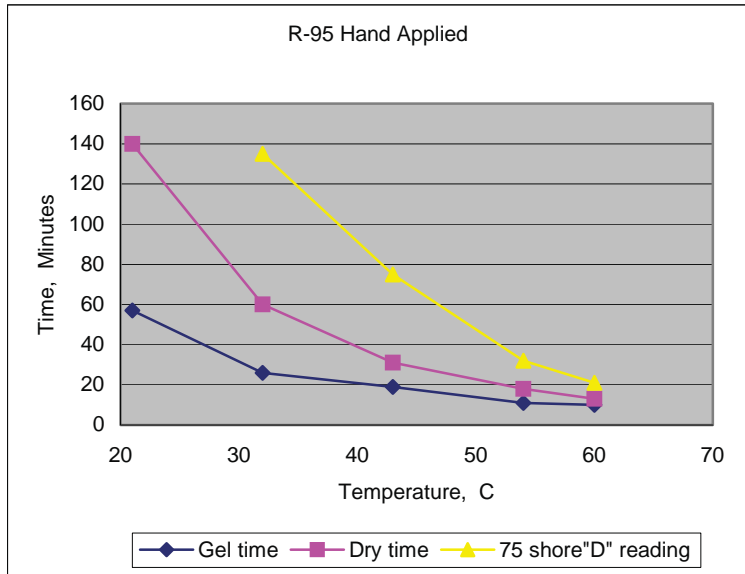
POWERCRETE R-95 GEL, RE-COAT AND CURING TIME CHART

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.
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 min. except indicated	Re-coat Time Window (In minutes from application time of previous coating pass)	Dry Time Unit in minutes except indicated	65 Shore "D" Reading Unit in minutes except indicated	75 Shore "D" Reading Unit in minutes except indicated
<60 °F (16 °C)	Hand Spray	MATERIAL IS TOO VISCOUS, FROZEN LIKE, HARD TO DIFFERENTIATE GELING AND DRYING.				
60 °F (16 °C)	Hand Spray	80 75	75 th -----120th 70-----100th	3 hrs 2 hrs 25 min	20 hrs	5 – 6 days Next day
65 °F (18 °C)	Hand Spray	60 44	55-----90th 40-----80th	2 hrs 50 min 2 hrs 17 min	6 hrs 5 hrs 7 min	10 hrs 9 hrs 17 min
70 °F (21 °C)	Hand Spray	57 39	52-----75th 34-----60th	4 hrs 100	6 hrs 4 hrs 5 min	9 hrs 8 hrs
80 °F (27 °C)	Hand Spray	37 31	32-----50th 29-----45th	95 77	4 hrs 2 hrs 17 min	5.5 hrs 5 hrs
90 °F (32 °C)	Hand Spray	26 21	22 -----40th 17-----35th	60 56	2 hrs 95	2.25 hrs 2 hrs
100 °F (38 °C)	Hand Spray	23 19	20-----32nd 16-----28th	40 40	70 60	90 70
110 °F (43 °C)	Hand Spray	19 14	16---22nd 12---21st	31 30	53 50	75 60
120 °F (49 °C)	Hand Spray	14 10	12---20th 9---15th	29 20	34 32	37 35
130 °F (54 °C)	Hand Spray	11 9	9---14th 7---10th	18 15	22 18	32 30
140 °F (60 °C)	Hand Spray	10 8	8--10th 6---8th	13 10	18 <11	21 11
150 °F (66 °C)	Hand Spray	7 6	5--10th 4 -7th	12 9	14 10	16 11

* Coating hardness to be at 75 Shore D reading prior to handling. Coating temperatures lower than 77° F (25° C) will give a false hardness reading. Using a grinder with grinding disk, a cured coating will give out dust particles, while an uncured coating will melt like gum.



WORDR95GEL-DRY-CURE040427

6

Material Safety
Data Sheet of
Powercrete R-95
Part-A



SAFETY DATA SHEET

Based on Directive 2001/58/EC of the Commission of the European Communities

POWERCRETE R95 PART A

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

1.1 Identification of the substance or preparation:

Synonyms: none
CAS No. : N.A.
EC index No. : N.A. NFPA code : 2-1-0(*)
EINECS No. : N.A. Molecular weight : N.A.
RTECS No. : N.A. Formula : N.A.

1.2 Use of the substance or the preparation:

Epoxy resin
Industrial use

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:

Europe: +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. Composition/information on ingredients

Hazardous ingredients	CAS No. EINECS/ELINCS No.	Conc. in %	Hazard symbol	Risks (R-phrases)
phenol/formaldehyde/glycidyl ether, polymer	28064-14-4	>20	Xi	38-43 (1)
magnesium carbonate	546-93-0 208-915-9	<5	Xi	36 (1)

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

3. Hazards identification

- Irritating to skin
- May cause sensitization by skin contact

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MSDS established : 19-01-2004 Revision date : 18-10-2005
Reference number : BIG\40364GB Revision number : 002
Reason for revision : 2; 8; 11; 16

POWERCRETE R95 PART A

4. First aid measures

- 4.1 Eye contact:**
- Consult a doctor/medical service if irritation persists
 - Rinse immediately with plenty of water
- 4.2 Skin contact:**
- Consult a doctor/medical service if irritation persists
 - Wash immediately with lots of water
 - Soap may be used
- 4.3 After inhalation:**
- Consult a doctor/medical service if breathing problems develop
 - Remove the victim into fresh air
 - Unconscious: maintain adequate airway and respiration
- 4.4 After ingestion:**
- Consult a doctor/medical service if you feel unwell
 - Immediately give lots of water to drink
 - Never give water to an unconscious person
 - Do not induce vomiting

5. Fire-fighting measures

- 5.1 Suitable extinguishing media:**
- Water spray
 - Polyvalent foam
 - BC powder
 - Carbon dioxide
- 5.2 Unsuitable extinguishing media:**
- No data available
- 5.3 Special exposure hazards:**
- Combustible
 - Upon combustion CO and CO₂ are formed
- 5.4 Instructions:**
- No specific firefighting instructions required
- 5.5 Special protective equipment for firefighters:**
- Heat/fire exposure: compressed air/oxygen apparatus
 - Protective clothing for exposure to chemicals

6. Accidental release measures

- 6.1 Personal protection/precautions:**
- See heading 8.1/8.3/10.3
- 6.2 Environmental precautions:**
- Contain released substance, pump over in suitable containers
 - Plug the leak, cut off the supply
- 6.3 Methods for cleaning up:**
- Take up liquid spill into inert absorbent material
 - Scoop absorbed substance into closing containers
 - 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
 - Remove contaminated clothing immediately
 - Clean contaminated clothing

POWERCRETE R95 PART A

7.2 Storage:

- Keep container tightly closed
- Store in a cool area
- Store in a dry area
- Meet the legal requirements
- 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	:	no data available	
- to avoid	:	no data available	

7.3 Specific uses:

- See information supplied by the manufacturer

8. Exposure controls/Personal protection

8.1 Exposure limit values:

magnesium carbonate

TLV-TWA	:	10	mg/m ³	ppm
TLV-STEL	:	-	mg/m ³	ppm
OES-LTEL	:	4 R/10 I	mg/m ³	- ppm
OES-STEL	:	-	mg/m ³	- ppm
MAC-TGG 8 h	:	10	mg/m ³	
VME-8 h	:	10	mg/m ³	- ppm
VLE-15 min.	:	-	mg/m ³	- ppm
GWBB-8 h	:	10	mg/m ³	- ppm
GWK-15 min.	:	-	mg/m ³	- ppm

Sampling methods:

- No data available

8.2 Exposure controls:

8.2.1 Occupational exposure controls:

- Work under local exhaust/ventilation

8.2.2 Environmental exposure controls: see heading 13

8.3 Personal protection:

8.3.1 respiratory protection:

- Gas mask with filter type A
- Insufficient ventilation: wear respiratory protection

8.3.2 hand protection:

- Gloves
- Suitable materials: No data available
- Breakthrough time: N.D.

8.3.3 eye protection:

- Face shield

8.3.4 skin protection:

- Protective clothing
- Suitable materials: No data available

POWERCRETE R95 PART A

9. Physical and chemical properties

9.1 General information:

Appearance (at 20°C)	: Liquid
Odour	: N.D.
Colour	: Light grey

9.2 Important health, safety and environmental information:

pH value	: N.D.		
Boiling point/boiling range	: N.D.	°C	
Flashpoint	: 143	°C	
Explosion limits	: N.D.	vol% (°C)	
Vapour pressure (at 20°C)	: N.D.	hPa	
Vapour pressure (at 50°C)	: N.D.	hPa	
Relative density (at 25°C)	: 1.8		
Water solubility	: Insoluble		
Soluble in	: No data available		
Relative vapour density	: > 1		
Viscosity	: 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 point	: N.D.	°C
Saturation concentration	: N.D.	g/m ³

10. Stability and reactivity

10.1 Conditions to avoid/reactivity:

- Stable under normal conditions

10.2 Materials to avoid:

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

10.3 Hazardous decomposition products:

- Upon combustion CO and CO₂ are formed and formation of metallic fumes

11. Toxicological information

11.1 Acute toxicity:

LD50 oral rat	: > 2000	mg/kg
LD50 dermal rat	: N.D.	mg/kg
LD50 dermal rabbit	: > 2000	mg/kg
LC50 inhalation rat	: > 1.7	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

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
- ON CONTINUOUS/REPEATED EXPOSURE/CONTACT:
- Skin rash/inflammation

12. Ecological information

12.1 Ecotoxicity:

- No data available

12.2 Mobility:

- **Volatile organic compounds (VOC):** N.D. %
- Insoluble in water
- Substance sinks in water

For other physicochemical properties see heading 9

12.3 Persistence and degradability:

- | | | | |
|-----------------------------------|---|---------------------|--------|
| - biodegradation BOD ₅ | : | N.D. | % ThOD |
| - water | : | - No data available | |
| - soil | : | T ½: N.D. | days |

12.4 Bioaccumulative potential:

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

12.5 Other adverse effects:

- **WGK** : N.D.
- **Effect on the ozone layer** : Not dangerous for the ozone layer (1999/45/EC)
- **Greenhouse effect** : no data available
- **Effect on waste water purification** : no data available

13. Disposal considerations

13.1 Provisions relating to waste:

- Waste material code (Flanders): 559
- Hazardous waste (91/689/EEC)

13.2 Disposal methods:

- Recycle/reuse
- Allow waste to solidify

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)

POWERCRETE R95 PART A

14. Transport information

14.1 Classification of the substance in compliance with UN Recommendations

UN number : -
CLASS :
SUB RISKS :
PACKING :
PROPER SHIPPING NAME :

14.2 ADR (transport by road)

CLASS : NOT SUBJECT
PACKING :
DANGER LABEL TANKS :
DANGER LABEL PACKAGES :

14.3 RID (transport by rail)

CLASS : NOT SUBJECT
PACKING :
DANGER LABEL TANKS :
DANGER LABEL PACKAGES :

14.4 ADNR (transport by inland waterways)

CLASS : NOT SUBJECT
PACKING :
DANGER LABEL TANKS :
DANGER LABEL PACKAGES :

14.5 IMDG (maritime transport)

CLASS : NOT SUBJECT
SUB RISKS :
PACKING :
MFIAG :
EMS :
MARINE POLLUTANT :

14.6 ICAO (air transport)

CLASS : NOT SUBJECT
SUB RISKS :
PACKING :
PACKING INSTRUCTIONS PASSENGER AIRCRAFT :
PACKING INSTRUCTIONS CARGO AIRCRAFT :

14.7 Special precautions in connection with transport

: not restricted for any mode of international transport

15. Regulatory information

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



Irritant

Contains phenol/formaldehyde/glycidyl ether, polymer. See information supplied by the manufacturer.

R38 : Irritating to skin
R43 : May cause sensitization by skin contact

S(02) : (Keep out of reach of children)
S24 : Avoid contact with skin
S37 : Wear suitable gloves
S(46) : (If swallowed, seek medical advice immediately and show this container or label)

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.

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

Exposure limits:

TLV : Threshold Limit Value - ACGIH USA 2003
OES : Occupational Exposure Standards - United Kingdom 2003
MEL : Maximum Exposure Limits - United Kingdom 2003
MAK : Maximale Arbeitsplatzkonzentrationen - Germany 2002
TRK : Technische Richtkonzentrationen - Germany 2002
MAC : Maximale aanvaarde concentratie - The Netherlands 2003
VME : Valeurs limites de Moyenne d'Exposition - France 1999
VLE : Valeurs limites d'Exposition à court terme - France 1999
GWBB : Grenswaarde beroepsmatige blootstelling - Belgium 2002
GWK : Grenswaarde kortstondige blootstelling - Belgium 2002
EC : Indicative occupational exposure limit values - directive 2000/39/EC

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

Chronic toxicity:

K : List of the carcinogenic substances and processes - The Netherlands 2003

Full text of any R-phrases referred to under heading 2:

R36 : Irritating to eyes
R38 : Irritating to skin
R43 : May cause sensitization by skin contact

7

Material Safety
Data Sheet of
Powercrete R-95
Part-B

POWERCRETE R 95 part B

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

1.1 Identification of the substance or preparation:

Product name : POWERCRETE R95 part B	
Synonyms : none	
CAS No. : N.A.	
EC index No. : N.A.	NFPA code : 3-1-0 (*)
EINECS No. : N.A.	Molecular weight : N.A.
RTECS No. : N.A.	Formula : N.A.

1.2 Use of the substance/preparation:

- Epoxy resin: Hardener
- Industrial use

1.3 Company/undertaking identification:

Berry Plastics BVBA
 Nijverheidsstraat 10-11
 B-2600 Westerlo
 Tel: +32 14 72 25 00
 Fax: +32 14 72 25 70
 e-mail address: cpge@berryplastics.com

1.4 Emergency telephone:

Europe: +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

- Harmful by inhalation and if swallowed
- Causes burns
- 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
4-tert-butylphenol	98-54-4 202-679-0	<20	36/37/38-43 (1)(2)	Xi
diethylenetriamine	111-40-0 203-865-4	<10	21/22-34-43 (1)(2)	C
benzyl alcohol	100-51-6 202-859-9	<5	20/22 (1)(2)	Xn
paraformaldehyde, oligomeric reaction products with 4-tert-butylphenol, 4-nonylphenol, m-phenylenebis(methylamine) and trimethylhexane-1,6-diamine	161278-27-9 500-618-5	>25	20/22-34-43-52/53 (1)	C
4,4'-methylenebis(cyclohexylamine)	1761-71-3 217-168-8	>10	22-34-51/53 (1)	C;N
amine derivative	-	>10	22-34 (1)	C

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

(2) Substance with a Community workplace exposure limit

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Reference number	: BIG\45425GB	Revision number
Reason for revision	: 3	

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 (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:

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

5.2 Unsuitable extinguishing media:

- No data available

5.3 Special exposure hazards:

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

5.4 Instructions:

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

5.5 Special protective equipment for fire-fighters:

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

6. Accidental release measures

6.1 Personal precautions:

See heading 8.2/13

6.2 Environmental precautions:

- Prevent soil and water pollution
- Prevent spreading in sewers
- Contain leaking substance
- Plug the leak, cut off the supply
- Dam up the solid spill

6.3 Methods for cleaning up:

- Cover spill with inert material, e.g.: sand, earth, vermiculite
- Scoop solid spill into closing containers
- Carefully collect the spill/leftovers
- Damaged/cooled tanks must be emptied
- Clean contaminated surfaces with an excess of water
- Take collected spill to manufacturer/competent authority
- Wash clothing and equipment after handling

POWERCRETE R 95 part B

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
- Meet the legal requirements
- Keep away from: heat sources, oxidizing agents, acids

Storage temperature	: N.D.	°C
Quantity limits	: N.D.	kg
Storage life	: N.D.	days
Materials for packaging	:	
- suitable	: no data available	
- to avoid	: no data available	

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:

4-tert-butylphenol				
TRGS 900	: 0.5	mg/m ³	0.08	ppm
MAK	: 0.5	mg/m ³	0.080	ppm
MAC-TGG 8 h	: 0.5	mg/m ³		
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
MAC-TGG 8 h	: 4	mg/m ³		
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
benzyl alcohol				
MAK	: -	mg/m ³	-	ppm

8.1.2 Sampling methods:

- Diethylene Triamine (Ethylediamine) NIOSH 2540
- Diethylene Triamine OSHA 60
- Benzyl Alcohol OSHA CSI
- Amines, Aliphatic NIOSH 2010

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:

- Gas mask with filter type K at conc. in air > exposure limit

b) Hand protection:

- Gloves
Suitable materials: No data available
- Breakthrough time: N.D.

c) Eye protection:

- Face shield

d) Skin protection:

- Corrosionproof clothing
Suitable materials: No data available

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)	: Paste
Odour	: Amine
Colour	: Light yellow to 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
Explosion limits (explosive properties)	: N.D.	vol%
Oxidising properties	: N.D.	
Vapour pressure (at 20°C)	: < 27	hPa
Vapour pressure (at 50°C)	: N.D.	hPa
Relative density (at 25°C)	: 0.97/1.0	
Water solubility	: Poorly soluble	
Soluble in	: No data available	
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

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:

LD50 oral rat	: N.D.	mg/kg
LD50 dermal rat	: N.D.	mg/kg
LD50 dermal rabbit	: N.D.	mg/kg
LC50 inhalation rat	: > 0.18	mg/l/4 h
LC50 inhalation rat	: N.D.	ppm/4 h

11.2 Chronic toxicity:

4-tert-butylphenol

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)	: D
IARC classification	: not listed

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

11.4 Acute effects/symptoms:

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

ON CONTINUOUS/REPEATED EXPOSURE/CONTACT:

- Skin rash/inflammation

12. Ecological information

12.1 Ecotoxicity:

4-tert-butylphenol:

- LC50 (96 h) : 5.14 mg/l (PIMEPHALES PROMELAS)
- EC50 (48 h) : 3.9 mg/l (DAPHNIA MAGNA)
- EC50 (72 h) : 11.2 mg/l (SCENEDESMUS SUBSPICATUS)

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)

benzyl alcohol:

- LC50 (96 h) : 10 ppm (LEPOMIS MACROCHIRUS)
- EC50 (48 h) : 400 mg/l (DAPHNIA MAGNA)
- EC50 (72 h) : 2600 mg/l (ALGAE)

4,4'-methylenebis(cyclohexylamine):

- LC50 (96 h) : 46/100 mg/l (LEUCISCUS IDUS)
- EC50 (48 h) : 9.24 mg/l (DAPHNIA MAGNA)

- **Effect on waste water purification** : no data available

12.2 Mobility:

- **Volatile organic compounds (VOC)**: < 5%
- Poorly soluble in water

For other physicochemical properties see heading 9

12.3 Persistence and degradability:

- **biodegradation BOD₅** : N.D. % ThOD
- **water** : - No data available
- **soil** : T ½: N.D. days

12.4 Bioaccumulative potential:

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

12.5 Results of PBT assessment:

- No data available

12.6 Other adverse effects:

- **WGK** : 2 (Classification based on the components in compliance with Verwaltungsvorschrift wassergefährdender Stoffe (VwVwS) of 27 July 2005 (Anhang 2))
- **Effect on the ozone layer** : Not dangerous for the ozone layer (1999/45/EC)
- **Greenhouse effect** : no data available

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): 07 02 14* (wastes from additives containing dangerous substances)
- Hazardous waste (91/689/EEC)

13.2 Disposal methods:

- Remove to an authorized incinerator equipped with an afterburner and a flue gas scrubber
- Allow waste to solidify
- Do not 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 : II

14.2 ADR (transport by road)

CLASS : 8
 PACKING : II
 CLASSIFICATION CODE : C7
 DANGER LABEL TANKS : 8
 DANGER LABEL PACKAGES : 8
 PROPER SHIPPING NAME :
 Amines, liquid, corrosive, n.o.s. (paraformaldehyde, oligomeric reaction products with 4-tert-butylphenol, 4-nonylphenol, m-phenylenebis(methylamine) and trimethylhexane-1,6-diamine; 4,4'-methylenebis(cyclohexylamine))

14.3 RID (transport by rail)

CLASS : 8
 PACKING : II
 CLASSIFICATION CODE : C7
 DANGER LABEL TANKS : 8
 DANGER LABEL PACKAGES : 8
 PROPER SHIPPING NAME :
 Amines, liquid, corrosive, n.o.s. (paraformaldehyde, oligomeric reaction products with 4-tert-butylphenol, 4-nonylphenol, m-phenylenebis(methylamine) and trimethylhexane-1,6-diamine; 4,4'-methylenebis(cyclohexylamine))

14.4 ADNR (transport by inland waterways)

CLASS : 8
 PACKING : II
 CLASSIFICATION CODE : C7
 DANGER LABEL TANKS : 8
 DANGER LABEL PACKAGES : 8

14.5 IMDG (maritime transport)

CLASS : 8
 SUB RISKS : -
 PACKING : II
 MFAG : -
 EMS : F-A, S-B
 MARINE POLLUTANT : -

14.6 ICAO (air transport)

CLASS : 8
 SUB RISKS : -
 PACKING : II
 PACKING INSTRUCTIONS PASSENGER AIRCRAFT : 808/Y808
 PACKING INSTRUCTIONS CARGO AIRCRAFT : 812

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'

15. Regulatory information

15.1 EU legislation:

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



Corrosive

contains: paraformaldehyde, oligomeric reaction products with 4-tert-butylphenol, 4-nonylphenol, m-phenylenebis(methylamine) and trimethylhexane-1,6-diamine; diethylenetriamine; 4,4'-methylenebis(cyclohexylamine); 4-tert-butylphenol; amine derivative

R20/22	:	Harmful by inhalation and if swallowed
R34	:	Causes burns
R43	:	May cause sensitisation by skin contact
R52/53	:	Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment
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)
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 27 July 2005 (Anhang 2))

16. Other information

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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
MAC : Maximale aanvaarde concentratie - 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 - directive 2000/39/EC

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

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:

R20/22 : Harmful by inhalation and if swallowed
R21/22 : Harmful in contact with skin and if swallowed
R22 : Harmful if swallowed
R34 : Causes burns
R36/37/38 : Irritating to eyes, respiratory system 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
R52/53 : Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment

8

Distributors for
Powercrete R-95

Global Distributors for Powercrete R-95

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