

MAKGROUT HS ULTRA

TECHNICAL DATA SHEET

High Flow, High Ultimate Strength, Dual Shrinkage Compensated Class C Precision Cementitious Grout

Makgrout HS Ultra is a highly fluid high ultimate strength shrinkage compensated Class C precision grout based on a blend of Portland cement, high quality graded aggregates and additives, which control expansion whilst the grout is in a plastic and hardened state.

Makgrout HS Ultra is used when it is essential to eliminate shrinkage in the plastic and hardened state when completely filling voids or grouting between a base plate and substrate.

The addition of a controlled amount of clean water produces a flowable shrinkage compensated grout for gap thicknesses from 10mm up to 200mm.

RECOMMENDED USES

- Grouting projects requiring >100 MPa compressive strength
- Heavy duty precision grouting for gaps from 10mm to 200mm where high flow and high ultimate strength is required
- Pre-cast Concrete Sections
- Grouting underneath precast panels and concrete sections
- Filling Anchor bolts
- Suitable for block work in core filling
- High ultimate strength and low permeability ensure the durability of the hardened grout
- Can be dry packed, rammed, troweled, poured, and pumped

- Base plate installation
- Shear key grouting
- Static load grouting
- Bridge bearing pads
- Crane rail sole plates
- Applications subject to high dynamic loads and where continuous vibration may occur

FEATURES AND BENEFITS

- Hydrogen free expansion system compensates for shrinkage and settlement in the plastic state
- Pre-packaged material overcomes potential on-sitemixing variations
- Develops high early strength without the use of chlorides
- Grouting from 10mm to 200mm in a single application
- Maximum aggregate size 2.5mm for pumping
- Excellent initial flow and flow retention
- No metallic iron to cause staining
- Hydrogen-free gaseous expansion
- Chloride free
- Suitable for pumping or pouring
- High ultimate (28 day) strength
- Shrinkage compensated in both plastic and hardened state, Class C
- Good impact and thermal resistance
- Complies with US Corp of Engineers CRDC 621.82A and ASTM C1107-91 for Class C grout
- Australian Made and Australian Owned

APPLICATION INSTRUCTIONS

SURFACE PREPARATION

For maximum bond, surfaces should be abraded or roughened, preferably by mechanical means such as needle gun, grit blasting, grinding. The substrate to be grouted must be clean, sound, and free from dust, oil, grease, curing compounds or any foreign matter that will affect the grout adhesion bond. Bolt holes and anchor points must be clean and free of water.

BASE PLATE

It is essential that this is clean and free from oil, grease, or scale. Air pressure relief holes should be provided to allow venting of any isolated high spots.

FORM WORK

The formwork to be constructed is leak proof and watertight. To achieve this, it is recommended that a suitable sealant such as polyurethane or silicone be used underneath the formwork.

The formwork should allow for gravity flow of grout with a suitable grout head allowing for continuous flow between the base plate and the concrete substrate.

The form work should be coated with form oil or release oil/agent prior to grouting (Consult **Makrete** Technical Department for additional information).

SUBSTRATE PREPARATION

Pre-soak all prepared areas with water for a minimum of 2 hours prior to grouting. This will reduce the porosity of the substrate.

Prior to grouting, any free or excess water must be removed, and all holes must be free from water and no ponding of water is present in areas to be grouted.

If grouting under base plates, it is paramount that bleed holes or venting holes are provided as this will eliminate pressure build up in a confined area and allow for free flow.

MIXING

A forced action mixer is essential. Mixing at low speed with a forced action mixer is essential. Mix for 3 to 5 minutes at slow speed (500/600rpm).

Makgrout HS Ultra is ready to use, simply requiring the addition of water.

Makgrout HS Ultra must be mixed with a mechanical mixer with a high shear helical mixing paddle to create forced action mixing. For smaller quantity mixing, an electric drill with a spiral mixing paddle is suitable. The speed drill should be approx. 500-600 rpm. The selected water content should be accurately measured into the mixing bucket. While mixing, slowly add the total contents of the **Makgrout HS Ultra**, mix continuously for a total of 5 minutes, ensuring a smooth, even consistency is obtained. Always add the powder to the water.

- Always add grout to pre-measured water
- The water level should be accurately gauged
- Do not add additional water as this will lead to segregation and bleeding
- Any grout that is unworkable or has set should be discarded and not to be re-used
- Grout should not be mixed by hand
- Do not use mechanical vibrators to assist flow
- Unrestrained grout must be kept to a minimum
- **Do not mix by hand**

MAKGROUT HS ULTRA MIXING CONSISTENCY

| Required Consistency | Litres of water added per 20kg bag | Yield - Litres of mixed material |
|----------------------|------------------------------------|----------------------------------|
| Stiff | 2.3 – 2.7 | 10.4 |
| Plastic | 2.8 - 3.4 | 10.7 |
| Flowable | 3.5 – 3.7 | 11.0 |

GROUT PLACEMENT

At 20°C place the grout within 20-30 minutes of mixing to gain full benefit of the expansion process.

Makgrout HS Ultra can be placed in thicknesses from 10mm up to 200mm in a single pour when used as an under-plate grout. Where the grouting gap beneath the base plate exceeds the maximum thickness allowed, then the grout can be filled / bulked out with **Makrete Filler M4/M6** to minimise exotherm heat build-up.

Filling/bulking out of the grout should not exceed a ratio of 2:1 grout: aggregate by weight.

Continuous grout flow is essential. Sufficient grout must be prepared before starting. The time taken to pour a batch must be regulated to the time to prepare the next one.

GROUTING TECHNIQUES:

1. Dry Pack/ Stiff Grout-

Ensure sufficient water is present to obtain a stiff/ dry pack consistency. If the grout is too dry, insufficient hydration of the cements will cause low strength gain and inadequate curing.

Using a tamping rod or a suitable tamping tool, apply the grout in the required position tamping to ensure adequate compaction.

2. Gravity flow using header box-

Makgrout HS Ultra can be placed in thicknesses from 10-200mm in a single application.

Mix the grout to a flowable consistency and pour grout from one side to avoid air entrapment.

Ensure a grout head box is used and the grout head is always maintained. This will ensure continuous flow of grout without the possibility of air entrapment.

3. Large volume mixing/pumping -

Mix the grout using a forced action mixer. A

positive displacement pump is the recommended pump for large placement application for continuous pumping **Makrete** recommend Putzknecht S30 or Putzmeister S5 pumps or similar.

For large grout pours ensure the grout is pumped from the base of the formwork, especially for column application an inlet poured should be positioned at the bottom of the column and grout pumped from the base of the column. By pumping or placing from the base of the column this will minimise any air entrapment. Ensure complete void filling.

For base plates pump from one side ensuring an air bleeder hole is available in the formwork or base plate to ensure any build-up of pressure is released from the bleeder hole.

APPLICATIONS – LIMITATIONS

Low temperature working/mixing

When the air or contact surface temperatures are 5°C or below, warm water (30 - 40°C) is recommended to accelerate strength development.

For ambient temperatures below 10°C the formwork should be kept in place for at least 48 -72 hours.

Normal precautions for winter working with cementitious materials should then be adopted. At low temperatures the grout will take longer to cure and reach maximum strength gain.

Unrestrained grout must be kept to a minimum.

High temperature working/mixing

At ambient temperatures above 35°C cool water (below 20°C) should be used for mixing the grout prior to placement.

- At high temperatures the grout will set and cure faster, working time will be reduced.
- Unrestrained area must be kept to a minimum
- Do not add additional water other

than what is specified

- Never apply mixed grout to a dry porous substrate without pre-soaking with water
- Refer to SDS (material safety data sheet) prior to mixing
- Always apply grout in a continuous operation as to avoid air entrapment and ensure grout head is maintained

CURING

On completion of the grouting operation, exposed areas should be thoroughly cured. This should be done using **Makrete** curing membrane. Alternatively, continuous application of water and/or application of wet hessian.

PACKAGING

Makgrout HS Ultra is supplied in 20kg poly lined bags.

SHELF LIFE

Makgrout HS Ultra has a shelf life of 12 months if stored in the original sealed packaging in dry, low humid environments. Do not use if there are any lumps in the product.

CLEAN UP

Makgrout HS Ultra should be removed from tools and equipment with clean water immediately after use. Cured material can only be removed mechanically.

HEALTH AND SAFETY INFORMATION

Avoid contact with skin. Protective gloves and clothing are recommended when mixing or using this product. Please refer to full Safety Data Sheet for this product, which is available from **Makrete** Building Solutions.

TECHNICAL SPECIFICATIONS - PERFORMANCE CHARACTERISTICS

| TEST | STANDARD | TYPICAL PROPERTIES (RESULTS) MPa | | | | |
|--|--------------------------------------|---|---------------------------------|------------------|-------------------------|--------|
| Compressive Strength MPa | AS 1478.2:2005 AS 1012-11 | Consistency | Water Addition | 1 Day | 3 Days | 7 Days |
| | | Stiff | 2.3 - 2.7 | 55 | 70 | 95 |
| | | Plastic | 2.8 - 3.4 | 45 | 65 | 80 |
| | | Flowable | 3.5 - 3.7 | 40 | 60 | 75 |
| Compressive Strength MPa | AS 1478.2:2005 AS 1012-11 | Consistency | Water Addition | 28 Days | 56 Days | |
| | | Stiff | 2.3 - 2.7 | 110 | 115 | |
| | | Plastic | 2.8 - 3.4 | 105 | 110 | |
| | | Flowable | 3.5 - 3.7 | 100 | 105 | |
| Flexural Strength (Modulus of Rupture) | AS 1012.11 - 2000 | 1 Day 7 Days 28 Days | 5.5 MPa 11.3 MPa 14.1 MPa | | | |
| Indirect Tensile Strength | AS 1012.10.2000 | 1 Day 7 Days 28 Days | 3.3 MPa 5.0 MPa 7.2 MPa | | | |
| Setting Time | AS 1012.18:1996 ASTM C191-2008 | | Initial Set @ 20°C | Final Set @ 20°C | Litres of water per bag | |
| | | Stiff | 1.5 hours | 3.5 hours | 2.3 - 2.7 | |
| | | Plastic | 3.0 hours | 4.5 hours | 2.8 - 3.4 | |
| | | Flowable | 5.0 hours | 7.0 hours | 3.5 - 3.7 | |
| Fresh Wet Density | AS1012.5 | Approx. 2200 kg/m ³ - depending on consistency mixed | | | | |
| Minimum Thickness Maximum Thickness | | 10 mm 200 mm | | | | |
| Flow Consistency initial | CRDC-621-82 | 25 - 35 seconds using CRDC Flow Cone | | | | |
| Flow Retention after 25 mins | CRDC-621-82 | 35 - 45 seconds using CRDC Flow Cone | | | | |
| Working Time | AS1012.18 | 30 - 40 minutes @ 20°C | | | | |
| Bond Strength | ASTM C882-1987 Slant Shear Method | >12 MPa @ 28 days | | | | |
| Expansion Characteristics | In a plastic state ASTM C940 | 1 - 2% in plastic state (Volume Expansion) Expansion Starts after 5 minutes Finishes in 2 hours | | | | |
| Application Temperature | | Min 10°C Max 30°C | | | | |
| Bleed | | 0 | | | | |

YIELDS

| CONSISTENCY | STIFF | PLASTIC | FLOWABLE |
|---|-----------|-----------|-----------|
| Water per 20 kg bag - LITRES | 2.3 - 2.7 | 2.8 - 3.4 | 3.5 - 3.7 |
| Yield per 20 kg bag - LITRES | 10.4 | 10.7 | 11.0 |
| Fresh Wet Density in kg/m ³ | 2250 | 2210 | 2200 |
| Bags required per cubic metre (m ³) | 98 Bags | 94 Bags | 91 Bags |

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| Product | MAKGROUT HS ULTRA |
| Issue Date | AUG 2022 |
| Issue No: | 1 |
| Item Code | MAKG24 |
| Pack Size | 20 kg Bag |

Product disclaimer

This Technical Data Sheet (TDS) summarises our best knowledge of the product, including how to use and apply the product based on the information available at the time.

The TDS should be carefully read and consider the information in the context of how the product will be used, including in conjunction with any other product and the type of surfaces to, and the manner in which, the product will be applied.

Our responsibility for products sold is subject to our standard terms and conditions of sale. Makrete does not accept any liability either directly or indirectly for any losses suffered in connection with the use or application of the product whether or not in accordance with any advice, specification, recommendation or information given by it.

The information and any recommendations relating to the application and end-use of all MAKRETE products are provided in good faith based on MAKRETE's knowledge and experience of the products. In applications, the differences in materials, and variances of substrates and actual site conditions can vary such that no warranty in respect of fitness for a particular purpose, nor any liability arising out of any legal relationship whatsoever, can be taken as inferred either from this information, or from any written recommendations, or from any other advice offered by MAKRETE. The proprietary rights of third parties must be observed. All orders are accepted subject to our sale terms and conditions.

It is recommended that all products be properly stored, handled and applied in accordance with the printed literature (TDS).

PLEASE CONSULT OUR TECHNICAL DEPARTMENT FOR FURTHER INFORMATION.