



REMR Material Data Sheet CM-PC-1.36

CONCRETE PATCHING MATERIAL: Q-8669 POLYESTER RESIN

1. NAME	<u>Sieve Size</u>	<u>Percent Passing</u>
Q-8669 Polyester Resin	3/8 in.	100
	No. 4	62-75
	No. 8	41-64
	No. 16	29-52
	No. 30	16-36
	No. 50	7-23
	No. 100	1-7
	No. 200	0-3

2. MANUFACTURER

Quality Controlled Industries, Inc.
5000 Beaver Grade Road
Coraopolis, PA
Telephone: 412-787-5221

3. DESCRIPTION

Q-8669 is a polyester resin for use as a binder in polymer concrete.

The manufacturer's recommended amount of polyester resin for the aggregate above is 14 ± 1 percent by weight of aggregate. The moisture content of the aggregates shall not exceed 0.5 percent at the time of mixing.

4. USES

Polymer concrete made with polyester resin is used to repair spalls in portland-cement concrete pavements and other structural members and as thin overlays for bridge decks, parking garages, and other concrete structures.

Preparation of existing surface:

Remove all patches other than sound, portland-cement concrete and all obviously loose and disintegrated concrete. After this initial removal, sound the area to be patched for all loose or unsound concrete. Where the bond between the concrete and a primary reinforcing bar has been destroyed or where more than one-half of the periphery of such a bar has been exposed, remove the adjacent concrete to a depth that will provide a minimum 3/4-in. clearance around the bar unless other reinforcing bars make this removal impracticable. Adequately support reinforcement that has become loose, and tie it back into place. Make a final sounding to ensure that only sound concrete remains.

5. MANUFACTURER'S GUIDANCE FOR APPLICATION

Mixture proportions for polymer concrete: The catalyst for Q-8669 is cumene hydroperoxide. The percentage of catalyst used can be adjusted in the field as conditions warrant but shall not be less than 1 percent or more than 2 percent of the weight of resin.

Listed below is a sample aggregate gradation for polymer concrete, as furnished by the manufacturer:

Saw cut edges at least 1 in. deep. Remove concrete with chipping hammers in the 35-lb class. Operate the hammer at an angle less than 45 deg with

respect to the surface. Remove concrete in a manner that prevents cutting, elongating, or damaging reinforcing steel.

Clean the concrete faces and reinforcing steel of the repair area by abrasive blasting or another approved method. To ensure bond between the polymer concrete and the surface concrete, the surfaces of the prepared concrete must be coated with the polyester-resin primer Q-8671 before placement of the polymer concrete. The primer can be applied by rolling, brushing, or spraying. The recommended application rate is one coat at 125 to 200 sq ft per gal. The rate varies, depending on the condition and texture of the concrete surface. Curing should occur within 15 to 50 min at ambient temperature of 50 to 90 °F. Primer may feel tacky but should not stick to the finger before application of the polymer concrete.

Surface preparation of PC overlay:

Remove and patch all areas of unsound concrete. Proceed with the preparation of the area to be overlaid as soon as possible after the polymer patches have been placed. Clean the entire portion of the area to be overlaid by shot-blasting to remove any oil, dirt, rubber and any other material that would prevent proper bonding or curing of the polymer material. Immediately prior to placing the overlay, dry and clean all surfaces with compressed air to remove dust and debris. Do not allow traffic on that portion of the deck that has been cleaned.

Mixing: For patching and small overlays, the materials can be mixed in any standard mortar mixer. Add the polyester resin to the mixer first. Then add the catalyst to the resin and mix in the mixer for approximately 1 min before adding the aggregate. Mix for approximately 2 to 3 min after the introduction of the aggregates, or until the mixture is uniform in appearance.

For large overlays such as bridge decks or sections of pavements, mix the polymer concrete on a continuous basis by means of a Concrete Mobile.

Placement of polymer concrete: For patching and small overlays, load finished mixture into the specified vehicle and move to the area to be patched. Place the polymer concrete as soon as possible after mixing. Consolidate the material and strikeoff to desired surface texture. Working time at different temperatures can be adjusted on the job site to allow full-batch finishing before gelation occurs. Once gelation starts, it cannot be stopped and is irreversible. Traffic should not be permitted on the new concrete until at least 1 hr after gelation.

For large overlays, use an approved self-propelled finishing machine with supports outside the surface to be overlaid, except where hand finishing equipment is authorized. If curb configuration or existing construction details make it impractical to support the finishing machine outside, then supports may be placed on the surface to be overlaid. Use a finishing machine equipped with forward and reverse drive mechanisms that enable precise velocity control of the machine while it is moving in either direction. It may be equipped with one or more rotating rollers, augers, and vibrating pans, or it may be a vibrating screed-type designed to consolidate by vibration. Use a vibration frequency between 1,500 and 2,000 pulses per minute for pans and between 3,000 and 11,000 for screeds. Screeds must have provisions for being raised above the finished concrete surface. The bottom face of the vibrating screed must be metal and at least 2 in. wide. After the screed rails have been set to proper profile and prior to placing the overlay, the contractor shall check to assure the engineer that the specified nominal thickness of the overlay will be attained over the entire area.

6. MANUFACTURER'S TECHNICAL DATA

Neat polyester resin:

<u>Property</u>	<u>Test Method</u>	<u>Test Results</u> Q-8669
Viscosity, cp, 77 °F	ASTM D 1824	400-500
Gel time, min	ASTM D 2471	30-60
Elongation, %	ASTM D 638	>5
Tensile strength, psi	ASTM D 638	9,000
Compressive strength, psi	ASTM D 695	15,000
Flexural strength, psi	ASTM D 790	12,000
Heat distortion, °F	ASTM D 648	145-165
Chloride permeability	AASHTO:T-259	Impermeable
Freeze-thaw	ASTM C 666	Passed 500 cycles
Thermal compatibility with concrete	ASTM C 884	Passed
Bond to concrete, psi	ASTM C 882	3,100

7. CORPS OF ENGINEERS' EVALUATION

Polyester-Resin Mortar

The polyester-resin mortar was prepared from 86-percent fine aggregate (ASTM C 33) and 14-percent polyester resin by weight. The polyester-resin concrete was prepared from aggregate composed of 45-percent coarse aggregate (3/8-in. nominal size), 55-percent fine aggregate (ASTM C 33) and 12-percent polyester resin by weight of aggregate. Below are the test results:

<u>Polyester-Resin Mortar</u>			<u>Property</u>	<u>Test Method</u>	<u>Test Results</u>
Compressive strength (psi)	ASTM C 109-80	8,090	Flexural strength (psi)	ASTM D 790-81	2,270
			Tensile strength (psi)	ASTM C 190-82	1,250
			Bond strength to concrete (psi)	ASTM C 882-78	3,000
			Thermal compatibility with concrete	ASTM C 884-78	Satisfactory

Polyester-Resin Concrete

<u>Property</u>	<u>Test Method</u>	<u>Test Results</u>
Compressive strength, 8 hr (psi)	ASTM C 39-86	1,810
Compressive strength, 24 hr (psi)	ASTM C 39-86	7,760
Curing shrinkage (percent)	duPont shrinkage gage	0.13
Bond strength to hard- ened poly- mer con- crete (psi)	ASTM C 882-78	3,290

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 must 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 & COST

Q-8669 and Q-8671 polyester resins are available from Quality Controlled Industries (Q.C.I.) and are packaged in 5-gal containers or 55-gal drums. The cost of Q-8669 when purchased by the drum is \$0.90 per pound.