

PRODUCT DATA SHEET

Sikacrete[®]-733 W 3D

1-PART MICRO-CONCRETE WITH LONGER OPEN TIME FOR 3D PRINTING

DESCRIPTION

Sikacrete[®]-733 W 3D is a 1-part fiber containing, micro-concrete, with longer interlayer open time and reduced CO₂ footprint for use with 3D concrete printing robot or gantry printers.

USES

For precision concrete printing of 3D objects and components for the following:

- Buildings
- Civil Engineering structures
- Molds and forms
- Art, craft, and visual displays
- Interior and exterior use

FEATURES

- Contains recycled waste material, to reduce the carbon footprint
- Longer open time, for extended interlayer bonding period
- Fast hardening development after setting, for stacking and building up layers
- Contains fibers, to control plastic shrinkage cracks
- Fast absorbing, suitable for continuous and static mixers
- Easy to use, just mix with water
- Adjustable consistency, for temperature variations
- Thixotropic consistency, to maintain shape after extrusion
- Lower viscosity, for lower pumping pressure
- Low shrinkage, to reduce potential for cracking
- Optimised grading, for smooth appearance
- Reduced dust emissions

PRODUCT INFORMATION

Composition	Portland cement and cement replacement from recycled waste material, selected fillers and aggregates, micro fibers and special additives.
Packaging	25 kg and 1500 kg bag
Appearance and colour	White powder
Shelf life	6 months from date of production
Storage conditions	The Product must be stored in original, unopened and undamaged sealed packaging in dry conditions. For consistent printing quality it is recommended to store the material at temperatures between 10 °C and 30 °C. Always refer to packaging.
Maximum grain size	~3 mm

TECHNICAL INFORMATION

Compressive strength	<u>1 day</u>	<u>~10 MPa</u>	(EN 196-1)
	<u>7 days</u>	<u>~25 MPa</u>	
	<u>28 days</u>	<u>~35 MPa</u>	
	*Tested at 25°C with Water : Powder ratio of 0.16		
Modulus of elasticity in compression	<u>28 days</u>	<u>~30 GPa</u>	(ASTM C469)
	*Tested at 25°C with Water : Powder ratio of 0.16		
Flexural-strength	<u>28 days</u>	<u>~6 MPa</u>	(EN 196-1)
	*Tested at 25°C with Water : Powder ratio of 0.16		

APPLICATION INFORMATION

Fresh mortar density	~2.1 kg/l	
Yield	~14.7 L per 25 kg bag. This figure is theoretical and does not allow for any lost material during the mixing or pumping process, additional material due to surface porosity, surface profile, variations in level or wastage etc.	
Layer thickness	~ 6 – 20 mm Layer thicknesses are subject to the equipment and printing procedure and it is recommended to make a test to check suitability	
Material temperature	Minimum	<u>10°C</u>
	Maximum	<u>25°C</u>
The material and water temperature plays a significant role in the printing process. Having a constant, or reducing significant variations during application will help maintain a consistent quality of printing.		
Ambient air temperature	Minimum	<u>5°C</u>
	Maximum	<u>30°C</u>
Mixing ratio	15 – 17% of water by weight of powder	
Pot Life	<u>10 °C</u>	<u>~80 min</u>
	<u>20 °C</u>	<u>~60 min</u>
	<u>30 °C</u>	<u>~40 min</u>
Pot life is based on the temperature of the material after extrusion and indicates when the material is starting to stiffen. Agitating the material during this time will prolong the pot life.		

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.

Variation in performance values

Performance values depend on the type of equipment and method of printing and may differ from the declared values. For structural designs printed material characteristics must be verified from the printed element.

For further assistance, contact Sika Technical Services

LIMITATIONS OF USE

- 3D concrete printing is a manufacturing process using mixing, pumping and robotic placement to apply the printed concrete. All these factors play a significant role in achieving optimal results of the finished concrete component and therefore pre-trials and tests must be carried out before final manufacturing

of the finished components.

- In the event of blockages, rinse equipment and pump lines immediately with clean water.
- Sika is not responsible for deviated performances due to external circumstances beyond our control.
- Continuously monitor the pot life of the mixed material.
- Do not allow mixed material to stand in warm temperatures.
- Keep pump lines wetted and cool.
- Use warm water at low temperatures and cold water at high temperatures to maintain application performance.
- Condensation due to certain curing methods and curing agents may cause some discoloration to the surface appearance.

ECOLOGY, HEALTH AND 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

MIXING

Static Mixers (Small volume quantities)

1. Mix with an electric single or double paddle mixer (<500 rpm) or using a forced action mixer capable of mixing 2 to 3 bags at a time.
2. Add the recommended amount of clean water in a suitable mixing container.
3. Stir slowly, add the powder to the water and mix thoroughly for a minimum of 2 minutes. Check the corners of the mixer for no dry powder. Add more water during the mixing time if necessary to the maximum specified amount to achieve a smooth consistent homogeneous mix.
4. Stir gently if required. Then place material into the pumping equipment.

Continuous Mixer (High volume quantities)

The mixing ratio shall be determined using a pan test heating method or microwave technique (according to Austrian Standard) to determine the equivalent flowrate in L/hour on the equipment.

A typical printing consistency is approximately 130 mm in a spread-flow test according to EN 13395-1. The vertical print speed must be < 1.2 cm/min.

<u>Printing height</u>	<u>Minimum layer circle time</u>
0.5 cm	25 sec
1.0 cm	50 sec
2.0 cm	100 sec

Printing at angles depends on several factors including temperatures and mixing ratio. Do not print Sikacrete®-733 W 3D for designs with an offset center of gravity due to the long open time of the material.

For further assistance, contact your local Sika Technical Services Department

APPLICATION

3D concrete printing is a manufacturing process using mixing, pumping and robotic placement to apply the printed concrete. All these factors play a significant role in achieving optimal results of the finished concrete component and therefore pre-trials and tests must be carried out before final manufacturing of the finished components.

- Use SikaPump® Start-1 to prime pump lines
- In the event of blockages, rinse equipment and pump lines immediately with clean water
- Continuously monitor the pot life of the mixed material
- Do not allow mixed material to stand in warm temperatures
- Keep pump lines wetted and cool
- Use warm water at low temperatures and cold water at high temperatures to maintain application performance
- For operational maintenance, refer to the equipment instructions

CURING TREATMENT

Discolouration of printed objects

Note: Condensation due to certain curing methods and curing agents may cause some discolouration to the surface appearance.

1. Carry out pre-trials with the chosen curing method or agent.
2. Cure the Product in the prescribed ambient conditions with a minimum of 40 % relative humidity to prevent too early drying of printed objects.
3. Do not cure newly printed objects outside in the direct sun or windy conditions.
4. The standard rules of good concreting practice, concerning production, and placing must be followed.

CLEANING OF EQUIPMENT

Clean all tools and application equipment with water immediately after use. Hardened material 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.

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ISO 9001, 14001, 45001 – SGS
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- Master Builders Solutions LLC

All products are supplied under a management system certified to conform to the requirements of the quality, environmental and occupational health & safety standards ISO 9001, ISO 14001 and ISO 45001.



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