



SOUTHWEST GAS CORPORATION

® ENGINEERING STAFF

MATERIAL SPECIFICATION

Prepared By: Engineering Staff 

Approved By: Jerome T. Schmitz 

Section No:	MS C-17
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Superseded Date	01/22/15

PIPE COATINGS

Powercrete Protective Pipe Coating

1. SCOPE

This specification defines the minimum requirements for materials, application and inspection for Powercrete and Powercrete R60 epoxy-based polymer concrete pipe coating systems. Both coatings are used to electrically isolate buried steel pipe from surrounding soil. Both coatings are also highly resistant to abrasion under severe handling conditions.

Powercrete is normally applied to fusion bonded epoxy coated steel pipe to protect it under severe handling conditions such as being pulled under a crossing or directional drilling applications.

Powercrete R60 is normally applied to bare steel pipe to protect it under severe handling conditions such as being pulled under a crossing or directional drilling applications. It is also used on pipeline girth welds and for mainline rehabilitation of pipelines with deteriorated coatings.

2. APPLICABLE DOCUMENTS

- 2.1 ASTM International C-109, "Standard Test Method for Compressive Strength of Hydraulic Cement Mortars."
- 2.2 ASTM International C-131, "Standard Test Method for Resistance to Degradation of Small-Size Aggregate by Abrasion and Impact in the Los Angeles Machine."
- 2.3 ASTM International C-581, "Practice for Determining Chemical Resistance of Thermosetting Resins Used in Glass Fiber-Reinforced Structures Intended for Liquid Service."
- 2.4 ASTM International C-642, "Standard Test Method for Density, Absorption and Avoirdupois in Hardened Concrete."
- 2.5 ASTM International D-149, "Test Methods for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating materials at Commercial Power Frequencies."
- 2.6 ASTM International D-570, "Test Method for Water Absorption of Plastics."



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2. APPLICABLE DOCUMENTS (Cont'd)

- 2.7 ASTM International D-4060, "Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser."
- 2.8 ASTM International D-4541, "Standard Test Method for Pull-Off Strengths of Coatings Using Portable Adhesion Testers."
- 2.9 ASTM International G-8, "Test Method for Cathodic Disbonding of Pipeline Coatings."
- 2.10 National Association of Corrosion Engineers (NACE International) Recommended Practice RP-0394, "Application, Performance and Quality Control of Plant-Applied, Fusion-Bonded Epoxy External Pipe Coating."
- 2.11 United States Department of Transportation (DOT), Code of Federal Regulations, Title 49, Part 192, "Transportation of Natural and Other Gas by Pipelines Minimum Safety Standards."

NOTE: Unless otherwise specified, the editions of the above documents incorporated by DOT 49 CFR 192 are applicable. Documents not incorporated by DOT 49 CFR 192 will be the most recent edition.

3. TERMINOLOGY

3.1 General

- 3.1.1 "Southwest Gas," "Southwest" or "SWG" wherever used in this specification and other related documents will refer exclusively to Southwest Gas Corporation.
- 3.1.2 The terms "approved," "as approved," "satisfactory," "as directed," "or equal" or other similar terms wherever used in this specification and other related documents will mean "as determined by Southwest Gas," unless specifically stated otherwise.
- 3.1.3 "Product Information Package" or "PIP" wherever used in this specification and other related documents will mean the required technical product information that a manufacturer must submit to SWG to determine if the product is suitable for use by SWG, unless specifically stated otherwise.



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4. MATERIALS AND MANUFACTURE

- 4.1 The properties of the Powercrete coatings shall be in accordance with requirements outlined in Appendix A.
- 4.2 The following information is specific to Powercrete Coating:
 - 4.2.1 Solvent-free two parts, medium pot life epoxy coating primarily designed for hot airless spray or manual application. Resistant to water immersion, seawater, cathodic disbondment and ground waters over a broad pH range.
 - 4.2.2 Powercrete is sprayed onto the pipe which has been previously coated with 14 to 16 mils of fusion bonded epoxy (FBE) and results in a hard, smooth surface. Each spray pass results in a thickness of approximately 0.020 inches. Multiple passes may be applied in order to build up to the desired thickness of 0.040 inches.
 - 4.2.3 At an ambient temperature of 90° F, the coating gets to a smear free surface in about 30 minutes. It is hard after 4 hours and has typically a minimum reading on the Shore D hardness scale of 75. The coating reaches full cure and maximum strength in 7 days.
 - 4.2.4 If damage occurs to the Powercrete coating, the area can be repaired by using the same material over the clean and dry surface.
 - 4.2.5 100% Volume Solids Content, no volatile Organic Compounds (V.O.C.'s)
 - 4.2.6 Flash Point: >200° F closed cap
 - 4.2.7 Mixing Ratio:
 - 9.75:1 – Part A to Part B by volume
 - 1005:5 – Part A to Part B by weight



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4. MATERIALS AND MANUFACTURE (Cont'd)

4.2.8 Method of Application:

- Hot Airless Spray – High capacity air powered pump (45:1), pre-heat Part A to 130° F - 180° F, heat Part B to 70° F- 90° F, Part A and Part B should be mixed thoroughly using static mixers.
- Manual Application – Add all of the pre-measured Part A to Part B and mix thoroughly for approximately 2-3 minutes using an electric drill, with no air included using a 4 inch wide blade. Pour mixed material onto the surface and smooth with a brush, roller or a Powercrete spreader to a uniform thickness.

4.2.9 Pot Life: (20 pound kit)

- At 70° F, 45 minutes
- At 100° F, 7 minutes

4.2.10 Temperature* (Ambient):

- Application: Minimum 50° F
- Curing: Minimum 50° F

* Contact Engineering Staff if temperatures are less than mentioned above.

4.2.11 Coating Repair:

- The area to be repaired (damaged area plus at least 0.75 inch) should be suitably roughened. Files should not be used.
- The roughened area should be cleaned using a clean, dry cloth or brush to remove any dust generated during roughening. The repair area should be lightly heated to remove any moisture prior to the application of the repair material (Powercrete).



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4. MATERIALS AND MANUFACTURE (Cont'd)

4.2.12 Shelf Life:

- 24 months in an unopened container in a dry, cool (below 100°F) protected storage area. A manufacturer representative should be contacted prior to use after prolonged storage or when using opened containers.

4.2.13 Solvent:

- Acetone, MEK or other suitable solvent may be used to clean equipment, brushes and the surface of the steel pipe.
- **Do not contaminate Powercrete with any solvent.**

4.2.14 Steel Surface Preparation:

- All surfaces should be dry, free from grease, oils, salts and other contaminants.
- Clean surfaces should be grit blasted to attain near white (SSPC-SP 10) or white (SSPC-SP 5) with a surface profile depth of 2-4 mils.

4.2.15 FBE Preparation:

- For FBE that is equal to or greater than 6 days old, all traces of UV degradation of the FBE must be mechanically removed (Consult manufacturer's representative for details).

4.3 The following information is specific to Powercrete R60 Coating:

- 4.3.12 Solvent-free two parts, medium pot life epoxy coating primarily designed for hot airless spray or manual applications. Resistant to water immersion, seawater, cathodic disbondment and ground waters over a broad pH range.



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4. MATERIALS AND MANUFACTURE (Cont'd)

4.3.13 Powercrete R60 is applied onto the pipe and results in a hard smooth surface. Each spray pass results in a thickness of approximately 0.030 inches. The DFT is approximately 99% of the WFT. Depending on the pipe diameter, multiple passes may be applied in order to build up to the desired thickness. When manually applied, it is mixed and poured onto the pipe surface. It is then smoothed with a Powercrete trowel to a uniform thickness.

4.3.14 At an ambient application temperature of 90° F, the coating gets to a smear free surface in about 20 minutes. It is hard after 2 hours and will cure in less than 4 hours with a minimum reading on the Shore D hardness scale of 75. It may be applied at temperatures below 50° F if the pipe is heated during the application and cure.

4.3.15 If damage occurs to the Powercrete R60 coating, the area can be repaired by using the same material over the clean and dry surface.

4.3.16 100% Volume Solids Content, no V.O.C.'s

4.3.17 Flash Point: > 200° F closed cap

4.3.18 Mixing Ratio:

- 4.8:1 – Part A to Part B by volume
- 100:11.2 – Part A to Part B by weight

4.3.8 Solvent:

- Acetone, MEK or other suitable solvent may be used to clean equipment, brushes and the surface of the steel pipe.
- **Do Not contaminate Powercrete R60 with any solvent.**



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4. MATERIALS AND MANUFACTURE (Cont'd)

4.3.9 Steel Surface Preparation:

- All surfaces should be dry, free from grease, oils, salts and other contaminants.
- Clean surfaces should be abraded to attain near white (SSPC-SP 10) or white (SSPC-SP 5) using suitable hand or power tools or particle blasted. The surfaces shall not be burnished.
- A 70 to 80 micron steel surface profile is ideal.
- Preheating the pipe prior to application can be useful, however it is not necessary.

4.3.10 Method of Application:

Airless Spray – Powercrete R60 Part A and Part B components shall be adequately mixed at the prescribed ration with no included air using a 43-P gun and 4 x 1/8 inch mixers connected by “L” bolts or equivalent, with a short ship hose and a 1-M airless gun. It shall be spray applied to the abraded, dried, cleaned surface using adequate atomization. It shall be sprayed over the entire bare metal surface to a thin layer of 4-6 mils for better penetration and then shall be built up to the desired thickness of 60 mils (Caution: do not mix mils and inches).

Manual Application – Warm Parts A & B to 68° F. Using an electric drill that has a 4-inch blade, premix Part A for approximately 2-3 minutes. Add all of the pre-measured Part B by pouring it into Part A and slowly begin mixing to avoid introducing air into the mixture. Thoroughly blend the 2 parts (2-3 minutes) making sure to mix up and down and circumferential directions. Reconfirm that the application temperature is above 50° F and 5° F above the dew point. Slowly pour mixed material onto the surface and smooth with a brush, roller or Powercrete spreader to a uniform thickness. Any air entrapment shall be removed and all runs and sags shall be leveled. Cover at least 2-inches of the adjacent mainline coating. Use a Wet Film gauge to determine if the desired minimum thickness (60 mils) has been achieved. Curing rate will vary according to pipe and ambient application temperature. Under no circumstances shall the pipe be installed before the coating has reached a minimum Type D Durometer hardness reading of 75.



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4. MATERIALS AND MANUFACTURE (Cont'd)

4.3.11 Pot Life:

- At 73° F, 20 minutes
- At 100° F, 8 minutes

4.3.12 Temperature* (Ambient):

- Application: Minimum 50° F
- Curing: Minimum 50° F

*Contact Engineering Staff if temperatures are less than mentioned above.

4.3.13 Coating Repair:

- All damage or holidays detected by visual or electrical inspection shall be repaired using Powercrete R60.
- The area to be repaired should be cleaned of coating to the pipe surface by hand or power tools. A dry cloth or brush should be used to remove any dust generated by the removed coating. The area(s) can be lightly heated to remove any moisture. Repairs shall overlap the surrounding undamaged coating by a minimum of 0.75 inch.
- 24 months in unopened containers in a dry, cool (below 100° F) protected storage area. A manufacturer representative should be contacted prior to use after prolonged storage or when using opened containers.

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4. MATERIALS AND MANUFACTURE (Cont'd)**APPENDIX A**

PROPERTY & UNIT	POWERCRETE	POWERCRETE R60	TEST METHOD
Specific Gravity	1.7	1.67	
Compressive Strength, psi	10,000	12,000	ASTM C-109
Cubed Water Absorption After Immersion, %	0.035	0.050	ASTM D-642
After Immersion and Boiling, %		0.139	ASTM D-642
Thin Film Water Absorption, After 134 days %	1.21	0.803	ASTM D-570
Dielectric Strength (in oil), Volts/mil	450	485	ASTM D-149
Resistance to Acids and Alkalies	To be Advised	To be Advised	ASTM C-581
Adhesion to Fusion Bonded Epoxy, psi	2,500	3,600	ASTM D-4541
Adhesion to Bare Steel >2 mills surface profile, psi		>4,000	ASTM D-4541
Impact Resistance Film Thickness 35mm, inch lbs	66	66	ASTM G-14
Flexibility Degrees Per Pipe Diameter, degrees	1.4	<0.73	NACERP-0394 Taber Abrasion

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4. MATERIALS AND MANUFACTURE (Cont'd)**APPENDIX A**
(Cont'd)

PROPERTY & UNIT	POWERCRETE	POWERCRETE R60	TEST METHOD
Abrasion Resistance, % Loss	3.4		ASTM C-131
Taber Abrasion (cycles/mil)	66.7	67	ASTM D-4060
H-18 Wheel Wear Cycles	1,565.5	1,250	ASTM D-4060
CS-17 Wheel, Wear Cycles			
Cathodic Disbondment 48 hrs, 150 deg F, (inches)	<0.16		ASTM G-8
Cathodic Disbondment (inches) 30 Days, 75 deg F 90 Days, 75 deg F		<0.2 0.4	ASTM G-8
Max Operating Temperature, deg F	130	140	
Compatible Line Coatings	FBE/CTE	FBE/CTE/EXT.PE	
Product Thickness (DFT) (inches)	0.020	0.030	
Single coat- Brush Applied	0.020	0.030	
Single coat – Spray Applied			
Color	Black/Tan	Maroon	



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5. PERFORMANCE REQUIREMENTS

- 5.1 Factory applied Powercrete and Powercrete R60 coatings shall be subject to quality control checks after application in accordance with the manufacturer’s quality control record. Minimum testing will include Shore D Hardness Test and Pull Adhesion Test with Patti Junior F-16 tester. Field applied Powercrete R60 shall meet or exceed the Shore D Hardness test. All coated pipe shall meet or exceed the minimum performance requirements.
- 5.2 Defective coating shall be removed and/or recoated to meet specifications.
- 5.3 The following information is specific to Powercrete Coating:

CURING TIMES 40 MILS DFT	At 70° F*	At 50° F*
Handle able (Tacky)**	42 Minutes	100 Minutes
Firm (Shore “D”: 75)	6.25 Hours	60 Hours
Shipping (Min. Shore “D”:75)***	7.33 Hours	72 Hours
Optimum Cure****	1 Day	7 Days
Re-coat ¹	42 Minutes	100 Minutes
* Constant Temperature		
** Pipe must be handled by the ends when moving from the coating area to the curing area		
*** Pipe may be handled by fork lift and shipped according to pipe owner’s specification		
**** Shore “D” Hardness ≥ 80		
¹ Coating that has a Shore “D” Hardness ≥ 55 should be abraded prior to the application of subsequent coats.		



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5. PERFORMANCE REQUIREMENTS (Cont'd)

5.4 The following information is specific to Powercrete R60 Coating:

CURING TIMES 40 MILS DFT	At 70° F*	At 50° F*
Handle able (Tacky)**	31 Minutes	50 Minutes
Firm (Shore "D": 75)	6.25 Hours	60 Hours
Shipping (Min. Shore "D":75)***	7.33 Hours	72 Hours
Optimum Cure****	1 Day	4 Days
Re-coat ¹	42 Minutes	100 Minutes
* Constant Temperature		
** Pipe must be handled by the ends when moving from the coating area to the curing area		
*** Pipe may be handled by fork lift and shipped according to pipe owner's specification		
**** Shore "D" Hardness ≥ 80		
¹ Coating that has a Shore "D" Hardness ≥ 55 should be abraded prior to the application of subsequent coats.		

6. INSPECTION

6.1 Successful review of the Product Information Package (PIP), as well as any future reference by SWG to the Seller's part number or internal code number in any future contract or purchase, will mean only that no conflict with the specification was found and will not relieve the seller from meeting all the requirements of the specification.

6.2 SWG retains the option to inspect the manufacture and testing of any and all materials, products or systems referenced in this specification that are sold to SWG.



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6. INSPECTION (Cont'd)

6.3 SWG will make appropriate inspections and tests of any and all materials, products or systems supplied to this specification. SWG will have the right, at their option, to reject any material which fails to conform to this specification. Any such rejection may take place at the manufacturer's facility; the supplier's warehouse or any subsequent delivery location, before or after SWG assumes possession. Notice of the rejection will be made promptly to the supplier by SWG. The defective product will be replaced or returned for credit at the manufacturer's expense.

6.4 Any changes in the manufacturing of previously-approved pipe coating covered under this document for sale to SWG must be approved by SWG's Engineering Staff. **Failure to obtain SWG's approval may be cause for rejection and disqualification as an approved supplier.**

7. CERTIFICATION

When specified in the purchase order or contract, the manufacturer's certification shall be furnished to SWG stating that samples representing each lot have been tested and inspected and that all requirements of this specification have been met.

Upon the request of Southwest, the certification of an independent third party indicating conformance to the specification may be considered at Southwest's expense.

8. MATERIAL SAFETY DATA SHEETS

In accordance with law, the seller will supply Material Safety Data Sheets for all applicable items supplied under this specification to the following:

- 1) The Receiving Location
- 2) Engineering Staff
- 3) Southwest Gas Corporation
Corporate Safety
Mail Station LVA-120
P.O. Box 98510
Las Vegas, NV 89193-8510



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9. PRODUCT MARKING

9.1 The identification marking of the bare pipe (information per API 5L) shall be legibly reproduced on the O.D. of the coating with the following:

- Coater's Name
- Powercrete
- Date the coating was applied

9.2 Pipe of different wall thickness for the same project shall have specific colored stripe painted at both ends of the pipe over the coating to differentiate that wall thickness from any other wall thickness.

10. PRODUCT PACKAGING

10.1 Pipe shall be handled, coated, moved and stored in a manner to prevent damage to pipe walls, beveled ends, pipe roundness and coating.

10.2 External coated pipe shall be stacked upon supports that have broad padded bearing surfaces or covered sand rows that are free from rocks, sticks or other objects with sharp edges which might damage the coating.

10.3 Under no circumstances shall coated pipe be pyramided, each layer of pipe shall be supported separately by the use of padded skids. The ends of the padded skids shall be blocked to prevent the coated pipe from rolling off the end of the skid.

10.4 Pipe sizes and maximum tier heights shall be as follows:

- Pipe sizes up to 3-inch shall be stacked using pipe bundles to a maximum of 6 high per bundle. This method of stacking provides for each layer of pipe to be supported separately. The boards and blocks used shall be a permanent part of the bundle.
- Pipe sizes 4-inch through 6-inch can be stacked to a maximum of 8 tiers high.
- Pipe sizes 8-inch through 10-inch can be stacked to a maximum of 6 tiers high.



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10. PRODUCT PACKAGING (Cont'd)

- Pipe sizes 12-inch through 16-inch can be stacked to a maximum of 4 tiers high.
- Pipe sizes 20-inches through 24-inch can be stacked to a maximum of 3 tiers high.

NOTE: Short lengths of pipe shall always be stacked on the top tier to prevent flattening of the ends.

- 10.5.1 Pipe shall be loaded for shipping in compliance with existing shipping standards and regulations.