LR-D1

A SIKA COMPANY

LR-D1 is a pre-blended, pre-packaged, dry-process shotcrete material containing Portland cement, air-entraining admixture, blended aggregates and other carefully selected components. This product provides low resistivity values and is specifically designed for use with cathodic protection systems.

FEATURES & BENEFITS

- Enhances performance of cathodic protection system
- Air-entrainment provides superior resistance to freeze-thaw cycling and salt-scaling resistance
- Designed with natural normal-density non-reactive aggregates to eliminate potential alkali-aggregate reactivity (AAR)
- All KING products are manufactured using ISO 9001:2015 Certified Processes

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OPTIONAL FEATURES & BENEFITS
SET-TIME/STRENGTH GAIN

LR-D1 X contains a level 1 dosage of accelerator.
LR-D1 X2 contains a level 2 dosage of accelerator.
LR-D1 X3 contains a level 3 dosage of accelerator.

See the Technical Data section for more detailed information.

SYNTHETIC FIBER
LR-D1 SY

- Synthetic fibers reduce cracking caused by intrinsic stresses
- Type III synthetic fiber in accordance with ASTM C 1116
- Grade FR Class I shotcrete in accordance with ASTM C 1480

GRADATION

- By default LR-D1 is blended to meet ACI 506 “Guide to Shotcrete”, Table 1.1, Gradation No. 1
- LR-D1 G2 is blended to meet ACI 506 “Guide to Shotcrete”, Table 1.1, Gradation No. 2

EXAMPLE:
For LR-D1 with a level 2 dosage of accelerator, with synthetic fibers and Gradation No. 2, the name of the product would be LR-D1 X2 SY G2.

USES

- Induced current applications including new construction and rehabilitation.
- Galvanic anode applications including new construction and rehabilitation.
- Use of a predampener in conjunction with dry-process accelerated shotcrete is not recommended. Contact your local KING Technical Representative.

PROCEDURES
Surface Preparation (Repair or Rehabilitation): All surfaces to be in contact with LR-D1 must be free from dust, oil, grease or any other foreign substances that may interfere with the bond of the material. Remove all loose or delaminated concrete providing a roughened surface and a minimum of 25 mm (1 inch) clearance behind any corroded reinforcing steel. The perimeter of the repair area should be sawcut a minimum of 20 mm (¾ inch). Clean the area to be repaired with potable water, leaving the concrete saturated but free of standing water (SSD).

Application: Apply LR-D1 in accordance with the ACI 506 “Guide to Shotcrete” publication.

CURING
Curing is essential to optimize physical properties of the shotcrete and minimize plastic shrinkage. LR-D1 should be cured immediately after material has reached initial set in accordance with ACI 308 “Guide to Curing Concrete”. Continuously moist cure for a minimum period of 7 days. Alternatively, moist cure for a minimum period of 24 hours and apply a curing compound that complies with ASTM C 309. Curing is particularly critical in rapid moisture loss conditions such as high temperatures, high winds and low humidity.

TECHNICAL DATA
The following data is representative of typical values achievable using proper application techniques as outlined in the ACI 506 “Guide to Shotcrete” publication. The data was obtained during project field tests and in-house shotcrete studies.

ACCELERATOR LEVEL

	LR-D1	LR-D1 X	LR-D1 X2	LR-D1 X3
SET TIME* ASTM C 1117				
Initial	4 hours	60 minutes	20 minutes	5 minutes
Final	6 hours	1 hour, 10 minutes	30 minutes	10 minutes
COMPRESSIVE STRENGTH* ASTM C 116 (MODIFIED)				
4 Hour	-	-	1 MPa (150 psi)	5 MPa (725 psi)
8 Hour	-	5 MPa (725 psi)	6 MPa (870 psi)	8 MPa (1150 psi)
12 Hour	-	7 MPa (1015 psi)	8 MPa (1150 psi)	10 MPa (1500 psi)
COMPRESSIVE STRENGTH* ASTM C 1604				
1 Day	15 MPa (2175 psi)	21 MPa (3000 psi)	21 MPa (3000 psi)	21 MPa (3000 psi)
3 Day	28 MPa (4060 psi)	28 MPa (4060 psi)	28 MPa (4060 psi)	28 MPa (4060 psi)
7 Day	32 MPa (4640 psi)	32 MPa (4640 psi)	32 MPa (4640 psi)	32 MPa (4640 psi)
28 Day	42 MPa (6000 psi)	42 MPa (6000 psi)	42 MPa (6000 psi)	42 MPa (6000 psi)

*The following data was obtained under controlled conditions with material and ambient temperatures of 21 °C (70 °F). Higher or lower temperatures can respectively accelerate or delay setting time and early-age compressive strength gain.

AIR CONTENT
ASTM C 457 6% ± 2%

LR-D1

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BOILED ABSORPTION
ASTM C 642 6.0%

MAXIMUM AIR VOID SPACING FACTOR
ASTM C 457 300 µm/m

MAXIMUM VOLUME OF PERMEABLE VOIDS
ASTM C 642 15.0%

ELECTRICAL RESISTIVITY
6500 Ω•cm

OPTIMUM PERFORMANCE

- LR-D1 should not be applied when ambient, substrate and material temperatures are below 5 °C (40 °F) or above 35 °C (95 ° F).
- For adverse temperatures, follow ACI recommendations for Cold/ Hot Weather Concreting.
- Performance of in-place shotcrete relies heavily upon application techniques. To ensure optimum quality of in-place shotcrete, the material, equipment and key personnel should be pre-qualified prior to project start-up.
- Special provisions are required when using LR-D1 in conjunction with galvanic anodes to ensure performance, please contact your local KING Technical Representative for more information.

YIELD

- 30 KG (66 lb) bag contains approximately 0.014 m^3 (0.5 ft^3)
- 1,000 KG (2,205 lb) bag contains approximately 0.45 m^3 (16.5 ft^3)

PACKAGING

LR-D1 is normally packaged in 30 KG (66 lb) triple-lined bags or 1,000 KG (2,205 lb) bulk bags and polywrapped on wooden pallets. All KING products can be custom packaged to suit specific job requirements.

STORAGE AND SHELF LIFE

Material should be stored in a dry, covered area, protected from the elements. Unopened bags have a shelf life of 12 months.

SAFETY PROCEDURES

LR-D1 contains Portland cement. Normal safety-wear such as rubber gloves, dust mask and safety glasses used to handle conventional cement based products should be worn. Safety Data Sheets are available upon request.

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Other Sites:
Boisbriand, Qc
Brantford; Cambridge; Sudbury; Toronto(ON)
Edmonton (Alberta)
Surrey (British Columbia)