



REMR Material Data Sheet CM-PC-2.2

FAST SETTING PATCHING MATERIALS: PYRAMENT
BLENDED CEMENTS

1. NAME

Pyrament Blended Cements

excellent freeze-thaw durability and are resistant to scaling caused by de-icing chemicals. The manufacturer also reports that concrete made with these cements is sulfate resistant and exhibits markedly reduced drying shrinkage when compared with ordinary portland cement.

2. MANUFACTURER

Pyrament/Lone Star Industries, Inc.
P. O. Box 2148
Houston, TX 77252
Telephone: 1-800-633-6121

The manufacturer's technical data for PBC are given below for concrete mixtures containing 752 lb of PBC per cu yd.

3. DESCRIPTION

Pyrament Blended Cement (PBC) is a hydraulic cement and requires only the addition of aggregate and water to produce a concrete that has high early strengths and high ultimate strengths. PBC can be obtained with an extended setting time and is designated Pyrament Blended Cement, Extended Setting Time (PBC-XT).

	<u>PBC</u>	<u>PBC-XT</u>
Compressive strength, psi (ASTM C 39-86)		
2 hr	1,900	300
4 hr	2,500	2,200
24 hr	5,600	6,100
7 days	10,700	10,700
28 days	11,800	11,800
90 days	12,300	12,300

4. USES

PBC and PBC-XT cements are used in making concretes for overlays, structural concrete, pavements, repair, or rehabilitation of concrete requiring usable strengths in hours.

Flexural strength, psi
(ASTM C 293-79)

2 hr	150	40
4 hr	500	500
24 hr	660	790
7 days	980	980
28 days	1,200	1,200
90 days	1,320	1,320

5. MANUFACTURER'S TECHNICAL DATA

Pyrament Blended Cements are used to produce a rapid strength-gaining concrete that obtains very high ultimate strengths. The manufacturer reports that high performance concretes produced with PBC, without the use of air-entraining admixtures, have

Freeze-thaw durability
(ASTM C 666-84
Procedure A)
300 cycles, durability factor

96	96
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	<u>PBC</u>	<u>PBC-XT</u>
Length change, percent (ASTM C 157-86)		
28 days - water	+0.01	+0.01
28 days - 50- percent rela- tive humidity in air	-0.02	-0.03
Setting time, final, minutes (ASTM C 403-85)	30-45	90-120

6. MANUFACTURER'S GUIDANCE FOR APPLICATION

Pyrament Blended Cements are complete cement systems that do not require additional admixtures to achieve high performance properties. Proportioning procedures are similar to those used for ordinary portland cement concrete (PCC) and should be in accordance with "Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete" (ACI 211.1-81). PBC concrete contains less water than is normally required with portland cement. The water to cement ratios normally range from 0.23 to 0.29. Initial trial batches and laboratory testing are recommended.

Depending on the mixture design, PBC concretes and mortars can be batched and mixed in conventional equipment

and placed using a variety of placement techniques. The PBC concrete can be batched at a ready-mix plant and delivered to the jobsite. The manufacturer recommends that mixing time plus travel time from the ready-mix plant to jobsite does not exceed 30 min, and total time from the time that cement and water are added to truck to placement does not exceed 1 hr. For specific recommendations on mixing and placement methods, contact the Pyrament Technical Services Department.

PBC concretes and mortars are placed and finished following normal procedures used conventional concrete. Curing should be started shortly after the concrete surface has been finished. Use a curing compound or cover with wet burlap.

The manufacturer states that PBC concrete can be placed in temperatures as low as 0 to 10°F. It is recommended that the temperature of the concrete during mixing and transportation be at least 60°F for cold weather applications.

7. CORPS OF ENGINEERS EVALUATION

PBC is presently being evaluated by the Waterways Experiment Station as part of the CPAR projects. The project is scheduled for completion on 1 January 1992. Test results for some of the completed tests are as given:

<u>Property</u>	<u>Test Method</u>	<u>Results</u>		
		<u>6 sack</u>	<u>7 sack</u>	<u>8 sack^{*-1}</u>
Compressive strength, psi	ASTM C 39			
4 hr		2,380	3,790	4,110
6 hr		2,770	4,370	4,900
24 hr		4,620	6,120	6,390
7 days		7,250	9,340	9,730
28 days		8,800	10,180	10,640
6 hr (10°F) ^{*-2}				2,520
24 hr (10°F)				4,200
7 days (10°F)				6,130
6 hr (20°F)				2,680
24 hr (20°F)				4,300
7 days (20°F)				6,560
Flexural strength, psi	ASTM C 78			
4 hr		370	490	545
6 hr		435	600	690
24 hr		620	665	790
7 day		790	780	940
28 day		740	820	930
Bond strength to concrete, 28 day, psi	ASTM C 882 (Modified)	2,910	3,820	3,890
Freeze-thaw durability 300 cycles, durability factor	ASTM C 666	96	97	97
Length change, percent 28 days, 50-percent relative humidity in air	ASTM C 157	-0.02	-0.03	-0.03

*-1 Three concrete mixtures made from PBC-XT cement, 3/4-in. crushed limestone, and sand. The cement contents were 6.0 sacks (564 lb), 7.0 sacks (658 lb), and 8.0 sacks (752 lb). All test specimens cured in laboratory air.

*-2 All materials conditioned to test temperatures except for mixing water, which was heated to 150°F. Test specimens stored at test temperature until time of test.

Tests in progress includes: (a) sulfate resistance, (b) water and chloride permeability, (c) alkali reactivity, and (d) workability in hot and cold weather.

8. ENVIRONMENTAL CONSIDERATIONS

Reasonable caution should guide the preparation, repair, and cleanup

phases of activities involving potentially hazardous and toxic chemical substances. The 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

Availability: These cements are marketed throughout the United States and in Europe.

Cost: The General Services Administration (GSA) scheduled price list for PBC is \$4.92 per 50-lb bag and \$132.00 per ton by bulk.