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BASF CONSTRUCTION CHEMICALS AUSTRALIA and NEW ZEALAND

APPLICATION GUIDE for “DRY-PACKING” MASTERFLOW® CEMENTITIOUS GROUTS

- Masterflow® 95
- Masterflow® 500
- Economical Construction Grout

IMPORTANT: READ THIS FIRST

BASF Construction Chemicals does not warrant the performance of this product unless the instructions of this document and other related BASF Construction Chemicals documents are adhered to in all respects.



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1. INTRODUCTION

Dry pack is placement of damp but very stiff, non-plastic grout into places by a heavy ramming force from a hard wooden ram struck with a mallet or hammer. It is placed one handful at a time and driven into place. The force of compaction is used to form a dense, compacted grout. Excellent high-early strengths are obtained through the use of less water than required for flowable grouts.

Only Masterflow 95, Masterflow 500 and Economical Construction Grout can be placed in this manner provided area of placement is properly roughed and cleaned; adequate pre-saturation of surrounding concrete is done; the grout is mixed in amounts that can be placed without re-tempering and/or re-mixing; and that continued damp curing is maintained to prevent drying before the cement is essentially hydrated.

ADVANTAGES of DRY-PACKING GROUT:

- Higher Early Strengths of Grout. (Important for emergency repairs).
- Minimum formwork. (Needs only a very strong backboard.)
- Minimum equipment required. (No pumps, extra mixers, wheelbarrows etc.)
- Reduced shrinkage compared to wet sand/cement mixes. (Does not fully overcome shrinkage.)
- Economical for very small scale work, very costly for moderately small to large-scale work

DISADVANTAGES of DRY-PACKING GROUT:

- No assurance that a uniform density grout is obtained or that minimum support under the base plate is being obtained, without lifting and inspecting each plate for defective work.
- Very slow placement of grout. One handful at a time followed by through ramming. Encourages re-tempering of grout that has stiffened before placement.
- Very skilled craftsmen needed.
- No accurate test for mixing adequacy and proper consistency.
- Test specimens difficult to prepare, which may or may not be representative of the grout in place.
- Heavy ramming required for proper compaction may knock plate out of alignment.
- Can only be used under small, flat plates that have a minimum number of anchor bolts and shims.



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2. FOUNDATION PREPARATION

The foundation surface must be free of all laitance and unsound material and thoroughly cleaned and cured. Keeping the surface covered will make the later job of cleaning the surface prior to grouting much easier and less costly.

The grout foundation should be roughened as specified. The concrete surface may be uniformly roughened before it has set by the use of a nail rake in one direction only. Use of a bull float, darby, broom, or wood floor finish, or scratching at random with a garden rake or trowel is NOT recommended.

After the concrete hardens, hand held, pistol grip pneumatic hammers with chisel point heads are recommended for roughening to remove laitance and loose material to ensure a good bond. Use of large paving breakers equipped with bush hammers, spade or chisel bits, are NOT recommended. Where grout will extend horizontally out beyond the edge of the plate or object grouted, the foundation must also be prepared below these areas to help assure bond.

Before setting structural elements or machinery, all of the areas of the foundation, which will be in contact with the grout, including anchor boltholes, must be thoroughly cleaned. Remove any oil, grease, and curing membrane. One method of cleaning a concrete surface is the use of compressed air and water. Continue cleaning until water runs clear.

Foundation surface must be saturated for a minimum time of 24 hours and this should be concluded immediately prior to grouting.

Just before mixing and placing is started, all free" standing" water must be removed from any anchor bolt holes and foundation surfaces over which grout is to be placed. This most often is accomplished with compressed air and/or blotting with dry absorbent rags.

Any rust, oil or grease on the bedplate being grouted must be removed. Air relief holes must be provided where necessary. Eliminate sources of vibration (which can cause settlement and bleeding) until grout hardens.

3. FORMING

Forms for dry packing should be strong, rigidly braced and provide containment on three sides. The placing side should be left open for ramming the grout into place between the foundation and underside of the plate.

Forms should be caulked to prevent leakage. Forming materials, such as wood, which absorb water, should be coated with water resistant oil (form oil), a form release agent (such as Rheofinish FR222), a good curing compound (such as Masterkure 100WB) or plastic coating. These coatings prevent loss of water from the grout and act as bond breakers so that smooth grout surfaces result after form removal and the forms are



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protected for reuse. The points to caulk are the interfaces between the form and rough foundation surface where grout might leak out during its placement or before setting. Vertical joints in the forms should be caulked if large cracks are evident. The use of duct tape applied on the inside of the form, at corners, is useful for this.

4. MIXING GROUT

Dry pack grout should be mixed in small batches to avoid drying out. In addition, do not mix more grout at one time than can be placed in ten minutes. Do not add additional water to maintain the desired consistency. However, lower mixed grout temperatures will extend the working time.

Grout that has been mixed for a long time and has lost workability and reached a consistency that is not placable should be discarded rather than retempered and used.

Consistency of the grout should be checked initially and periodically thereafter to see that it meets specifications. Consistency of dry pack is determined by squeezing it in the palm of the hand. Dry pack should be compactable and barely cohesive.

BASIC PRINCIPLES

- A. Place the mixing water in the mixer first, then add the dry grout rapidly in a steady stream. Do not let large clumps drop in at one time.
- B. The best retarder for non-catalysed grouts is a lower "as mixed" grout temperature. This is usually accomplished through the use of cold or iced mixing water or cool storage of the dry grout material.
- C. BASF grouts are supplied in a ready to use form requiring only the addition of water. Do not add any other dry materials (sand, cement etc).
- D. Do not use grout from damaged bags.
- E. Mix with potable water only.
- F. Do not mix by hand.

SMALL BATCH SIZES

Small batches are those in which one or two bags are mixed at one time with a drill-mixer (eg Festo) and grout stirrer in a 20 to 25-litre pail. Add all the required water to the mixing pail. Slowly and uniformly add the grout into the water over 30 seconds while mixing. Do not "dump" the grout into the mixer. This may cause lumping, which will be hard to break down. Mix for 1-2 minutes at 300-400rpm ensuring the mixing blade is kept below the surface of the grout to prevent air entrapment. Excessive mixing will entrap air, reducing flow and strength.



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5. PLACING GROUT

Dry pack grout should be placed on a non-absorbent sheet near the applicator. The applicator then places one or two handfuls on the foundation at one time and rams it solidly against the back form, or previously placed grout. This operation is repeated until the space is full. Care must be taken to see that each amount is fully compacted before placing more grout, and that bending and misalignment of the plate, or damage to the anchor bolts or shims is avoided. For grouting below plates dry packing is usually limited to 60 – 110mm vertical clearance into unobstructed voids with a horizontal distance not to exceed one metre.

Where test specimens are required, strong metal cube moulds should be used and the grout rammed into the moulds using the mallet and wooden ram in the same manner as that being placed. The top of cubes may require additional ramming to level the top surface and fill corners. A top cover plate should be clamped tight to the mould.

Each cube specimen should be accurately weighted just prior to compression testing and each cube weight shown with the crushing strength. This is extremely important to detect improperly made specimens. Strengths should be directly proportional to weights. This defect of lack of uniform density in test cubes also occurs in the grout under equipment. Good results call for high degree of experienced workmanship and inspection. Where damp pack placement is attempted under wide plates or between closely spaced shims or bolts, it may be very difficult to tell if the grout is getting into the proper places.

6. CURING

All BASF cementitious products require thorough curing in order to achieve their full potential in strength and durability. Premature drying harms grouts not only the strength and durability suffer loss, but more importantly, the chemical action that reduces or eliminates drying shrinkage after hardening. Properly cured, however, these grouts provide continued bearing when normal drying does take place at later age.

Presaturation of concrete foundation prior to grouting is important to curing because the saturated condition prevents loss of water from the fresh grout. Curing is generally accomplished in two steps and these should commence immediately after the grout placement.

Cover exposed, freshly placed grout with soaking wet clean rags as soon after placing as possible. Maintain this wet cover for seven (7) days. After seven days, remove wet rags and trim shoulder or finish as desired. NEVER remove forms or cut back grout below underside of unit grouted BEFORE grout has hardened. Immediately thereafter, liberally apply Masterkure 402, Masterkure 404 or other BASF curing agent on all exposed grouts.



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Applying curing compound by brush is preferred to spraying so as to avoid waste and not spray the agent over the base plate and its supported equipment. Curing compounds are difficult to remove from intricate machinery parts and, if a sprayer is to be used, it may be advisable to recommend covering the top of the base plate and machinery with a temporary tarpaulin or plastic sheeting to protect the equipment.

In a few instances, regardless of the curing method, where exposed grout shoulders extend beyond the bedplate or connected member, or are over several metres in length as in large equipment, there is a probability of some superficial, hairline cracks appearing in the exposed grout perpendicular to the plate or member grouted. Fine hair cracks are of no structural significance and they do not detract from the quality and satisfactory results of the non-shrink, load-bearing grout, if our saturation and curing procedures listed previously are fully carried out.

Curing temperatures are critical if early loading of a base plate or machine is anticipated. For the early loading of grouts, as needed in repairs or fast installation and utilisation of rail systems or machinery, higher temperature curing is very useful.

After placing the grout it should not be permitted to fall below 7°C. When environmental and grout temperatures are low, the final set may be delayed several hours. After final set all grouts of all types should be maintained above 0°C (preferably 4°C) until the grout reaches 28 MPa compressive strength.

During the long curing time required for grouts to reach strength in cold environments, it is vital that the grout does not dry out. Finally, do not remove shims or back off levelling screws until grout has attained sufficient bearing strength, which will depend on site temperatures.

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