

ARMOURGUARD

Specially formulated, high performance, steel fiber reinforced shotcrete mix designed to provide superior impact and abrasion resistant characteristics. ArmourGuard is a pre-blended, pre-packaged, dry-process shotcrete material containing high early Portland cement, silica fume, steel fiber, blended aggregates, set time accelerators and other carefully selected components. ArmourGuard is designed to produce superior impact and abrasion resistant characteristics.

FEATURES & BENEFITS

- Superior impact and abrasion resistant characteristics
- Significantly increased load carrying capacity
- Significantly increased energy absorbing capacity (toughness)
- Rapid early age strength development
- Low permeability
- Blended to meet ACI 506 "Guide to Shotcrete", Table 1.1, Gradation No. 2
- Can be poured in place as a conventional concrete mix
- All KING products are manufactured using ISO 9001:2008 Certified Processes

USES

- Ore pass linings.
- Ore pass brows.
- Truck dumps.
- Ore and rock chutes.
- Other areas of high impact and abrasion.
- Use of a predampener in conjunction with dry process accelerated shotcrete is not recommended. Contact KING Technical Support Staff for more information.

PROCEDURES

Surface Preparation (Rock Surfaces):

All surfaces to be in contact with ArmourGuard 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 rock. Clean the area with potable water, leaving the substrate saturated but free of standing water (SSD).

Surface Preparation (Concrete Surfaces):

All surfaces to be in contact with ArmourGuard must be free from dust, oil, grease or any other foreign substances that may interfere with the bond of the material. Clean the area to be repaired with potable water, leaving the concrete saturated but free of standing water (SSD).

Application:

Apply ArmourGuard in accordance with the ACI 506 "Guide to Shotcrete" publication. If placing as conventional concrete, note that mix is not pumpable.

Curing:

Good curing conditions are beneficial to optimizing physical properties of ArmourGuard. Although the high relative humidity commonly found in underground environments provides for good curing conditions, additional curing is often appropriate and should be performed in accordance with ACI 308 "Guide to Curing Concrete".

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.

COMPRESSIVE STRENGTH

ASTM C 116 (ADAPTED)

| | |
|---------|-------------------|
| 4 Hour | 2 MPa (290 psi) |
| 8 Hour | 8 MPa (1160 psi) |
| 12 Hour | 20 MPa (2900 psi) |

ASTM C 1604

| | |
|--------|-------------------|
| 1 Day | 25 MPa (3620 psi) |
| 7 Day | 40 MPa (5800 psi) |
| 28 Day | 60 MPa (8700 psi) |

ABRASION RESISTANCE

ASTM C 779

(PROCEDURE C)

| | |
|--------|--|
| 7 Day | 170 µm/min (6.7 x 10 ⁻³ in/min) |
| 28 Day | 120 µm/min (4.7 x 10 ⁻³ in/min) |
| | (Rate of wear) |

LASA MODIFIED TUMBLING

| | |
|---------|-------------------------------------|
| 7 Day | |
| 24 Hour | 0.20 litres (12.2 in ³) |
| 48 Hour | 0.34 litres (20.7 in ³) |
| | (Volume of material lost) |

FLEXURAL PERFORMANCE

ASTM C 1609

| First Peak Strength F ¹⁰⁰ 600 | F ¹⁰⁰ 400 | F ¹⁰⁰ 150 |
|--|-----------------------|-----------------------|
| 6.25 MPa (905 psi) | 5.50 MPa (797 psi) | 5.50 MPa (797 psi) |
| | | 4.50 MPa (652 psi) |

FLEXURAL TOUGHNESS

ASTM C 1550

Peak Applied Load Toughness as a function of flexure

| 40 kN (8992 lbf) | 5 mm >100 J | 10 mm >215 J | 20 mm >350 J | 30 mm >450 J | 40 mm >500 J |
|---------------------|----------------|-----------------|-----------------|-----------------|-----------------|
|---------------------|----------------|-----------------|-----------------|-----------------|-----------------|

OPTIMUM PERFORMANCE

- ArmourGuard should not be applied when ambient, substrate and material temperatures are below 0 °C (32 °F).
- 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.
- Recommended minimum inside diameter of shotcrete hoses should be 50 mm (2 inches).

YIELD

1,000 KG (2,205 lb) bag contains approximately 0.45 m³ (16.5 ft³)

ARMOURGUARD

PACKAGING

ArmourGuard is normally packaged in 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. Physical properties of ArmourGuard may be adversely affected if material is stored in temperatures below 0 °C (32 °F). Material stored below these temperatures should be allowed to warm to ambient underground temperatures before shooting.

SAFETY PROCEDURES

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

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Warranty: This product is designed to meet the performance specifications outlined in this product data sheet. If the product is used in conditions for which it was not intended, or applied in a manner contrary to the written recommendations contained in the product data sheet, the product may not reach such performance specifications. The foregoing is in lieu of any other warranties, representations or conditions, expressed or implied, including, but not limited to, implied warranties or conditions of merchantable quality or fitness for particular purposes, and those arising by statute or otherwise in law or from a course of dealing or usage of trade. [REV.0002_ 2457128.5]

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