MasterRoc FLC 100

A powdered admixture for the production of non-shrink, high strength grouts for post-tensioned cables and fixing anchors or bolts in concrete or rock

MATERIAL DESCRIPTION

MasterRoc FLC 100 is a chloride free admixture in powder form. It is added at the rate of 6% by weight of cement to produce a flowable, pumpable, non-shrink, non-segregating, impermeable grout, providing high strength and high bond to steel. The most important property **MasterRoc FLC 100** imparts to grout is the ability to protect cables against corrosion from aggressive agents and stress.

Inadequate protection against corrosion offered by normal grouts is due to:

a) Excessive capillary microporosity due to high water/cement ratio. Using **MasterRoc FLC 100** the water/cement ratio is reduced to 0.3;

b) High macroporosity caused by bleed water collecting under strands and in the upper part of the sheath (Fig. 1). When bleed water evaporates and is reabsorbed by the cement paste, voids form thus providing easy access for corrosive substances. European recommendations on prestressed concrete (FIP) prescribe that the volume of bleed water must not exceed 0.5%. With the use of **MasterRoc FLC 100**, the volume of bleed water is considerably lower: it ranges from 0 to a maximum of 2% depending upon the type of cement used;

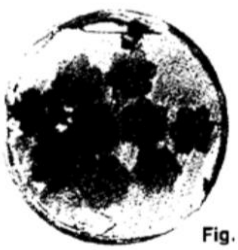
Fig. 1

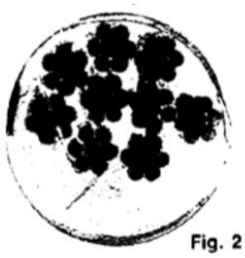
Fig. 2

Fig. 1 Section of sheath of post-tensioned cables filled with a cement paste showing bleeding water.

Fig. 2 Section of sheath of post-tensioned cables filled with a cement paste containing MasterRoc FLC 100 . No bleed water is observed.

c) Shrinkage of cement paste and consequent cracking. With normal cement grouts final shrinkage varies from 2 to 3mm. **MasterRoc FLC 100** allows not only shrinkage to be eliminated completely, but also slight expansion to occur during setting and hardening.

The main properties of grouts containing 6% of **MasterRoc FLC 100**, shown in Tables 1 and 2, can be summed up as follows:

- Very high flowability (as measured by the Flow Cone Test) without bleed water or with a very low amount of it. The pumpability of the grout is assured for at least two hours at + 20°C.
- High mix water retention. This very important property imparts high cohesion to the very flowable mix. Under vacuum, of 600 mm Hg, over 90% of the water is retained by the **MasterRoc FLC 100**. Inadequate water retention would allow water to separate from solid components when the grout is forced through strands of tendons.

COMPRESSIVE STENGTH – EN 196 PT 1

1 day	15 – 26 N/mm²
28 days	50 – 70 N/mm²

- Absence of shrinkage, and expansion ranging from 200 to 800 µm/m depending upon the type of cement used.
- Initial setting time in excess of 3 hours at +30°C.
- High early and ultimate strengths: depending on the type of Portland cement used, strengths can range from 15 to 26 N/mm² at 1 day and from 50 to 70 N/mm² at 28 days. Slightly lower values are obtained if pozzolanic or slag cements are used.
- High bond to steel: after 7 days the value is in excess of 15 N/mm².

Owing to its high flowability, a cement grout made with 6% by weight of **MasterRoc FLC 100** assures the complete filling of sheaths, especially among the strands of cables. This ensures maximum protection of steel against corrosion caused by aggressive agents. As this high flowability is obtained with a low water / cement ratio, the hardened cement paste is dense, compact, impermeable and, therefore, highly durable. On the other hand, the high cohesion and fluidity of the fresh mix, together with freedom from shrinkage, prevents the formation of voids which are often responsible for the penetration of aggressive agents.

Fig. 2 shows a representative section of a sheath filled with a grout containing **MasterRoc FLC 100**

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PACKAGING

MasterRoc FLC 100 is supplied in 500kg bags.

MIXING INSTRUCTIONS

Introduce approximately 25 litres of water per 100kg of cement into the mixer.

Start the mixer and add **MasterRoc FLC 100** (6% by the weight of cement) followed by the cement.

Mix for 3 minutes until a plastic and homogeneous mixture is obtained. Add approximately 7 litres of water and mix for a further 2 minutes until the grout is flowable, without lumps and the flow cone empties in approximately 20 seconds. If a high-speed mixer is used (about 1500 r.p.m.) the total mixing time can be reduced from 5 to 3 minutes. The amount of mixing water necessary by weight of cement and **MasterRoc FLC 100** is approximately 34% but can range from a minimum of 30% to a maximum of 38% depending upon the cement used. Finely ground cement usually requires a higher amount of water. The grout thus obtained can generally be pumped for at least 2 hours, unless the cement used shows a rapid or false set.

YIELD

Approximately 68 litres of highly flowable grout are obtained by mixing 100 kg of cement, 6 kg of **MasterRoc FLC 100** and 34 litres of water.

PRECAUTIONS

The temperature of walls and spaces where the grout is to be pumped should be between +5 and +40°C for optimum results. If the temperature is outside this range, consult your Master Builders Solutions representative.

MasterRoc FLC 100 is a chloride free product, which is especially important in the case of cables. However, chlorides can be introduced into a mix if brackish water or special types of cement are used. Therefore, the use of drinkable water (generally containing less than 40 mg/l of chloride) and chloride-free cements (Cl lower than 0.06% by weight of cement) is recommended. Though all Portland, pozzolanic or slag cements may be employed, the use of Portland cement Type I and, preferably, Type III, is recommended in cold weather.

STORAGE AND SHELF LIFE

Storage:

Store out of direct sunlight, clear of the ground on pallets protected from rainfall. Avoid excessive compaction. Do not use if the bag is damaged or has been opened for more than 1 month.

Shelf life:

12 months from date of manufacture. Failure to comply with the recommended storage conditions may result in premature deterioration of the product or packaging. For specific storage advice consult Master Builders Solutions' Technical Services Department.

SAFETY PRECAUTIONS

As with all chemical products, care should be taken during use and storage to avoid contact with the eyes, mouth, skin and foodstuffs (which can also be tainted with vapour until product fully cured or dried). Treat splashes to eyes and skin immediately. If accidentally ingested, seek immediate medical attention. Keep away from children and animals. Reseal containers after use.

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NOTE

Technical support, where provided, does not constitute supervisory responsibility. For additional information contact your local MB Construction Chemicals Solutions South Africa (Pty) Ltd representative. MB Construction Chemicals Solutions South Africa (Pty) Ltd shall not be liable for technical advice provided.

MB Construction Chemicals Solutions South Africa (Pty) Ltd reserves the right to have the true cause of any difficulty determined by accepted test methods. Undertaking such tests is not, and shall not be deemed to be, an admission of liability or an assumption of any risk, loss, damage or liability.

QUALITY AND RESPONSIBLE CARE

All products originating from MB Construction Chemicals Solutions South Africa (Pty) Ltd are manufactured under a management system independently certified to conform to the requirements of the quality standards ISO 9001, environmental and occupational health and safety standards.

* Properties listed are based on laboratory controlled tests.

TYPICAL EXAMPLES OF PROPERTIES OF CEMENT PASTES CONTAINING 6 OF MASTERROC FLC 100

Type of cement	Water % by weight of cement	Flow-Cone test EN 445		Bleed water EN 445	Expansion at 3 hours	Setting times	
		Initial	30 Mins	(by volume)		Initial	Final
OPC ASTM C-150 Type 1	34.5	15	17	Less than 2%	0-2%	>3 hours	<10 hours

DISCLAIMER

The technical information and application advice given in this MB Construction Chemicals Solutions South Africa (Pty) Ltd publication are based on the present state of our best scientific and practical knowledge. As the information herein is of a general nature, no assumption can be made as to a product's suitability for a particular use or application and no warranty as to its accuracy, reliability or completeness either expressed or implied is given other than those required by law. The user is responsible for checking the suitability of products for their intended use.