

MasterFlow[®] 928 (Formerly known as Masterflow 928M)

High strength, non-shrink cementitious grout

DESCRIPTION OF PRODUCT

MasterFlow 928 is a ready-to-use product in powder form, which requires only the on-site addition of water to produce a non-shrink grout of predictable performance.

APPLICATIONS

MasterFlow 928 is formulated for use at any consistency, from fluid to damp-pack, and may be used with confidence for bedding, grouting and precision bearing operations such as:

- Gas or steam turbines
- Generators
- Presses
- Crane rails
- Milling machines
- Pre-cast elements
- Anchor bolts

ADVANTAGES

- Non-shrink
- Adjustable consistency
- Proven and predictable performance
- Excellent workability retention, even at high ambient temperatures
- High bond strength to steel and concrete
- Early strength development, even at fluid consistency
- Good fatigue and impact resistance
- Micro silica content enhances strength and durability
- Impermeable

PACKAGING

MasterFlow 928 is supplied in 30kg moisture-resistant bags.

STANDARDS

MasterFlow 928 is approved by the Water Research Council Complies with CRD-C 621 ASTM C1107 – Grade B

APPLICATION PROCEDURE PREPARATION:

The surface onto which the grout is to be applied should be scabbled to remove laitance and expose aggregate. Do not use bush hammers or similar preparation equipment that can crush the

aggregate but leave it in place. The surface must be free of oil, dust, dirt, paint, curing compounds, etc. Soak area to be grouted with water for 24 hours prior to grouting to minimise localised absorption and to assist in the free flow of the grout. Surfaces should be damp but free of standing water.

Particular attention should be paid to bolt holes to ensure that these are water-free. Use oil-free compressed air to blow out bolt holes and pockets as necessary.

Base plate and anchor bolts must be clean and free of oil, grease and paint etc. Set and align equipment. If shims are to be removed after the grout has set lightly grease them for easy removal.

Ensure formwork is secure and watertight to prevent movement and leaking during the placing and curing of the grout. The area should be free of excessive vibration. Shut down adjacent machinery until the grout has hardened.

In hot weather, base plates and foundations must be shaded from direct sunlight. Bags of grout should be stored in the shade prior to use.

In cold weather, the temperature of base plates and foundations should be raised to >10°C.

MIXING:

In hot weather, use cool water to bring the mixed grout temperature to <30°C.

In cold weather, use warm water to raise the mixed grout temperature to >10°C.

Damp down the inside of the grout mixer with water prior to mixing the initial batch of **MasterFlow 928**. Ensure the mixer is damp but free of standing water. Add the pre-measured quantity of water. Slowly add the **MasterFlow 928**, mixing continuously. Mix for at least five minutes until a smooth, uniform, lump-free consistency is achieved.

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PLACING:

Lengths of metal strapping laid in the formwork prior to placing may be necessary, to assist grout flow over large areas and in compacting and eliminating air pockets. Pour the grout continuously. Maintain a constant hydrostatic head, preferably of at least 15cm. On the side where the grout has been poured, allow 10 cm clearance between the side of the form and the base plate of the machine.

On the opposite side, allow 5-10cm clearance between the formwork and the base plate.

MASTERFLOW grouts are suitable for use with most types of pumping equipment. Immediately after **MasterFlow 928** grout is placed, cover all exposed grout with clean damp hessian, and keep moist until grout is firm enough to accept a curing membrane.

Should the grout shoulders require finishing work, this should be carried out prior to application of the curing membrane. We recommend the use of a curing membrane from our **MasterKure** range.

SHOULDERS

Due to differences in temperature between the grout under the base plate, and exposed shoulders that are subject to more rapid temperature changes, de-bonding and / or cracking can occur. Avoid shoulders wherever possible. If shoulders are required they should be firmly anchored with reinforcing to the substrate to prevent de-bonding

TYPICAL WATER REQUIREMENTS:

Application	Consistency	Flow Table *	Flow Cone **	Mix Water ltr/30kg	
				Min	max
Grouting machinery:	Fluid	-	20-30	5.4	6
Grouting machinery:	Flowable	130	-	4.2	4.8
Bedding pre-cast:	Plastic	60	-	3.6	4.2
Filling tie-bar voids:	Dry-pack	-	-	2.4	3

* ASTM C230 / ASTM C827 (determination of consistency - previously referenced in CRD-C 588)

** ASTM C939 (formerly CRD-C 79)

FLOWABLE GROUTING TECHNIQUES

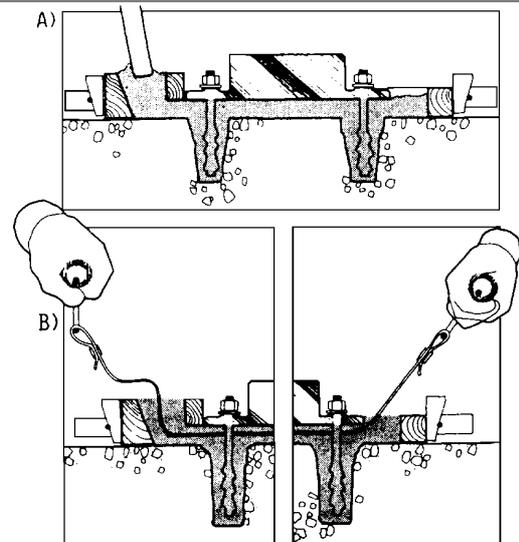


Diagram A illustrates the use of grout surcharge to ensure complete filling under a base. Diagram B shows that straps can be used to aid grout flow under a wider base. A gentle "sawing" action with the strap allows the grout to flow without segregation for greater distances.

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TYPICAL PROPERTIES STRENGTH DEVELOPMENT:

The strength of grout is dependent on many factors, which include mixing, water addition, curing, temperature and humidity. The table below gives typical average strengths of **MasterFlow 928** at 25°C, when mixed with 4 litres (flowable) and 4.5 litres (fluid) per 30kg bag.

Time	Compressive Strength		Flexural Strength N/mm ²
	Flowable N/mm ²	Fluid N/mm ²	
1 day	34	28	7.0
3 days	43	35	8.5
7 days	51	45	10.0
28 days	64	58	11.5

Table 2 shows compressive strength of 100mm cubes and flexural strength of 40 x 40 x 160mm prisms.

BLEED WATER:

No bleed water is apparent (ASTM C-232) at recommended water addition rates.

EXPANSION:

Tests were made following both ASTM Standard C-878, on the use of expansive cements and Corps of Engineers Standard for grout. Tests made as prescribed by ASTM standard C-878 show an expansion value of about 0.05%. Tests in conformity with Corps of Engineers show an expansion value of 0.3% that is lower than the maximum value (0.4%) fixed by the same standards. Moreover, **MasterFlow 928** expansion occurs both in the plastic and in the early-hardened state. However, the expansion action of **MasterFlow 928** exhausts mainly during the first 12 hours of curing.

MODULUS OF ELASTICITY:

The static modulus of elasticity, measured by applying a load corresponding to 1/3 of the strength, is approximately 25,000N/mm² at 7 days and 30,000N/mm² at 28 days.

FATIGUE RESISTANCE:

Cube samples, produced with **MasterFlow 928** and cured for a month, underwent fatigue tests of 2,000,000 pulsing stresses ranging between 20 and 50N/mm² at a frequency of 500 cycles/min. Tested specimens were undamaged and their compressive strength was higher than that of similar specimens that were not subjected to fatigue tests.

BOND TO CONCRETE:

After a 28-day curing period, the **MasterFlow 928** concrete bond was determined (about 6.5N/mm²) by the load applied to cause the disbondment from the contact surface.

BOND TO STEEL:

The bond of **MasterFlow 928** to steel, calculated by applying loads to the bars undergoing pull-out tests and by the grout steel contact surface, is 3N/mm² at 7 days and 4N/mm² at 28 days for plain bars; 20N/mm² at 7 days and 30N/mm² at 28 days for deformed bars.

WORKABILITY:

Tests at the fluid consistency performed according to ASTM C939; show compliance with the requirements of CRD-C 621-82. Flowable and plastic consistency tests were made using ASTM C230 apparatus.

CAPILLARY PORES AND PERMEABILITY:

Even under a pressure of 20atm, water does not penetrate **MasterFlow 928** specimens. The permeability factor is calculated to be therefore lower than 1.10-12cm/sec.

RESISTANCE TO CHEMICAL ATTACK:

Thanks to its water tightness, **MasterFlow 928** grout is protected against environmental aggressive agents in solution.

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RESISTANCE TO HIGH TEMPERATURE:

MasterFlow 928 grouts can withstand high temperature (+400°C) for very long periods without deteriorating substantially

RESISTANCE TO LOW TEMPERATURE:

After 300 freezing and thawing cycles, the modulus of elasticity decreases only 5%. This indicates that **MasterFlow 928** is highly resistant to the disrupting action of frosts

STORAGE

Store out of direct sunlight, clear of the ground, on pallets protected from rainfall. Avoid excessive compaction.

Failure to comply with the recommended storage conditions may result in premature deterioration of the product or packaging. For specific storage advice, consult BASF's Technical Services Department.

SHELF LIFE

Up to 12 months if stored in unopened containers according to manufacturer's instructions.

PRECAUTIONS

The temperature of both the grout and elements coming into contact with the grout should be in the range of >10°C to >35°C. Do not use water in an amount or at a temperature that will produce a consistency more than fluid or cause mixed grout to bleed or segregate.

MasterFlow 928 should be laid at a minimum thickness of 10mm and to a maximum depth of 80mm.

For applications above 80mm, consider the use of MASTERFLOW 980M. For applications below 10mm, consult BASF's Technical Services Department for advice.

To simulate on-site conditions it is necessary to restrain cubes for the first 24 hours immediately after casting.

DO NOT OVERWORK AND AVOID USING MECHANICAL VIBRATION.

UNDER NO CIRCUMSTANCES SHOULD MasterFlow 928 BE RE-TEMPERED BY THE LATER ADDITION OF WATER.

It is essential that a mechanically powered grout mixer is used to obtain the optimum properties.

YIELD/CONSUMPTION

15.2-15.6ltr/30kg bag dependent on water addition rate 65x30kg bags/m³

WARNING

As with other products containing Portland cement, the cementitious material in **MasterFlow 928** grout may cause irritation. Avoid contact with eyes and prolonged irritation. 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.

REQUEST AND REFER TO RECOMMENDED INSTALLATION PROCEDURES FOR **MASTERFLOW** EPOXY GROUTS PRIOR TO USE

NOTE

Field service, where provided, does not constitute supervisory responsibility. For additional information, contact your local BASF representative.

BASF reserves the right to have the true cause of any difficulty determined by accepted test methods.



We create chemistry

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QUALITY STATEMENT

All products manufactured by BASF Egypt, or imported from BASF affiliate companies worldwide, are manufactured to procedures certified to conform to the quality, environment, health & safety management systems described in the ISO 9001:2008, ISO 14001:2004 & OHSAS 18001:2007 standards.

* Properties listed are based on laboratory controlled tests.

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