

Cementitious Grouting of Machine Bases and Base Plates

Method Statement

INFORMATION & INSTALLATION PROCEDURES

Introduction

1. This method statement describes the step by step procedure for grouting of machine bases and base plates using the SikaGrout range of ready to use mortar products and shall be read in conjunction with the relevant product data sheet and safety data sheet.
2. The SikaGrout cement based products are 1 component, ready to use, high precision, expanding mortars which are used to fill thin bed applications under machine bases and base plates.

Product	Description
SikaGrout 212	Non-shrink, cementitious grout with a unique two stage shrinkage compensating mechanism for shrinkage in both the plastic and hardened states
SikaGrout 212 HP	High performance, non-shrink, fluid, cementitious grout with silica fume and a unique two stage shrinkage compensating mechanism
SikaGrout 212 SR	Non-shrink, sulphate resistant cementitious grout with a unique two stage shrinkage compensating mechanism in both the plastic and the hardened states.
Sika M-Bed Standard	Non-shrink, gassing grout composed of cement, gassing & flow agents and graded siliceous sand.

References

For best demonstrated practices, reference is made to the most up to date version of the following documents.

1. ACI 351.1R Report on grouting between foundations and bases for support of equipment and machinery.
2. ACI 308.1 Specification for curing concrete.

Preparation

1. Concrete
 - a. The concrete substrate shall be thoroughly clean, in a good sound condition and free from dust, loose material, surface contamination and materials which reduce bond such as oil, grease, ice, snow, etc. Concrete surfaces shall be generally level (within tolerances) and shall not be laid to a gradient, so grout flows to the lowest end.

- b. The concrete substrate shall be roughened to a surface profile of CSP 6 to 8. All dust and loose particles shall be removed by sandblasting, high pressure water blasting or other suitable means.
- c. Concrete foundations less than 28 days old shall be kept wet for at least 12 hours, and older foundations for a minimum of 24 hours before placing grout. All free standing water shall be removed from concrete surfaces prior to grouting. The surface shall not be allowed to dry before application of the grout.
- d. The surface shall achieve a dark matt appearance without glistening and surface pores and pits shall not contain water (saturated surface dry – SSD). Use pressurized air (oil free) to blow away excess water in difficult to reach areas (especially the underside of the base plate and formwork).

2. Formwork

- a. Formwork shall be clean and fixed in place as soon as possible after the substrate has been prepared. If required, release agents shall be applied to the formwork before placing into position. Do not contaminate the substrate with the release agent and reduce bond of the grout material due to spillage or run-off.
- b. Openings in the formwork shall be protected to prevent ingress of debris or contamination. Formwork shall be watertight and free from obstructions to allow the free flow of grout. Formwork shall be designed to allow air to escape. In the case of a long base plate, ensure there is enough pressure head to help the flow of the grout. Divide into sections if necessary and apply the grout in more than one stage.
- c. Side and end forms shall be placed a minimum of 25 mm from the base being grouted. All vertical and horizontal edges shall be chamfered a minimum of 15 mm at a 45° angle. In addition, the top of the chamfer should be no more than 3 to 5 mm above the bottom of the base plate.

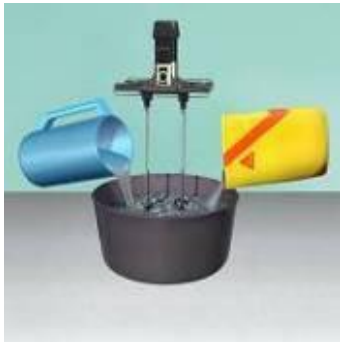
3. Material storage



- a. Materials shall be stored properly in undamaged original sealed packaging in dry conditions.
- b. Refer to specific information contained in the relevant product data sheet regarding minimum and maximum storage temperatures.
- c. For best results, pre-condition the product to 18 to 29°C for 48 hours prior to mixing and installation. Lower temperatures may result in slower strength development and longer cure times.

Mixing

- 1. Mixing shall always be carried out in accordance with the recommendations contained in the latest product data sheet (PDS). Do not use water beyond the stated maximum and minimum limits.
- 2. In determining the mixing ratio the wind strength, humidity, ambient and substrate temperature shall be taken into consideration. For best results only mix full bags.



Product	Procedure
SikaGrout	Place minimum recommended water ratio into the mixing container
	Progressively add the powder whilst mechanically mixing using a heavy duty low speed (300 to 450 rpm) electric drill or mortar mixer. See also 3 below for other mixing equipment recommendations.
	Add more water if required to suit the desired consistency and flow properties but not exceeding the maximum dosage. Mix in total for 3 minutes.

3. Use professional equipment for mixing SikaGrout



Single mixer with spindle paddle
Small quantities



Double mixer with spindle paddle
Medium quantities



Forced action pan mixer
Large quantities



Drum mortar mixer
Large quantities

Application

The product and system shall be appropriate for the type of substrate, structure and exposure conditions for which they are required.

1. Before application



- a. Working place shall be clean and tidy with no obstructions.
- b. Record the substrate, ambient temperature and relative humidity. Check pot life information on the bag or the product data sheet and allow for climatic conditions e.g. high / low temperatures and humidity.
- c. External applications shall be adequately protected. Do not apply grout in direct sun, windy, humid or rainy conditions. Do not apply grout if there is a risk of frost within 24 hours in unprotected areas. Erect hoarding as necessary to ensure that the concrete and equipment is protected from the elements and that the concrete substrate is maintained at a minimum temperature of 10°C.
- d. Make sure vent holes are not obstructed and can allow the escape of air.

2. Application

- a. Grout shall be poured immediately after mixing into prepared openings (within 15 minutes to optimize expansion properties). Make sure air displaced by grout can escape easily.
- b. Pour the grout through the "mouth" of the formwork allowing the material to flow to the opposite end. Always maintain sufficient head pressure while pouring.
- c. Ensure a process of continuous pouring to avoid air entrapment and prevent the grout flow from coming to a stop before the grouting operation is completed.
- d. Keep pouring until the grout is up to the top of the chamfer on the formwork. This will force the material to the underside of the baseplate and achieve an effective bearing area without any voids. Always pour grout from opposite ends towards any vent holes.
- e. Never grout from two places on the same application as it will be difficult to determine if the entire void under the base plate has been filled.
- f. Depending on the size of the application, it may be necessary to "rod" the grout with a thick chain to help the grout flow.
- g. Keep any visible and exposed grout surfaces as small as possible and protect from premature drying by curing with an appropriate method. Do not vibrate the formwork.
- h. Dry Pack Application Method
 - i. Provide SSD (surface saturated dry) conditions by pre-wetting the concrete 12 to 24 hours prior to grouting. Remove any standing water immediately prior to grouting.
 - ii. Less water is required when mixing grout for the dry pack method than for a flowable grout. Start by adding 2.8 L of water per 25 kg bag of grout and mix as per the recommendations on the product data sheet. When the mix is at optimum consistency, a small amount of grout, when squeezed tightly in a gloved hand, will form a ball that will not break up when lightly bounced in the hand and does not leave a wet cement paste on the glove. It is critical to add water slowly as required to achieve this consistency.
 - iii. Empty all or a portion of the grout onto plywood sheets immediately in front of the structure to be grouted. The plywood will prevent the grout from becoming contaminated.
 - iv. Dry pack placement and compaction should take place against a solid backing. It should be applied in layers and compacted over the entire surface using tamping methods. Tamping

direction should vary to ensure complete compaction and the dry pack should be visually inspected before further layers are applied. Just prior to the placement of the next layer, the compacted dry pack layer should be rubbed with the end of the tamping tool to leave a key for bonding more grout.

- v. Use appropriately sized pieces of lumber or other tamping tool to push the dry packed grout to the back side of the void that is being filled with grout. Using a hammer and appropriately sized lumber, compact the grout tightly by applying several hammer blows to the lumber until the grout refuses to be compacted further. Pack no more than 40 mm of grout at a time working from the back side of the form to the front of the void.
- vi. When the void is completely filled with grout, shave off the front face of grout so it has a vertical face flush with the outside of the structure using a hand trowel. Rub the surface gently with a damp sponge float then smooth the surface with a margin trowel.

3. Curing

- a. Protect the fresh material from premature drying.
- b. Cure exposed area with proper curing methods for 3 days minimum or spray with appropriate curing compound (SikaFlorseal WB 18 or 25) once the grout starts to stiffen.
- c. Suitable curing covers also include Sika UltraCure DOT or NCF, burlap and water or plastic sheeting.

4. Application limits

- a. Do not apply a grout as a patch repair or overlay in unconfined areas (horizontal, free application).
- b. Avoid application in direct sun and/or strong winds.
- c. Do not add water over the maximum recommended dosage.
- d. Always check the materials pot life and adjust for climatic conditions.
- e. Temperature of the grout and substrate shall not differ significantly.

Additional guidance

The following applications offer further guidance in specific situations.

1. Grouting in confined spaces



- a. Use a sloping channel or chute to convey grout to a lower level.
- b. Avoid the free fall of the material to prevent segregation of the aggregates.
- c. Maintain a constant flow of grout during application.
- d. Apply grout only in one corner making sure there is adequate space around the application for release of air.

2. Increasing maximum layer thickness

- a. The application thickness of SikaGrout can be increased with the addition of more aggregate. This technique only applies for filling voids or applications subject to static compression loads e.g. under base plates and machine bases.

- b. Refer to the product data sheet for recommended aggregate size and specification and layer thicknesses
- c. The SikaGrout characteristics will be affected with the addition of more aggregate, significantly the flow. These new characteristics shall be taken into account when this technique is used on the job site e.g. flow distance, grouting height, volume, ambient and substrate temperatures.
- d. Pre-testing of the modified material shall be carried out first to determine an acceptable construction method together with new material mechanical properties.
 - i. Always pre-test the new material characteristics
 - ii. Always check for bleeding and sedimentation
 - iii. Use same aggregate and grading to be used on the job site
 - iv. Consider ambient and substrate temperatures
 - v. Check the new mechanical properties

Pumping

1. Pumping is a specialist technique and is recommended to be carried out by a specialist contractor. The risk associated with pumping a fluid grout is bleeding as the sand separates while it is under pressure and can cause a blockage. It is recommended checking the compatibility of the pump equipment and grout before the main application.
2. SikaGrout is mixed in the normal way, placed into the hopper of the equipment and pumped through a hose to the point of application. Typical pump machines can be:
 - a. Screw pumps
 - b. Piston pumps
 - c. Double piston pumps
 - d. Membrane pump (for small grain sizes, refer to equipment manufacturer recommendations)
3. The pump machine and ancillary equipment shall be of adequate capacity for the volumes to be applied.
4. All moving parts, fittings and hopper shall be inspected for cleanliness and damage before any use. Any hardened material shall be removed. The equipment shall not leak.
5. The hose or pipe shall not have any dents or kinks and be long enough to reach from the pump location to the point of application. It is advisable to use the shortest length of hose available to reduce the risk of blockage.
6. Always consult with the recommendations provided by the pump manufacturer.

Health and Safety Information

For information and advice on the safe handling, storage and disposal of chemical products, users should refer to the most recent **Safety Data Sheet** containing physical, ecological, toxicological and other safety-related data.

1. Risk assessment



- a. The risk to health and safety from falling objects or defects in the structure shall be properly assessed.
- b. Platforms and temporary structures shall provide a stable and safe area to work. Do not take any unnecessary risks!

2. Personal protection



- a. Work safely !
- b. Handling or processing cement products may generate dust which can cause mechanical irritation to the eyes, skin, nose and throat.
- c. Appropriate eye protection shall be worn at all times while handling and mixing products.
- d. Approved dust masks shall be worn to protect the nose and throat from dust.
- e. Safety shoes,, gloves and other appropriate skin protection shall be worn at all times.
- f. Always wash hands with suitable soap after handling products and before food consumption.
- g. FOR MORE INFORMATION REFER TO THE SAFETY DATA SHEET.

3. First aid



- a. Seek immediate medical attention the event of excessive inhalation, ingestion or eye contact causing irritation.
- b. Do not induce vomiting unless directed by medical personnel.
- c. Flush eyes with plenty of clean water occasionally lifting upper and lower eyelids. Remove contact lenses immediately. Continue to rinse eye for 10 minutes and seek medical attention.
- d. Rinse contaminated skin with plenty of clean water. Remove contaminated clothing and continue to rinse for 10 minutes and seek medical attention
- e. FOR MORE INFORMATION REFER TO THE SAFETY DATA SHEET.

Environment

1. Cleaning tools and equipment

- a. Clean all tools and equipment with water immediately after use.
- b. Hardened material may only be removed mechanically.

2. Waste disposal



- a. Do not empty surplus material into drains.
- b. Avoid run-off onto soil or into waterways, drains or sewers.
- c. Dispose unwanted material responsibly through licensed waste disposal contractor in accordance with local legislation and/or regional authority requirements.
- d. FOR MORE INFORMATION REFER TO THE SAFETY DATA SHEET.

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The Information, and in particular, the recommendations relating to the application and end-use of Sika products, are given in good faith based on Sika's current knowledge and experience of the products when properly stored, handled and applied under normal conditions, within their shelf life. In practice, the differences in materials, substrates and actual site conditions are such that no warranty in respect of merchantability or of fitness for a particular purpose, nor any liability arising out of any legal relationship whatsoever, can be inferred either from this information, or from any recommendations, or from any other advice offered. The proprietary rights of third parties must be observed. All orders are accepted subject to our current terms of sale and delivery. Users should always refer to the most recent issue of the Technical Data Sheet for the product concerned, copies of which will be supplied on request or can be accessed in the Internet under www.sika.ca.