

PRODUCT DATA SHEET

King® MS-D3 US

HIGH-EARLY STRENGTH SHOTCRETE MATERIAL FOR DRY-MIX PROCESS APPLICATIONS

PRODUCT DESCRIPTION

King® MS-D3 US is a high early strength, preblended, and pre-packaged shotcrete material formulated for dry-mix process applications. It contains high early Portland cement, silica fume, air-entraining admixture, blended aggregates, along with other carefully selected components. It has greatly enhanced shooting characteristics and physical properties, along with high early strength development.

USES

Overall:

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

Added Steel fiber reinforcement (ST) or Added Macro-Synthetic fiber reinforcement (MF):

- Ground support applications for mining, tunneling, and other underground openings
- Rehabilitation of marine structures
- Lining and rehabilitation of sewers and other tunnels
- Slope stabilization, soil-nailing, shaft and tunnel linings

CHARACTERISTICS / ADVANTAGES

- Improved early age strength development
- Air-entrainment provides superior resistance to freeze-thaw cycling and salt-scaling resistance
- 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 shrinkage Compatible with integral, pre-applied and/or postapplied corrosion inhibitors
- Designed with natural normal-density non-reactive aggregates to eliminate potential alkali-aggregate reactivity (AAR)

OPTIONAL FEATURES & BENEFITS

Accelerator Level

- Improved performance in cold temperatures
- Improved performance in presence of running water
- Allows for earlier re-opening of traffic lanes on bridges and in subway tunnels

Product	Dosage Level
King® MS-D3 US	N/A
King® MS-D3 X US	Level 1
King® MS-D3 X2 US	Level 2
King® MS-D3 X3 US	Level 3

Micro-Synthetic Fiber (SY)

- Micro-Synthetic fibers reduce cracking caused by intrinsic stresses
- Type III synthetic fiber in accordance with ASTM C1116 Grade FR Class I shotcrete in accordance with ASTM C1480

Steel Fiber (ST)

- Improved performance in cold temperatures
- Improved performance in presence of running water
- Air-entrainment provides superior resistance to freeze-thaw cycling and salt-scaling resistance
- Significantly increased load carrying capacity
- Significantly increased energy absorbing capacity (toughness)
- Significantly increased impact resistance
- Improved adhesive and cohesive plastic properties
- Improved resistance to water wash-out

- Low permeability
- Reduction of cracking due to drying shrinkage

Product	Dosage of Fiber
King® MS-D3 STA US	High
King® MS-D3 STB US	Medium
King® MS-D3 STC US	Low
King® MS-D3 STD US	Very Low

Corrosion Inhibitor (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 King® MS-D3 US, King® MS-D3 MF US, and King® MS-D3 ST US are blended to meet ACI 506 “Guide to Shotcrete”, Table 1.1, Gradation No. 1 (No Added Abbreviation) ▪ King® MS-D3 G2 US, King® MS-D3 ST G2 US, and King® MS-D3 MF G2 US are blended to meet ACI 506 “Guide to Shotcrete”, Table 1.1, Gradation No. 2 (G2)

Macro-Synthetic Fiber (MF)

- Improved performance in cold temperatures
- Improved performance in presence of running water
- Significantly decreased wear on placing equipment and accessories when compared with steel fibers
- Increased fire resistance
- Ideal for use in manways or other areas where people may come in contact with the shotcrete surface
- Significantly increased load carrying capacity
- Significantly increased energy absorbing capacity (toughness)
- Significantly increased impact resistance
- Low permeability
- Reduction of cracking due to drying shrinkage

Product	Dosage of Fiber
King® MS-D3 MFB US	High
King® MS-D3 MFC US	Medium
King® MS-D3 MFD US	Low

EXAMPLES:

For King® MS-D3 US with a level 3 dosage of accelerator, with micro-synthetic fibers and gradation No. 2, the name of the product would be: **King® MS-D3 X3 SY G2 US**

▪ For King® MS-D3 ST US with a high dosage of steel fiber, a level 2 dosage of accelerator and a gradation No. 1, the name of the product would be:

King® MS-D3 X2 STA US

▪ For King® MS-D3 MF US with a level 2 dosage of accelerator, a high dosage of macro-synthetic fiber and gradation No. 1, the name of the product would be:

King® MS-D3 X2 MFB US

Product Data Sheet

King® MS-D3 US

July 2026, Version 01.01

020302030200243778

PRODUCT INFORMATION

Packaging	65 lb (29.5 kg) bag 2200 lb (997 kg) bulk bag Products with Macro-Synthetic fibers (MF) or Steel fibers (ST) can only be packaged in bulk bags
------------------	--

Shelf Life	12 months in original, unopened packaging
-------------------	---

Storage Conditions	Store in a dry, covered area, protected from the elements between 40°F - 95°F (5°C - 35°C)
---------------------------	--

Underground Environments

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

TECHNICAL INFORMATION

Compressive Strength

Age	King® MS-D3 X US	King® MS-D3 X2 US	ASTM C116 (Modified)
			King® MS-D3 X3 US
4 hrs	N/A	290 psi (2 MPa)	1015 psi (7 MPa)
8 hrs	1015 psi (7 MPa)	1150 psi (8 MPa)	1500 psi (10 MPa)
12 hrs	1500 psi (10 MPa)	1750 psi (12 MPa)	2030 psi (14 MPa)

Age	King® MS-D3 US	King® MS-D3 X US	King® MS-D3 X2 US	ASTM C1604
				King® MS-D3 X3 US
1 day	3000 psi (21 MPa)	3625 psi (25 MPa)	3625 psi (25 MPa)	3625 psi (25 MPa)
3 days	4350 psi (30 MPa)	4350 psi (30 MPa)	4350 psi (30 MPa)	4350 psi (30 MPa)
7 days	5075 psi (35 MPa)	5075 psi (35 MPa)	5075 psi (35 MPa)	5075 psi (35 MPa)
28 days	6000 psi (42 MPa)	6000 psi (42 MPa)	6000 psi (42 MPa)	6000 psi (42 MPa)

Modulus of Elasticity in Compression

Age	ASTM C496
1 day	3.0 x 10 ⁶ psi (20.8 GPa)
7 days	3.2 x 10 ⁶ psi (22.0 GPa)
28 days	3.7 x 10 ⁶ psi (25.4 GPa)

Flexural Strength

Age	King® MS-D3 US	King® MS-D3 X US	King® MS-D3 X2 US	ASTM C78
				King® MS-D3 X3 US
7 days	940 psi (6.5 MPa)	870 psi (6.0 MPa)	870 psi (6.0 MPa)	870 psi (6.0 MPa)
28 days	1085 psi (7.5 MPa)	1015 psi (7.0 MPa)	1015 psi (7.0 MPa)	1015 psi (7.0 MPa)

Product Data Sheet

King® MS-D3 US

July 2026, Version 01.01

020302030200243778

BUILDING TRUST



	ASTM C78			
	King® MS-D3 ST US & King® MS-D3 MF US			
	28 days			
1160 psi (8.0 MPa)				
Tensile Strength	ASTM C1583			
	7 days			
	320 psi (2.2 MPa)			
28 days				
320 psi (2.3 MPa)				
Shear Strength	ASTM C882 (modified)			
	7 days			
	3060 psi (21.0 MPa)			
28 days				
3625 psi (25.0 MPa)				
Shrinkage	ASTM C157			
	Age	King® MS-D3 US	King® MS-D3 X US	King® MS-D3 X2 US
	King® MS-D3 X3 US			
	28 days			
0.50%				
0.60%				
0.60%				
56 days				
0.58%				
0.65%				
0.65%				
Coefficient of Thermal Expansion	CRD-C39			
	28 days			
4.5 x 10 ⁻⁶ in/in/°F (8.1 x 10 ⁻⁶ cm/cm/°C)				
Freeze-Thaw Stability	ASTM C666			
	King® MS-D3 US	King® MS-D3 X US	King® MS-D3 X2 US	King® MS-D3 X2 US
	95%			
95%				
95%				
88%				
Porosity	ASTM C457			
	Air Content			
	6 ± 2%			
	ASTM C457			
	Maximum Air-Void Spacing Factor			
0.0118 in (300 μm)				
ASTM C642				
Boiled Absorption				
6.0%				
ASTM C642				
Maximum Volume of Permeable Voids				
15.0%				
Salt resistance	ASTM C672			
	King® MS-D3 US	King® MS-D3 X US	King® MS-D3 X2 US	King® MS-D3 X2 US
	0.02 lb/ft²			
	0.035 lb/ft²			
0.04 lb/ft²				
0.24 lb/ft²				
(0.10 kg/m²)				
(0.17 kg/m²)				
(0.20 kg/m²)				
(1.2 kg/m²)				
Splitting tensile strength	ASTM C496			
	Age			
	7 days			
640 psi (4.4 MPa)				
28 days				
650 psi (4.6 MPa)				
Flexural toughness	Macrosynthetic Fiber			
	King® MS-D3 MFB US Toughness as a function of flexure			

	ASTM C1550			
Peak Applied Load	10 mm	20 mm	30 mm	40 mm
5620 lbf (25 kN)	> 150 J	> 250 J	> 350 J	> 450 J

Macrosynthetic Fiber

King® MS-D3 MFC US Toughness as a function of flexure

	ASTM C1550			
Peak Applied Load	10 mm	20 mm	30 mm	40 mm
4495 lbf (20 kN)	> 80 J	> 125 J	> 250 J	> 350 J

Macrosynthetic Fiber

King® MS-D3 MFD US Toughness as a function of flexure

	ASTM C1550			
Peak Applied Load	10 mm	20 mm	30 mm	40 mm
5620 lbf (25 kN)	> 50 J	> 80 J	> 150 J	> 275 J

Steel Fiber

King® MS-D3 STA US Toughness as a function of flexure

	ASTM C1550			
Peak Applied Load	10 mm	20 mm	30 mm	40 mm
8992 lbf (40 kN)	> 215 J	> 350 J	> 450 J	> 500 J

Steel Fiber

King® MS-D3 STB US Toughness as a function of flexure

	ASTM C1550			
Peak Applied Load	10 mm	20 mm	30 mm	40 mm
5620 lbf (25 kN)	> 190 J	> 300 J	> 375 J	> 425 J

Steel Fiber

King® MS-D3 STC US Toughness as a function of flexure

	ASTM C1550			
Peak Applied Load	10 mm	20 mm	30 mm	40 mm
4495 lbf (20 kN)	> 175 J	> 270 J	> 325 J	> 370 J

Steel Fiber

King® MS-D3 STD US Toughness as a function of flexure

	ASTM C1550			
Peak Applied Load	10 mm	20 mm	30 mm	40 mm
4495 lbf (20 kN)	> 80 J	> 125 J	> 150 J	> 175 J

Flexural Performance		ASTM C1609	
Dosage	First Peak Strength	F ₁₀₀ ₆₀₀	F ₁₀₀ ₁₅₀
King® MS-D3 STA US	906 psi (6.25 MPa)	797 psi (5.50 MPa)	652 psi (4.50 MPa)
King® MS-D3 STB US	797 psi (5.50 MPa)	435 psi (3.00 MPa)	398 psi (2.75 MPa)
King® MS-D3 STC US	652 psi (4.50 MPa)	435 psi (3.00 MPa)	398 psi (2.75 MPa)
King® MS-D3 STD US	580 psi (4.00 MPa)	362 psi (2.50 MPa)	145 psi (1.00 MPa)

Rapid Chloride Permeability

Age	ASTM C1202
28 days	700 Coulombs

APPLICATION INFORMATION

Coverage

Approx. 0.49 ft³ per 65 lb bag (0.013 m³ per 29.5 kg bag)
 Approx. 16.5 ft³ per 2200 lb bulk bag (0.45 m³ per 1000 kg bulk bag)
 * May vary according to projects conditions

Thinner

	King® MS-D3 US	King® MS-D3 X US	King® MS-D3 X2 US	ASTM C1117 King® MS-D3 X3 US
Initial Set	3 hrs	45 min	15 min	3 min
Final Ser	5 hrs	60 min	25 min	5 min

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.

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 accelerator dosages:

Accelerator	X - Level 1
	X2 - Level 2
	X3 - Level 3

Descriptors / Features of fiber dosages:

Steel Fibers	STA - High
	STB - Medium
	STC - Low
	STB - Very Low
Micro-Synthetic Fibers	SY
Macro-Synthetic Fibers	MFB - High
	MFC - Medium
	MFD - Low

Descriptors / Features of other technologies:

Corrosion Inhibitor	CI
Anti-Microbial	AM
Crystalline Waterproofing	CW
10% Silica Fume	SF10
Not Air-Entrained	NE
Gradation	G2

APPLICATION INSTRUCTIONS

EQUIPMENT

Special precautions needed when using predampeners with dry blended powdered accelerated shotcrete. Contact your Sika Technical Representative in for more information.

SUBSTRATE PREPARATION

Temperatures above 40°F (5°C):

▪ **Repair or Rehabilitation:** All surfaces to be in contact with King® MS-D3 US and its variations 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 ¾ inch (20 mm) clearance behind any corroded reinforcing steel. The perimeter of the repair area should be sawcut a minimum of ¾ inch (20 mm). Clean the area to be repaired with potable water, leaving the concrete saturated but free of standing water (SSD).

▪ **Rock Surfaces:** All surfaces to be in contact with King® MS-D3 US and its variations 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).

Temperatures below 40°F (5°C):

Use King® MS-D3 (X2 / X2 MF / X2 ST) US
or King® MS-D3 (X3 / X3 MF / X3 ST) US

▪ **Repair or Rehabilitation:** All surfaces to be in contact with King® MS-D3 X2 US or King® MS-D3 X3 US must be free from 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 1 inch (25 mm) clearance behind the reinforcing steel. The perimeter of the repair area should be sawcut a minimum of ¾ inch (20 mm). To avoid freezing of the interface between the shotcrete and the parent concrete, do not pre-wet the receiving surface. Pneumatically remove any free standing or other fine particles that may interfere with the bond between King® MS-D3 X2 US or King® MS-D3 X3 US and the substrate. Do not apply King® MS-D3 X2 US or King® MS-D3 X3 US when ambient temperature is below or is expected to fall below 20°F (-5°C) within 6 hours following the application of shotcrete. Do not apply when temperature of receiving surface is below 20°F (-5°C). Material temperature should be maintained above 50°F (10°C) at the time of application. Mixing water temperature should be maintained between 70°F (20°C) and 80°F (25°C).

▪ **Rock Surfaces:** All surfaces to be in contact with King® MS-D3 X2 US or King® MS-D3 X3 US 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. To avoid freezing of the interface between the shotcrete and the parent concrete, do not pre-wet the receiving surface. Pneumatically remove any free standing or other fine particles that may interfere with the bond between King® MS-D3 X2 US or King® MS-D3 X3 US and the substrate.

APPLICATION

Apply 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-D3 US, King® MS-D3 X US, King® MS-D3 MF US, King® MS-D3 X MF US, King® MS-D3 ST US, and King® MS-D3 X ST US should not be applied when ambient, substrate, and material temperatures are below 40°F (5°C) or above 95°F (35°C)
▪ King® MS-D3 X2 US and King® MS-D3 X3 US should not be applied when ambient and substrate temperatures are below 20°F (-5°C) or when ambient, substrate and material temperatures are above 95°F (35°C)

- For adverse temperatures, follow ACI recommendations for Cold / Hot Weather Concreting
- When using King® MS-D3 MF US or King® MS-D3 ST US, the recommended minimum inside diameter of shotcrete hoses should be 2 inch (50 mm)
- Contact your Sika Technical Representative for more information

CURING TREATMENT

Curing is essential to optimize physical properties of the shotcrete and minimize plastic shrinkage. Product 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.

Underground environments

Good curing conditions are beneficial to optimizing physical properties. 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".

For temperatures below 40 °F (5 °C):

A resin based liquid membrane curing compound approved for use in cold weather conditions should be applied immediately after shotcrete reaches final set be applied immediately after shotcrete reaches final set.

CLEANING OF TOOLS

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

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 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.

SIKA grants this product for one year from date of



Product Data Sheet

King® MS-D3 US

July 2026, Version 01.01

020302030200243778

installation to be free from manufacturing defects and to meet the technical properties on the current Product Data Sheet if used as directed within the product's shelf life. User determines suitability of product for intended use and assumes all risks. User's and/or buyer's sole remedy shall be limited to the purchase price or replacement of this product exclusive of any labor costs. **NO OTHER WARRANTIES EXPRESS OR IMPLIED SHALL APPLY INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. SIKA SHALL NOT BE LIABLE UNDER ANY LEGAL THEORY FOR SPECIAL OR CONSEQUENTIAL DAMAGES. SIKA SHALL NOT BE RESPONSIBLE FOR THE USE OF THIS PRODUCT IN A MANNER TO INFRINGE ON ANY PATENT OR ANY OTHER INTELLECTUAL PROPERTY RIGHTS HELD BY OTHERS.**

Sale of SIKA products are subject to the Terms and Conditions of Sale which are available at <https://usa.sika.com/en/about-us/terms-conditions-of-sale.html> or by calling 1-800-933-7452.

KingMS-D3US-en-US-(07-2026)-1-1.pdf

