

## PRODUCT DATA SHEET

# SikaGrout<sup>®</sup>-9650

(formerly MFlow 9650)

Bulk supplied, high strength grout with applied nanotechnology for grouting offshore wind turbine installations

### PRODUCT DESCRIPTION

SikaGrout<sup>®</sup>-9650 is a shrinkage compensated grout which when mixed with water, produces a homogeneous, flowable and pumpable grout. Latest best binder packing models and applied cementitious nanotechnology produces a grout with superior technical performance, and exceptional rheological properties.

### USES

SikaGrout<sup>®</sup>-9650 has been especially formulated for large scale, pump applications.

- For use as high strength grout in offshore foundations like monopiles using bolted connections
- For rock socket structural grouting in offshore applications, or similar.
- Grouting of structural and non-structural parts of offshore wind turbine installations, e.g as skirt backfill
- Grouting under very harsh conditions, e.g. at temperatures as low as 0°C.

Contact the Technical Department of your local Sika office regarding any application required not mentioned here.

### CHARACTERISTICS / ADVANTAGES

- Compressive strength class C60/75, even at cold temperatures.
- Available as silo material.
- Can be applied in the shortest weather windows.
- Excellent strength gain.
- No segregation or bleeding to ensure consistent final physical performance.
- For applications in a wide temperature range.
- Excellent flow and pumping properties reduce installation times and costs.
- Very fast grout installation: limited to no interference with the critical path of the installation vessel.
- Pumpable through 2" grout lines.
- Volume stable.

### APPROVALS / STANDARDS

Certified by Det Norske Veritas (DNV)

### PRODUCT INFORMATION

<b>Packaging</b>	SikaGrout <sup>®</sup> -9650 is supplied by bulk transport and is stored in special job-site silos or containers. Upon request, the material may be available as well in special 1000 kg big bags.
<b>Shelf Life</b>	6 months from date of production. First-in / First-out principle shall however be used.
<b>Storage Conditions</b>	Product must be stored in closed silos or warehouse under dry conditions.
<b>Density</b>	Approximately 2.25 gr/cm <sup>3</sup> (DIN 18555-2)

## TECHNICAL INFORMATION

<b>Compressive Strength</b>	<b>Typical values - Additional test results</b>			(EN 12390-3)	
	<b>N/mm<sup>2</sup></b>	<b>5 °C</b>	<b>10 °C</b>		<b>20 °C</b>
	8 hours				≥ 5
	12 hours		≥ 5		≥ 30
	1 day	≥ 30	≥ 40		≥ 65
	7 days		≥ 70		≥ 75
	28 days	≥ 75	≥ 80	≥ 90	
	<b>Concrete strength class</b>			(EN 206)	
	C60/75				
	<b>Determined as part of DNV GL verification</b>			(EN 12390-3)	
	<b>N/mm<sup>2</sup></b>	<b>20 °C</b>	<b>-1 °C</b>		
	1 day	76.5	8.6		
	3 days	83.2	62.3		
7 days	91.6	81.4			
28 days	105.7	88.5			
90 days	121.3	92.9			
<b>Characteristic compressive strengths (Determined as part of DNV GL verification):</b>			(28 days)		
<b>20 °C</b>	<b>-1 °C</b>				
100.5	83.3				
<b>Exposure classes</b>			(EN 206-1, DIN 1045-2)		
XO, XC4, XD3, XS2, XS3, XF3, XA2, WA					
<b>Modulus of Elasticity in Compression</b>	<b>Determined as part of DNV GL verification:</b>			(EN 12390-13)	
	28 days	35.6 GPa			
	<b>Poisson's ratio (Determined as part of DNV GL verification):</b>			(ASTM C469)	
0.19					
<b>Flexural Strength</b>	<b>Determined as part of DNV GL verification:</b>			(EN 12390-3)	
	<b>N/mm<sup>2</sup></b>	<b>20 °C</b>	<b>-1 °C</b>		
	28 days	15.6	14.7		
<b>Shrinkage</b>	<b>Restrained shrinkage (Determined as part of DNV GL verification):</b>			(ASTM C1581)	
	<b>Age</b>	<b>mm/m</b>			
	28 days	0.035			
<b>Bleeding</b>	No bleeding				
	<b>Sedimentation stability:</b>				
	No sedimentation (in accordance of DAFstb Self compacting concrete, section N.1.2.)				

## APPLICATION INFORMATION

<b>Consumption</b>	1000 kg powder will yield approximately 485 to 530 litre of mixed grout.	
<b>Layer Thickness</b>	50 - 1000 mm	
<b>Product Temperature</b>	0 °C min. / +30 °C max.	
<b>Ambient Air Temperature</b>	0 °C min. / +30 °C max.	
<b>Mixing Ratio</b>	140 (± 5) litres / 1000 kg powder	
<b>Substrate Temperature</b>	0 °C min. / +30 °C max.	
<b>Pot Life</b>	20°C	10°C
	≥ 180 minutes	≥ 240 minutes

## VALUE BASE

All technical data stated in this Product Data Sheet are based on laboratory tests. Actual measured data may vary due to circumstances beyond our control.

## FURTHER DOCUMENTS

Sika Method Statement: SikaGrout®-9650

## 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

### NOTES ON INSTALLATION

- Sands or other products that could affect the products properties must not be added.
- SikaGrout®-9650 which will be exposed to strong drying conditions, e.g. mortar which is directly exposed to heavy wind and/or direct sunlight, should be protected using appropriate curing agents.
- As the powder may densify over time, especially when the goods are stored on the vessel in the off-shore silos and exposed to many vibrations, the First-in / First-out principle is key to a successful grouting job.

### EQUIPMENT

Mixer and pump type	Continuous mixing and pumping system
<b>Defined by DNV GL:</b>	
Minimum diameter of grout lines	$\geq 2$ inch
Grout annulus	$50 \leq t \leq 1000$
Pumping length through 2" flexible hose	$L \leq 225$ m
Pumping elevated head with 2" flexible hose	$H \leq 25$ m

### CLEANING OF TOOLS

Tools and spillages can be cleaned with water while SikaGrout®-9650 is still uncured. Once hardened, the material can only be removed mechanically.

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## LOCAL RESTRICTIONS

Please note that as a result of specific local regulations the performance of this product may vary from country to country. Please consult the local Product Data Sheet for the exact description of the application fields.

## 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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