MS-W1

A SIKA COMPANY

MS-W1 is a silica fume enhanced, pre-packaged shotcrete material for wet-process applications. This product is a pre-blended, pre-packaged, wet-process shotcrete material containing Portland cement, silica fume, fly ash, air-entraining admixture, blended aggregates and other carefully selected components. It has greatly enhanced shooting characteristics and physical properties.

FEATURES & BENEFITS

- Air-entrainment provides superior resistance to freeze-thaw cycling and salt-scaling resistance
- Improved pumpability and shootability
- Improved adhesive and cohesive plastic properties
- Significantly reduced rebound, resulting in lower material usage
- Improved ability to build greater thicknesses in a single pass in both vertical and overhead orientations
- Improved resistance to water wash-out
- Improved resistance to sulphate attack
- Very low permeability
- Low dust levels
- Low shrinkage
- Compatible with integral, pre-applied and/or post-applied corrosion inhibitors*
- 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

*For more information regarding the use of a corrosion inhibitor in conjunction with MS-W1, please contact your KING Technical Representative.

OPTIONAL FEATURES & BENEFITS

SET-TIME/STRENGTH GAIN

- Liquid accelerator can be added at the nozzle to reduce set time and increase early age strength gain. Contact your KING Technical Representative for more information.

SYNTHETIC FIBER

MS-W1 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

CORROSION INHIBITOR

MS-W1 CI

- Corrosion inhibitor protects steel reinforcing and other metals embedded in concrete from corrosion induced by carbonation or chlorides
- Pre-blended corrosion inhibitor provides the correct dosage to enhance corrosion protection

GRADATION

- By default MS-W1 is blended to meet ACI 506 “Guide to Shotcrete”, Table 1.1, Gradation No. 1
- MS-W1 G2 is blended to meet ACI 506 “Guide to Shotcrete”, Table 1.1, Gradation No. 2.

EXAMPLE:
For MS-W1 with synthetic fibers and Gradation No. 2, the name of the product would be MS-W1 SY G2.

USES

- Rehabilitation of concrete bridges, dams, reservoirs, subway tunnels and parking ramps
- Lining and rehabilitation of sewers and watermains
- New construction including slope stabilization, soil-nailing, shaft and tunnel linings, pools and other concrete structures

PROCEDURES

Surface Preparation (Rock Surfaces): All surfaces to be in contact with MS-W1 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 (Repair or Rehabilitation): All surfaces to be in contact with MS-W1 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 20 mm (¾ inch) clearance behind any corroded reinforcing steel. The perimeter of the repair area should be saw-cut 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).

Mixing: Place 75% of required water into mixer and slowly introduce entire bag of MS-W1 while the mixer is running. Allow MS-W1 to mix for a minimum of five minutes. Slowly add balance of required water until desired slump has been obtained, not exceeding maximum recommended volume of water. **Maximum recommended volume of water is 3.4 L (0.9 US gallon) per 30 KG (66 lb) bag.** Continue mixing and stop only after material has reached a consistent, homogeneous mix.

Application: Apply MS-W1 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. MS-W1 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.

SET TIME*

ASTM C 1117	
Initial	4 hours
Final	6 hours

COMPRESSIVE STRENGTH*

ASTM C 1604	
1 Day	15 MPa (2175 psi)
3 Day	28 MPa (4060 psi)
7 Day	32 MPa (4640 psi)
28 Day	42 MPa (6000 psi)

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*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.

FLEXURAL STRENGTH
ASTM C 78
28 Day 6.5 MPa (940 psi)

AIR CONTENT
ASTM C 457 6% ± 2%

BOILED ABSORPTION
ASTM C 642 6.0%

UNIAXIAL DRYING SHRINKAGE
ASTM C 157 650 µm/m

MAXIMUM AIR VOID SPACING FACTOR
ASTM C 457 230 µm

MAXIMUM VOLUME OF PERMEABLE VOIDS
ASTM C 642 15.0%

SPLITTING TENSILE STRENGTH**
ASTM C 496
7 Day 4.5 MPa (650 psi)
28 Day 5.8 MPa (840 psi)

FREEZE-THAW RESISTANCE
ASTM C 666 100% (Excellent durability factor)

SALT-SCALING RESISTANCE
ASTM C 672 0.2 kg/m^2 (0.04 lb/ft^2)

CHLORIDE ION PENETRABILITY
ASTM C 1202 700 Coulombs

**The following data was obtained under laboratory condutions using specimens cast in accordance with the indicated test method. Contact your local KING Technical Representative for more information regarding the test method and how it pertains to shotcrete.

OPTIMUM PERFORMANCE

- MS-W1 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.

YIELD

30 KG (66 lb) bag contains approximately 0.014 m^3 (0.5 ft^3).

PACKAGING

MS-W1 is normally packaged in 30 KG (66 lb) triple-lined 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

MS-W1 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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