

## PRODUCT DATA SHEET

# King® MS-W1 UG

### SHOTCRETE MATERIAL FOR WET-MIX PROCESS FOR UNDERGROUND APPLICATIONS



#### PRODUCT DESCRIPTION

King® MS-W1 UG 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, blended aggregates and other carefully selected components. It has greatly enhanced shooting characteristics and physical properties.

#### USES

- Ground support applications for mining, tunneling and other underground openings
- Construction of underground bulkheads, backfill barricades, pillars, ventilation walls and other underground concrete structures

#### CHARACTERISTICS / ADVANTAGES

- 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
- Low permeability
- Low shrinkage

#### 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 Sika STM Technical Representative for more information.

##### Steel Fiber (ST)

- Significantly increased load-carrying capacity
- Significantly increased energy absorption capacity (toughness)
- Significantly increased impact resistance

Product	Dosage of Fiber
King® MS-W1 UG STA	High
King® MS-W1 UG STB	Medium
King® MS-W1 UG STC	Low
King® MS-W1 UG STD	Very Low

##### Gradation (G1)

- By default King® MS-W1 UG is blended to meet ACI 506 "Guide to Shotcrete", Table 1.1, Gradation No. 2
- King® MS-W1 UG G1 is blended to meet ACI 506 "Guide to Shotcrete", Table 1.1, Gradation No. 1

##### EXAMPLES:

- For King® MS-W1 UG with gradation No. 1, the name of the product would be:  
**King® MS-W1 UG G1.**
- For King® MS-W1 UG with a medium dosage of steel fiber and gradation No. 2, the name of the product would be:  
**King® MS-W1 UG STB.**

# PRODUCT INFORMATION

**Packaging** 66 lb (30 kg) bag  
 2205 lb (1000 kg) FIBC\*  
 Products containing Steel fibers (ST) can only be packaged in FIBC\*  
 Custom packaging is available to suit specific project requirements  
 \*Flexible Intermediate Bulk Container

**Shelf Life** Unopened bags have a shelf life of 12 months.

**Storage Conditions** Store in a dry, covered area, protected from the elements between 40°F - 95°F (5°C - 35°C)  
 Physical properties may be adversely affected if material is stored in temperatures below 40°F (5°C) and should be allowed to warm to ambient underground temperatures before application

**Compressive Strength** ASTM C116 (modified)

8 Hours	725 psi (5 MPa)
12 Hours	1500 psi (10 MPa)

ASTM C1604

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

**Flexural Strength** ASTM C78

	<b>King® MS-W1 UG</b>	<b>King® MS-W1 UG ST</b>
28 Days	940 psi (6.5 MPa)	1160 psi (8 MPa)

**Flexural toughness**

**STEEL FIBER**

**King® MS-W1 UG STA**

**Peak Applied Load**      **Toughness as a function of flexure**

	<b>10 mm</b>	<b>20 mm</b>	<b>30 mm</b>	<b>40 mm</b>	<b>50 mm</b>
8992 lbf (40 Kn)	> 100J	> 215J	> 350J	>450J	>500J

**King® MS-W1 UG STB**

**Peak Applied Load**      **Toughness as a function of flexure**

	<b>10 mm</b>	<b>20 mm</b>	<b>30 mm</b>	<b>40 mm</b>	<b>50 mm</b>
25 kN (5620 lbf)	> 100J	> 190J	> 300J	> 375J	> 425J

**King® MS-W1 UG STC**

**Peak Applied Load**      **Toughness as a function of flexure**

	<b>10 mm</b>	<b>20 mm</b>	<b>30 mm</b>	<b>40 mm</b>	<b>50 mm</b>
4496 lbf (20 kN)	> 100J	> 175J	> 270J	> 325J	> 370J

**King® MS-W1 UG STD**



	Peak Applied Load	Toughness as a function of flexure				
		10 mm	20 mm	30 mm	40 mm	50 mm
	4496 lbf (20 kN)	> 40J	> 80J	> 125J	> 150J	> 175J
<b>Porosity</b>	<b>BOILED ABSORPTION</b>					
	6.0%					ASTM C642
	<b>MAXIMUM VOLUME OF PERMEABLE VOIDS</b>					
	15.0%					ASTM C642
<b>Coverage</b>	Approx. 0.5 ft <sup>3</sup> per 66 lb bag (0.014 m <sup>3</sup> per 30 kg bag) Approx. 0.61 yd <sup>3</sup> per 2205 lb FIBC (0.45m <sup>3</sup> per 1000 kg FIBC)					
<b>Flowability</b>	<b>SLUMP</b> 8 in (200 mm) ± 2 in (50 mm)					ASTM C143
<b>Pot Life</b>	4 hours					
<b>Set Time</b>						ASTM C1117
	Initial			< 10 minutes		
	Final			< 45 minutes		

## BASIS OF PRODUCT DATA

Results may differ based upon statistical variations depending upon mixing methods and equipment, temperature, application methods, test methods, actual site conditions and curing conditions.

The following data was obtained under controlled conditions using liquid set accelerator added at the nozzle, with material and ambient temperatures of 70 °F (21 °C). Higher or lower temperatures and accelerator dosages can respectively accelerate or delay setting time and early-age compressive strength gain. Contact your local Sika Technical Representative for more information.

## AVAILABILITY/WARRANTY

Each of the following descriptors / features have the possibility of being included in a specific mix design; Either on their own, or combined with any other descriptors / features.

### Descriptors / Features of fiber dosages:

Steel Fibers	STA - High
	STB - Medium
	STC - Low
	STD - Very Low

### Descriptors / Features of other technologies:

Gradation No. 1	G1
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## ENVIRONMENTAL, HEALTH AND SAFETY

For further information and advice regarding transportation, handling, storage and disposal of chemical products, user should refer to the actual Safety Data Sheets containing physical, environmental, toxicological and other safety related data. User must read the current actual Safety Data Sheets before using any products. In case of an emergency, call CHEMTREC at 1-800-424-9300, International 703-527-3887.

### SURFACE PREPARATION

- **Rock Surfaces:** All surfaces to be in contact with King® MS-W1 UG 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).

### MIXING

Mix material at a maximum water content of 24.5 US gallons (92.6 L) per 2,205 lb (1,000 KG) bag. For mixing instructions, follow recommendations of concrete mixer manufacturer. For custom mix designs developed to meet specific project requirements, contact your Sika STM Technical Representative.

## APPLICATION

Apply King® MS-W1 UG in accordance with the ACI 506 “Guide to Shotcrete” publication.

Performance of in-place shotcrete relies heavily upon application techniques. The shotcrete material, equipment and key personnel should be pre-qualified prior to project start-up to ensure optimum quality of in-place shotcrete.

## OPTIMUM PERFORMANCE

- King® MS-W1 UG should not be applied when ambient, substrate and material temperatures are below 40 °F (5 °C) or above 95 °F (35 °C).
- For adverse temperatures, follow ACI recommendations for Cold / Hot Weather Concreting.

Contact your Sika STM Technical Representative for more information.

## CURING TREATMENT

Curing is essential to optimize physical properties of the shotcrete and minimize plastic shrinkage. King® MS-W1 UG 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 C309. Curing is particularly critical in rapid moisture loss conditions such as high temperatures, high winds and low humidity.

## CLEANING OF TOOLS

Clean all tools and equipment after use with water. Once hardened, the product can only be removed mechanically.

## OTHER RESTRICTIONS

See Legal Disclaimer.

## LEGAL DISCLAIMER

- KEEP CONTAINER TIGHTLY CLOSED
- KEEP OUT OF REACH OF CHILDREN
- NOT FOR INTERNAL CONSUMPTION
- FOR INDUSTRIAL USE ONLY
- FOR PROFESSIONAL USE ONLY

Prior to each use of any product of Sika Corporation, its subsidiaries or affiliates (“SIKA”), the user must always read and follow the warnings and instructions on the product’s most current product label, Product Data Sheet and Safety Data Sheet which are available at [usa.sika.com](http://usa.sika.com) or by calling SIKA’s Technical Service Department at 1-800-933-7452. Nothing contained in any SIKA literature or materials relieves the user of the obligation to read and follow the warnings and instructions for each SIKA product as set forth in the current product label, Product Data Sheet and Safety Data Sheet prior to use of the SIKA product.

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### Product Data Sheet

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