

# MASTERFLOW<sup>®</sup> 9500

Ultra high strength, high modulus, cement based grout with applied nanotechnology for grouting offshore wind turbine installations

## Product description

MASTERFLOW 9500 is a shrinkage compensated, cement based grout which when mixed with water, produces a homogeneous, flowable and pumpable grout with exceptionally high early and final strength and modulus. Latest best binder packing models and applied cementitious nanotechnology produces a grout with superior technical performance, exceptional rheological properties, and, uniquely, extended open times.



"Statement of compliance"  
2011-0943\_12NE7QE-7  
By Det Norske Veritas

## Fields of application

MASTERFLOW 9500 has been especially formulated for large scale, pump applications.

- Grouting of wind turbine installations, e.g. foundations, mono-piles, transition pieces of wind towers, where very good fatigue resistance is required
- Grouting under very harsh conditions, e.g. off-shore applications or below water grouting, at temperatures as low as 0°C.
- All void filling from 25mm to 200mm thickness where high strength, high modulus is important (in other applications or where void dimensions of 10 - 25 mm are to be filled contact our technical department).

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

## Features and benefits

- "Statement of Compliance" by Det Norske Veritas (DNV)
- Ultra high mean compressive strength  $\geq 135$ MPa.
- Ultra high modulus for exceptional stiffening properties.
- Very good fatigue resistance.
- Quick return to service and removal of temporary supports due to high early strength build-up.  $\geq 60$  MPa @ 24hrs at 20°C
- Excellent strength gain at low temperatures @ 0°C at 24hrs

- No segregation or bleeding to ensure consistent final physical performance and to prevent pump blockages
- No wash-out during below water grouting
- Pump able over long distances and large heights.
- Extended pot life of  $\geq 4$  hours
- Specially graded sands and exceptional flow and low friction increases pump output, reduces installation times and costs as well as reducing pump pressures and wear
- Dust reduced for ease of handling and safety of workers
- Cement based.
- Low chromate.
- Available in special, watertight big bags for large scale application.
- Meets the requirements of EN1504-6 for anchoring reinforcement bars.

## Application method

MASTERFLOW 9500 has been especially formulated for use in specific applications. As such MASTERFLOW 9500 should be installed by experienced fully trained contractors.

Full application procedures are available on request.

## Cleaning of tools

Tools and spillages can be cleaned with water while MASTERFLOW 9500 is still uncured.

Once hardened, the material can only be removed mechanically.

## Consumption

Approximately 2.2 kg powder is needed for 1 litre of mixed mortar. Or, 1000 kg powder will yield approximately 450 litre of mixed grout.

## Packaging

MASTERFLOW 9500 is supplied in special watertight 1000 kg big bags.

## Storage

Store in cool and dry conditions. Shelf life under these conditions is 12 months in unopened original big bags.

## Notes

- Sands or other products that could affect the products properties must not be added.
- MASTERFLOW 9500 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 MASTERKURE® curing agents.
- Independent test report is available on request.

## DNV – Statement of Compliance

The verification programme for Masterflow 9500, which is the basis for issuing the Statement of Compliance by DNV, comprised the following main activities:

- Validation and acceptance of test methodology, procedures and extent of testing
- Evaluation and acceptance of the external, independent testing laboratory for testing properties of Masterflow 9500
- Witnessing and acceptance of the laboratory tests, and the reporting thereof
- Evaluation and witnessing of a mock-up and large scale pumping trials, and the acceptance of the reporting thereof
- Audit, evaluation and acceptance of grout manufacturing equipment and facilities
- Audit, evaluation and acceptance of BASF internal laboratory with respect to production quality control of Masterflow 9500
- Evaluation and acceptance of results of the tests and trials carried out to demonstrate the materials suitability for use in offshore applications, such as grouted connections of monopile foundations for offshore wind turbines or similar.

The verification work related to the above mentioned activities are carried out in accordance with applicable EN-standards and DNV-OS-C502 (Offshore concrete structures)

## Health and safety

Usual preventive measures for the handling of chemical products should be observed when using this product, for example do not eat or drink while working and wash hands when taking a break or when the job is completed.

MASTERFLOW 9500 contains cement. Avoid contact with eyes and prolonged contact with skin. In case of contact with eyes, immediately flush with plenty of water for at least 15 minutes. Call a physician. In case of contact with skin, wash skin thoroughly.

Specific safety information referring to the handling and transport of this product can be found in the Material Safety Data Sheet.

Disposal of product should be carried out according to the local legislation in force. Responsibility for this lies with the final owner of the product.

## Safety phrases

Symbol: Xi Irritant

Contains: Cement, Portland, chemicals.

After adding water the mixture is alkaline. Contains less than 2 mg water soluble chromate per kg of cement.

R37/38 Irritating to respiratory system and skin.

R41 Risk of serious damage to eyes.

S22 Do not inhale dust

S24 Avoid contact with skin.

S26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

S37/39 Wear suitable gloves and eye/face protection.

MAL-kode (1993): 00-4

PR-no.: 2093192

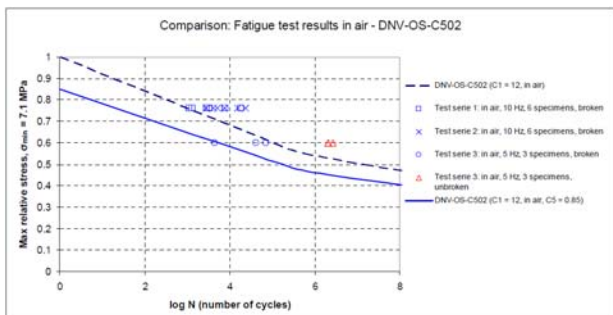
## Technical data

Property	Unit	Values			
Density of mixture (DIN18555-2)	g/cm <sup>3</sup>	Approx. 2.4			
Mixing water demand	litres	Approx. 75 / 1000 kg powder (min. 70 to max. 80)			
Pot life of mixed material	hours	≥ 4			
Setting time	hours	≤ 10			
Air content (EN 1015-7)	%	≤ 4			
Application temperature (substrate and material):	°C	From 0 to +35			
Minimum total application thickness	mm	25 (for thicknesses of 10 – 25 mm contact our technical department)			
Maximum total application thickness		200 (DNV has verified thickness up to 150 mm; for layer thickness up to 200 mm contact our technical department)			
<b>Mechanical properties determined as part of DNV verification (☛):</b>					
☛ Autogenous shrinkage - after 42 days - after 365 days	%	- 0.0093 + 0.0006			
☛ Compressive strength (mean of 3 results) (75 mm cubes – EN 12390-3) - after 1 day - after 3 days - after 7 days - after 28 days - after 4 months	N/mm <sup>2</sup>	20°C	12°C	5°C	
		90 110 125 140 160	40 105 125	10 75 100	
☛ Flexural strength (mean of 3 results) (40 x 40 x 160 mm prisms – EN 196-1) - after 28 days	N/mm <sup>2</sup>	20°C			
		18			
☛ Tensile splitting strength (mean of 3 results) (ø 100 x 200 mm cylinders – EN 12390-6) - after 28 days	N/mm <sup>2</sup>	20°C			
		8			
☛ Static modulus of elasticity (mean of 3 results) (ø 100 x 200 mm cylinders – EN 13412) - after 28 days	GPa	20°C			
		50			
<b>Characteristic strength:</b>					
Compressive strength (15 x 30 cm cylinders) - after 28 days	MPa	X <sub>k(10)</sub> = 116			
<b>Typical values – additional test results</b>					
Compressive strength (75 mm cubes – EN 12390-3) - after 1 day - after 2 days - after 3 days - after 7 days - after 28 days	N/mm <sup>2</sup>	20°C	10°C	5°C	2°C
		≥ 60 ≥ 80 ≥ 95 ≥ 120 ≥ 135	≥ 25 ≥ 70 ≥ 85 ≥ 120	≥ 8 ≥ 50 ≥ 65 ≥ 95	≥ 3 ≥ 25 ≥ 45 ≥ 60
Flexural strength (40 x 40 x 160 mm prisms – EN 12190) - after 28 days	N/mm <sup>2</sup>	20°C		2°C	
		≥ 15		≥ 12	
Capillary water absorption (EN 13057)	kg / m <sup>2</sup> .h <sup>-0.5</sup>	≤ 0.05			
Adhesion strength to concrete (EN 1542)	N/mm <sup>2</sup>	≥ 2			
Adhesion strength after freeze/thaw (EN 13687-1)	N/mm <sup>2</sup>	≥ 2			
Drying shrinkage (EN 12617-4)	mm/m	≤ 0.3			
Crack resistance - Coutinho-ring		no cracking after 180 days			
Pull-out strength of rebar (EN 1881) displacement at 75kN load	mm	≤ 0.6			
Data are given for conditions of 20°C and 65% R.H. unless otherwise stated. The technical data provided do not represent guaranteed minima.					

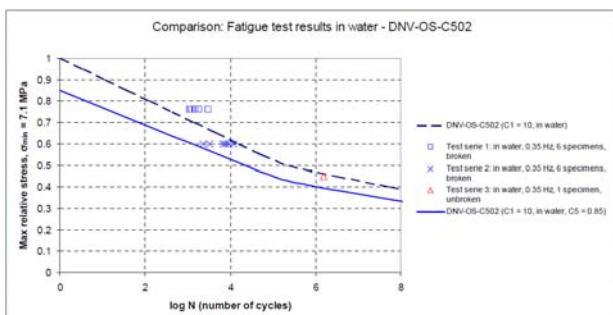
**Fatigue resistance** as part of DNV verification

Individual values for MASTERFLOW 9500 exposed to water and air, are represented in the graph below in view of DNV-OS-C502.

More detailed results are available on request.




Fatigue resistance measured in air at 5 / 10 Hz



Fatigue resistance measured in water at 0.35 Hz

**EN1504, part 6 certification**

 1073	
<b>BASF A/S</b> <b>Hallandsvej 1</b> <b>DK-6230 Rødékro</b>  13 DK0020/01  <b>EN 1504-6</b>  Anchoring product EN 1504-6 Principle 4.2	
Pull- out strength	Displacement ≤ 0,6mm at load of 75 kN
Chloride ion content	≤ 0,05 %
Reaction to fire	Class A1
Dangerous substances	Comply with 5.3 (EN 1504-6)

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**NOTE:**

Similar to all the other recommendations and technical information, this technical data sheet serves only as a description of the product characteristics, mode of use and applications. The data and information given are based on our technical knowledge obtained in the bibliography, laboratory tests and in practice. The data on consumption and dosage contained in this data sheet are based on our own experience and are therefore subject to variations due to different work conditions. Real consumption and dosage should be determined on the job by means of prior tests and are the liability of the client. Our Technical Service is at your disposal for any additional advice.

BASF Construction Chemicals reserves the right to modify the composition of the products provided these continue to comply with the characteristics described in the data sheet. Other applications of the product not covered by those indicated shall not be our liability. In the case of defects in the manufacturing quality of our products we provide a guarantee, any additional claims being exempt and our liability being only to return the value of the goods supplied. The possible reservations with respect to patents or third party rights should be noted.

Edition 07/2013

The present data sheet becomes null and void on issuance of a new edition.