BUILDING TRUST
CONSTRUIRE LA CONFIANCE

PRODUCT DATA SHEET

King® MS-W1 UG

SHOTCRETE MATERIAL FOR WET-MIX PROCESS FOR UNDERGROUND APPLICATIONS

PRODUCT DESCRIPTION

King® MS-W1 UG 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.

WHERE TO USE

- 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 local Sika Technical Representative for more information.

STEEL FIBRE

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

Product	Dosage of fibres
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

EXAMPLES:
- King® MS-W1 UG with Gradation No. 1, the name of the product would be King® MS-W1 UG G1
- King® MS-W1 UG with a high dosage of macro-synthetic fibre and Gradation No. 2, the name of the product would be King® MS-W1 UG MFB.
- King® MS-W1 UG with a medium dosage of steel fibre and Gradation No. 2, the name of the product would be King® MS-W1 UG STB.

APPROVALS / CERTIFICATES

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

PRODUCT INFORMATION

Packaging

- 30 kg (66 lb) triple-lined bags
- 1 000 kg (2 205 lb) FIBC

*Custom packaging is available to suit specific project requirements

Shelf Life

12 months in original, unopened packaging

Storage Conditions

Material should be stored in a dry, covered area, protected from the elements. Physical properties of may be adversely aff ected 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.

Compressive Strength

8 Hours	5 MPa (725 psi)	**ASTM C 116 (modified)**
12 Hours	10 MPa (1500 psi)	
1 Day	15 MPa (2175 psi)	**ASTM C 1604**
3 Days	28 MPa (4060 psi)	
7 Days	32 MPa (4640 psi)	
28 Days	42 MPa (6000 psi)	

Tensile Strength in Flexure

ASTM C 78

	King® MS-W1 UG	King® MS-W1 UG ST
28 days	6.5 MPa (940 psi)	8 MPa (1160 psi)

Flexural rigidity

STEEL FIBRES

King® MS-W1 UG STA

Peak Applied Load	Tougness as a function of flexure				
	10 mm	20 mm	30 mm	40 mm	50 mm
40 Kn (8992 lbf)	> 100J	> 215J	> 350J	>450J	>500J

King® MS-W1 UG STB

Peak Applied Load	Toughness as a function of flexure				
	10 mm	20 mm	30 mm	40 mm	50 mm
25 kN (5620 lbf)	> 100J	> 190J	> 300J	> 375J	> 425J

King® MS-W1 UG STC

Peak Applied Load	Toughness as a function of flexure				
	10 mm	20 mm	30 mm	40 mm	50 mm
20 kN (4496 lbf)	> 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
	20 kN (4496 lbf)	> 40J	> 80J	> 125J	> 150J	> 175J

Porosity	**BOILED ABSORPTION** 6.0%	**ASTM C 642**
	MAXIMUM VOLUME OF PERMEABLE VOIDS 15.0%	**ASTM C 642**
Yield	Approx. 0.465 m³ (16.5 ft³) / 1,000 KG (2,205 lb) bag * Yield in service may slightly vary according to projects conditions	
Flowability	**SLUMP*** 200 mm (8") ± 50 mm (2")	**ASTM C 143**
Pot Life	4 hours*	
Curing Time	Good curing conditions are beneficial to optimizing the physical properties of King® MS-W1 UG. 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”.	
Setting Time	Initial: < 10 minutes Final: < 45 minutes	**ASTM C 1117**

BASIS OF PRODUCT DATA

All technical data stated in this Data Sheet are based on laboratory tests. Actual measured data may vary due to circumstances beyond our control.
*Data was obtained under laboratory conditions with material and ambient temperatures of 21 °C (70 °F). Higher or lower temperatures can respectively reduce or increase slump and pot life.
** Data was obtained under controlled conditions using liquid set accelerator added at the nozzle, with material and ambient temperatures of 21 °C (70 °F). 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.

OTHER DOCUMENTS

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 descriptor / feature:

Corrosion inhibitor (CI)	Gradation 1 (G1)
Crystaline Waterproofing (CW)	Air Entrained (E)

Descriptors / features of fibre dosages:

Steel fibres (ST)	STA,STB,STC,STD
Micro-synthethic fibres	SY

ENVIRONMENT, HEALTH & SAFETY

User must read the most recent corresponding Safety Data Sheets (SDS) before using any products. The SDS provides information and advice on the safe handling, storage and disposal of chemical products and contains physical, ecological, toxicological and other safety-related data.

APPLICATION INSTRUCTIONS

SURFACE PREPARATION

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

APPLICATION

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

OPTIMUM PERFORMANCE

- Product should not be applied when ambient, substrate and material temperatures are below 5 °C (40 °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.

CLEAN UP

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

LOCAL RESTRICTIONS

Note that as a result of specific local regulations the declared data and recommended uses for this product may vary from country to country. Consult the local Product Data Sheet for exact product data and uses.

LEGAL NOTES

The information, and, in particular, the recommendations relating to the application and end-use of Sika products, are given in good faith based on Sika's current knowledge and experience of the products when properly stored, handled and applied under normal conditions in accordance with Sika's recommendations. In practice, the differences in materials, substrates and actual site conditions are such that no warranty in respect of merchantability or of fitness for a particular purpose, nor any liability arising out of any legal relationship whatsoever, can be inferred either from this information, or from any written recommendations, or from any other advice offered. The user of the product must test the product’s suitability for the intended application and purpose. Sika reserves the right to change the properties of its products. The proprietary rights of third parties must be observed. All orders are accepted subject to our current terms of sale and delivery. Users must always refer to the most recent issue of the local Product Data Sheet for the product concerned, copies of which will be supplied on request.