



CAC for Refractory Applications

Lumnite® (Calcium Aluminate Cement) for refractory-concrete based on Diabase Traprock

INTRODUCTION

LUMNITE Cement is often used with traprock aggregate to produce refractory concretes with excellent strength, abrasion and corrosion resistance. This mix is particularly suited for industrial floors in the iron and steel industry, along with food, chemical and petrochemical facilities. It is also a good choice for rapid repairs where compressive strengths greater than 3000 psi are needed within six hours.

PROPERTIES

Traprock is a dark gray to black, fine-textured igneous rock. After quarrying, it is crushed, screened and graded to size. Traprock aggregates are manufactured by a number of firms across the United States. While the chemistry of the materials may vary, a typical oxide analysis is shown in Table 1.



Oxide Analysis			
SiO ₂	75%	Na ₂ O	4%
Al ₂ O ₃	9%	CaO	1%
Fe ₂ O ₃	4%	MgO	<1%
K ₂ O	5%	LOI	<1%

Table 1

This chemical analysis is presented only as information and should not be considered as a criteria for acceptance in the ability of any given traprock aggregate to perform satisfactory with LUMNITE.

Traprock has a specific gravity of about 2.6 to 3.0 which results in concretes having unit weights in the range of 150 pounds per cubic foot. In spite of the high unit weight, the K factor of a LUMNITE: Traprock concrete will be in the range of 4 to 4.5.

The data in the following table is presented as an example of the properties that can be achieved under laboratory conditions from a LUMNITE: Traprock concrete. This data was developed using a particular traprock. Other traprock may produce different results depending on the gradation and chemical properties.

AGGREGATE GRADATION (Cumulative Percent Retained on Each Sieve)			
Diameter (U.S.)	Diameter (metric)	Traprock Coarse	Traprock Sand
1.0 in	(25.4 mm)	0	0.0
0.75 in	(19 mm)	2.9	0.0
0.5 in	(12.7 mm)	40.9	0.0
0.375 in	(9.5 mm)	76.4	0.0
0.187 in	(4.75mm)	99.5	0.0
0,09 in	(2.36m)	99.6	1.9
0,05 in	(1.18mm)	99.7	30
0,024 in	(600 μm)	99.7	60.2
0,012 in	(300 μm)	99.8	81.3
0,006 in	(150 μm)	99.8	94.2
0,003 in	(74 μm)	99.8	98.4

Table 2





TYPICAL CONCRETE MIX DESIGN
(Materials needed for 4 cubic yards of concrete based on a 9 sack mix)

Material	Quantity
Lumnite Cement	3300 lbs (1 super sack)
Traprock Coarse	6100 lbs
Traprock Sand	5200 lbs
Water	158 gallons (0.40 water/ cement ratio)

Table 3

TYPICAL COMPRESSIVE STRENGTHS

Mix	Sack per yard	Water/ Cement Ratio	Slump	Compressive Strength (psi and Mpa)		
				24 hr	7 days	28 days
No admix	9	0.40	8 inch	6000	8500	9000

Table 4

In order to maximize strength at early ages, it is important that the water/cement ratio not exceeds 0.40. The addition of admixtures to aid the placing of the concrete may be necessary at water/Cement ratios less than 0.40. Admixtures are available for acceleration, retardation, water reduction, and homogeneity of the mix. Please consult Calucem for further recommendations pertaining to your particular application.

Proper concreting practices should be followed when placing a Lumnite: Traprock concrete. Contamination by Portland cement, lime, or hydrated cement can cause accelerated set and should be avoided. Mixing times should not exceed 8 minutes. In addition, proper curing procedures should be followed for the first 24 hours following placement. Water sprinkling is necessary so as not to lose the water of hydration and prevent excessive heat build-up.

BENEFITS

ISTRA Calcium Aluminate Cements are a cost efficient solution for insulating and dense refractory products. ISTRA Calcium Aluminate cements are used in precast shapes or in premixed refractory formulations. They can be applied as concretes or gunning mixes and offer the following benefits.

- High Temperature Resistance
- Abrasion and Mechanical Resistance
- Strictly monitored chemical composition for consistent high product quality
- Reliable behavior of ISTRA Calcium Aluminate Cements during installation

START FORMULATIONS

Starting formulations are available upon request.

MORE INFO

For additional information about ISTRA Calcium Aluminate Cements, please visit the CALUCEM web site at www.calucem.com or contact us worldwide.

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