



REMR MATERIAL DATA SHEET CM-PC-1.13
 CONCRETE PATCHING MATERIAL: BURKE 881 LPL

1. NAME

Burke 881 LPL Patch and Bond Epoxy
 Medium Viscosity

sound concrete that has been properly prepared. Mixed with dry, graded aggregates, Burke 881 LPL Patch and Bond Epoxy makes an excellent mortar for patching spalls and grouting and sealing. It can also be used to secure anchor bolts, base plates, and reinforcing on horizontal surfaces. This versatile epoxy will adhere to dry and damp surfaces that are free of standing water. It forms a solid, permanent bond that is stronger than the surrounding concrete. It may be extended with aggregate for strong grouting and patching mortars.

2. MANUFACTURER

The Burke Company
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 Telephone: 415-349-7600

3. DESCRIPTION

Burke 881 LPL Epoxies are formulated of 100 percent solids, epoxy resin binder and curing agent packaged in two parts. Mixed in a 2:1 ratio by volume, the white epoxy resin and black curing agent make a uniform gray epoxy resin binder.

Burke 881 LPL Patch and Bond Epoxy (medium viscosity) conforms to ASTM C 881 Types I, II, and III: Grade 2: Class B and C and meets USDA regulations for use in federally inspected meat and poultry plants as a concrete repair, bonding agent or adhesive.

4. USES AND LIMITATIONS

Uses: This medium viscosity epoxy is an effective adhesive for bonding fresh plastic concrete to existing

Limitations: Do not thin epoxy with solvents. Do not use it if the surface temperature is below 40°F (4.4°C) or if the atmospheric temperature is below 40°F (4.4°C) and falling. Exposure to ultraviolet light may cause discoloration of the epoxy surface.

5. MANUFACTURER'S TECHNICAL DATA

Physical properties:

Property	Test Method	Requirement	Typical Results Grade 2
Viscosity, poise (PaS)	ASTM D 2393		Med. Visc.
Grade 1 Class B Type I, II, III (50°F)		20 (2.0) max	-
Grade 1 Class C Type I, II, III (73°F)		20 (2.0) max	-

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Property	Test Method	Requirement	Typical Results Grade 2
Grade 2 Class B Type I, II, III (50°F)		20 (2.0) min 100 (10.) max	42
Grade 2 Class C Type I, II, III (73°F)		20 (2.0) min	27
Consistency, inches (mm)	ASTM C 881		
Class B Type I, II, III (50°F)		1/4 (6.4) max	-
Class C Type I, II, III (73°F)		1/4 (6.4) max	-
Gel time	ASTM C 881		
Class B (50°F)		30 min	300
Class C (73°F)		30 min	135
Volatile content, cured			
System, Type I & II Class B & C	ASTM D 1259 Method B	3% max	1
Absorption, 24 hr	ASTM D 570	1.5% max	0.8
Type I, II, III Class B & C			
Bolt pull-out (lb)			
Cured 7 days at 77°F			
1/2 in.-diam bolt, 5 in. deep, 3/4 in.-hole			11,150
Bond strength, psi (MPa)	ASTM C 882		
2 days (dry cure old to old concrete)			
Type I Class B (50°F)		2,000 (18.6) min	3,210
Type III Class B (50°F)		300 (2.06) min	3,210
Type I Class C (73°F)		2,000 (18.6) min	3,040
Type III Class C (73°F)		300 (2.06) min	3,040
14 days (moist cure old to old concrete)			
Type I Class B (50°F)		2,000 (18.6) min	3,640
Type III Class B (50°F)		300 (2.06) min	3,640
Type I Class C (73°F)		2,000 (18.6) min	3,950
Type III Class C (73°F)		300 (2.06) min	3,950
14 days (moist cure old to new concrete)			
Type II Class C (73°F)		1,500 (10.3) min	2,110
Shrinkage	ASTM C 883		
Type I, II, III Class B & C		No glass breakage	Passed
Thermal compatibility	ASTM C 884		
Type III Class B & C		No delamination or cracks	Passed
Tensile strength (psi)	ASTM D 638		
Cured 7 days at 77°F			4,900
Compressive strength (psi)	ASTM D 695		
Cured 7 days at 77°F			
100% epoxy			10,100
1:4 epoxy to sand			12,400
1:1 epoxy to sand			-
Hardness Shore D	ASTM D 2240		
Cured 7 days at 77°F			83

6. MANUFACTURER'S GUIDANCE FOR APPLICATION

Patching and topping: Clean and prepare the substrate surface. Apply a thin coat of aggregate-free epoxy liquid as a primer. Prepare an epoxy mortar or patching compound by adding four to seven parts by volume of graded, dry aggregate to one part by volume of liquid epoxy mixture. Combine thoroughly, and apply to the primed surfaces. The desired depth of the patch or the topping thickness should be 1/4 to 1/2 in. (6 to 13 mm). When patching holes deeper than 1 in. (25 mm), apply epoxy mortar or patching compound in layers to allow thermal expansion and contraction to take place. Each layer must cool and harden before the next layer is placed.

Bonding fresh concrete to cured concrete: To bond fresh concrete to sound, prepared concrete, use a stiff brush to apply a uniform coverage of epoxy at a rate between 25 and 75 sq ft per gal (0.62 and 1.8 m²/l). Pour the fresh concrete as soon as possible after the epoxy has been spread. If the epoxy is not tacky at the time of the pour, apply a second coat of epoxy. If the adhesive has hardened completely, scarify it mechanically before applying a second coat. The best adhesion is achieved if the concrete has a slump of 3 in. (51 mm) or less; concrete with a slump in excess of 6 in. (102 mm) should not be used.

Securing anchor bolts and base plates: To fasten a metal anchor in a vertical hole in concrete, fill the hole halfway with epoxy. Position and set the bolt. Top off with more epoxy and finish. Allow the epoxy to gravity feed, and then top off and finish again. On vertical and overhead surfaces, use a caulking gun or trowel to apply Burke 881 LPL Non-Sag Patch and Bond Epoxy.

To secure base plates, pour Burke 881 LPL Patch and Bond Epoxy directly into base plate voids. When using Burke 881 LPL Topping and Crack Grouting Epoxy, add one part graded aggregate to two parts epoxy by volume. Where space permits, hand trowel the epoxy/aggregate mixture into the area to be filled.

Other types of bonding: For other types of bonding, apply an epoxy layer approximately 1/64-in. (0.4 mm) thick to the clean, prepared surface. Coverage will vary, depending on the roughness of the surface. Join the surfaces immediately. No firm clamping pressure is necessary beyond that needed to hold the parts in place.

Surface preparation: Proper surface preparation is essential for epoxy to bond to substrate. Carefully examine the surface to determine its soundness and degree of contamination. If the surface is contaminated with oil, grease, curing compounds, wax, coatings, or food acids, clean it with detergents and rinse it thoroughly.

Then roughen the surface by grinding, sandblasting, or mechanical scarification. Vacuum the surface or blow away dust with compressed air before applying epoxy.

On concrete contaminated with only laitance and dirt other than grease and oil, acid etching is sufficient preparation. Dilute commercial muriatic acid with water in a ratio of 1:2 and apply to concrete surface. Rinse with ammonia solution and follow with a thorough rinsing with clean water. A successful application depends upon thorough preparation of the substrate.

Temperature of the substrate should be between 40°F and 100°F (4.4°C and 37.8°C). Lower temperatures will prolong curing time and could inhibit the epoxy bond. Temperatures above 100°F (37.8°C) shorten pot life and make application difficult.

Mixing: Stir each component separately, and then pour the entire contents of curing agent (component B) into the epoxy resin (component A). Mix thoroughly for at least 3 min with a low speed power mixer. Thorough mixing of the color-coded components is essential. The white epoxy resin (component A) and the black curing agent (component B) must be blended to a uniform gray color without streaks or lumps. Carefully scrape the sides and bottom of the container and mixing blade to be sure all material is combined. Small batches may be mixed by hand in a one gallon can. Mix two (2) parts component A to one (1) part component B by volume.

Fillers such as graded aggregate may be added after components are mixed. Use dry aggregates only, and mix thoroughly into the epoxy. Up to seven volumes of filler may be added for each volume of Burke 881 LPL Topping and Crack Grouting Epoxy or Burke 881 LPL Patch and Bond Epoxy. Not more than two volumes of filler may be used with Burke 881 LPL Non-Sag Patch and Bond Epoxy.

Mix only the amount of epoxy that can be applied during the pot life

period - approximately 60 min at 77°F (25°C).

Clean up: Epoxy materials are very difficult to remove when set. Immediately after use, clean tools and equipment with epoxy thinner, Toluene, Xylene or Methyl Ethyl Ketone (MEK). Because the solvents are flammable, and epoxy vapors may be toxic, clean equipment away from heat, sparks, and open flame, and avoid breathing vapors.

Safety: Avoid skin and eye contact. This product can cause severe skin irritation after prolonged and repeated exposure. If contact occurs, wash immediately with soap and water. If eye contact should occur, flush with plenty of water and seek medical attention. When handling, use disposable plastic or rubber gloves, wear protective clothing and discard clothing and gloves when finished. Never warm epoxy over direct heat; this procedure could result in exposure to potentially toxic fumes. Use in a well ventilated area. Avoid breathing vapors or inhaling fumes. If swallowed, call physician immediately. Do not induce vomiting. Keep out of the reach of children.

7. CORPS OF ENGINEERS' EVALUATION

This material was evaluated by Singleton Laboratories, TVA, through a support agreement with US Army Engineer Waterways Experiment Station.*

<u>Property</u>	<u>Test Method</u>	<u>Results</u>
Compressive strength, psi	ASTM C 109	9,760
Slant-shear bond strength, psi	ASTM C 882	
Dry surfaces		3,680
Wet surfaces		1,890
Bond capacity in direct tension, psi	**	45
Bond capacity under flexural stress, psi	ASTM C 293	1,110
Underwater abrasion loss, %	CRD-C 63	3

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<u>Property</u>	<u>Test Method</u>	<u>Results</u>
Resistance to cycles of freezing and thawing, % of original weight after 312 cycles	ASTM C 666 Procedure A	102
Impact resistance, in.-lb	--	425
Coefficient of thermal expansion, millionths/°F	--	15.9

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- * Best, Floyd J., and McDonald, James E. 1990. "Spall Repair of Wet Concrete Surfaces," Technical Report REMR-CS-25, US Army Engineer Waterways Experiment Station, Vicksburg, MS.
 - ** Causey, F. E. 1984. "Preliminary Evaluation of a Tension Test for Concrete Repairs," Report Gr-83-14, Department of the Interior, Bureau of Reclamation.

8. ENVIRONMENTAL CONSIDERATIONS

Reasonable caution should guide the preparation, repair, and cleanup phases of activities involving potentially hazardous and toxic chemical substances. Manufacturer's recommendations to protect occupational health and environmental quality should be carefully followed. Material safety data sheets should be obtained from the manufacturers of such materials. In cases where the effects of a chemical substance on occupational health or environmental quality are unknown, chemical substances should be treated as potentially hazardous toxic materials.

9. AVAILABILITY AND COSTS

Available from manufacturer. Cost of a gal unit (2/3 gal of Component A, Epoxy Resin, 1/3 gal of Component B, Curing Agent) approximately \$40.00 plus shipping.