Elastomeric Concrete & Rubber Membrane Seal Physical Properties

1. Components and Materials

A. **Rubber Membrane Seal** – Material shall be a flexible, extruded thermoplastic elastoprene rubber compound exhibiting the physical properties listed in the table below. The seal design shall have factory-punched holes in the wing flaps through which the elastomeric concrete header material bonds the seal to the deck to ensure water tightness and proper joint performance. ElastoBond Activator is spray applied prior to placement of the elastomeric concrete to facilitate a chemical cross-link bond between the rubber and the elastomeric concrete.

Physical Properties of Elastoprene Membrane Seal:

Property	Requirement	ASTM Method
Tensile Strength	1000 psi (+75/-0)	D412
Ultimate Elongation	445%	D412
Hardness, Shore A	65 +/- 3 pts.	D2240
Tear Strength	140 pli / 24.5 kN/m @ 23°C	D624
	58 pli / 10.2 kN/m @100°C	D624
Compression set		
168 hrs.	25% @ 23°C	D395
168 hrs.	38% @ 100°C	D395
Ozone Resistance	No Cracks	D1149
UV Resistance	Very Good	
Brittle Point	-76°F(-60°C)	D746

B. **Elastomeric Concrete** – LokCrete® Elastomeric Concrete is a 2-component, 100% solids, low VOC, low/no odor, medium viscosity, polyurethane embedding material manufactured by MM Systems Corporation in an ISO2001 manufacturing facility. Its polyurethane liquid components "A" and "B" and a specialty aggregate component "C" cure through chemical cross-linking to form a hard elastic, abrasion-resistant expansion joint concrete filler. Elastomeric concrete cures exothermically.

Physical Properties of Elastomeric Concrete Binder after seven-day cure at room temperature:

Property	Requirement	ASTM Method
Tensile Strength	4750 psi	D412
Compressive Strength	9200 psi	D695
Ultimate Elongation	10%	D412
Hardness, Shore D	78 +/- 5	D2240
Tear Resistance	200 pli / 35 kN/m	D624
Water Absorption	3%	D570
Heat Shrinkage, max.	2%	D1299
Compression Set	48%	D395
Pot Life	25 minutes	(after mixing)

Physical Properties of Elastomeric Concrete Binder & Aggregate mix:

Physical Property	Requirement	ASTM Method
Compressive strength	2800 psi	D695
Resilience @ 5% deflection	95%	D695
Compressive stress, psi	800 psi (min.)	D695
Impact resistance, ft-lb, @ -20°F	No Cracks	Ball drop
Adhesion	Concrete Failure	D421

C. **Elastomeric Concrete Chemical Resistance** – LokCrete® Elastomeric Concrete does not require the use of a primer and has good chemical resistance and outstanding adhesion properties making it the ideal embedding material for expansion joints. All samples were submerged in solution for 6 months and then tested for Shore Hardness, Weight, and Color Stability.

RESISTANCE: (**+ GOOD   O TEMPORARY   - NONE)**

Sulfuric Acid	60%	–	Nitric Acid	10%	o	Acetone		–
	50%	o	Boric Acid	4%	+	Xylene		–
	25%	+	Chromic Acid	10%	+	Butyl Acetate		–
Phosphoric Acid	70%	o	Lactic Acid	25%	+	Methanol		+
	50%	+	Citric Acid	10%	+	Ethanol	10%	+
Formic Acid	10%	o	Tannic Acid		+	Alcohol		+
	5%	+	Ammonium Hydroxide 5%		+	Gasoline		+
Acetic Acid	96%	–	Potassium Hydroxide 10%		+	Diesel Fuel		+
	50%	o	Sodium Hydroxide	50%	+	Glycerin		+
	10%	+	Peroxide	10%	+	Sodium Carbonate	20%	+
Hydrochloric Acid	31%	o	Formaldehyde	37%	+	Sodium Chlorate	10%	+
	10%	+	Methylene Chloride		–	Sugar Water	30%	+
						Tap Water		+

2. Comparison of Physical Properties and Aggregate Mix Ratio

The published physical property data of many elastomeric concrete products in the market today claim to have a final mix elongation percentage of 25% and an initial elongation of 200%. LokCrete® has a final mix elongation percentage is 10%. The fact that LokCrete's elongation does not change when the aggregate is added demonstrates that this technology is very stable. The aggregate complements and integrates with LokCrete's physical properties whereas other technologies in the market have physical properties that change when the aggregate is added to the mixture.

3. Advantages of Consistent Elongation Properties

The elongation and flexibility of any header embedding system should be engineered to be more flexible than the concrete deck and capable of absorbing impact loads from normal vehicular traffic. The ultimate design should provide the proper amount of elongation and an appropriate tensile strength to provide sufficient abrasion resistance to create a strong, hard and resilient system. The LokCrete® system will not easily bend, break away, splinter, or reform. The system will flex with concrete deck loads and bond tenaciously to the substrate. It will not deform when repeated pressure is applied over a period of time. Consequently, movement occurs in the rubber seal element of the system, which by design provides the expansion and contraction flexibility rather than the header embedding material, which is designed to provide monolithic fixation to the substrate. For example, when an automobile drives over an expansion joint with elastomeric concrete that exhibits a low elongation (see photos 3 & 4), the surface will not bend or distort when traffic load is applied. If the elastomeric concrete exhibits high elongation properties, the surfaces where the traffic load is applied will bend and reform (see photos 1 & 2). Over time this will cause dips and deterioration in the elastomeric concrete surface because high elongation systems are too weak to support repeated impact loads.

1

High elongation properties resulting in deformation and shifting.

2

High elongation properties resulting in shifting, separation and cracking.

3

Low elongation properties result in expected service life and endurance.

4

Low elongation properties provide resistance to repeated impact loads.

4. Physical Properties at Low Temperatures

Changes in temperature do not affect LokCrete's physical properties. Tensile Strength and Elongation testing were performed from –20 to 120 degrees Fahrenheit and the physical properties remained the same. This also demonstrates the stability of LokCrete® Elastomeric Concrete.

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