

# GROUTING FOR STONES AND TILES 6



## 6 GROUTING FOR STONES AND TILES

### 6.1 TYPES OF GROUT

Grout is the material that is used to fill the space between adjacent tiles and support the joints. It is visible and can be water-resistant. However, in most Portland cement based grouts, water or other liquids are likely to penetrate the joints. There are two major classifications of grout:

#### a. Cement based (CG) grout

They can be further classified as class 1 (CG1) for Normal Performance and class 2 (CG2) for Improved Performance).

In cementitious grouts, there are two basic types: sanded and non-sanded. The general industrial practice for the application of cementitious grouts is as follows:

Sanded grouts	Formulated with Fine Silica Sand for Joint width of up to 6 mm
	Formulated with Coarse Silica Sand for Joint width between 4 mm to 15 mm
Non-Sanded grouts	Joint width of 4 mm or smaller

- **Sanded cementitious grout**



This grout consists of very fine graded aggregates, portland cement, synthetic resins and coloured pigments added with water retentive additive.

- **Non-sanded cementitious grout**



This cement based grout consists of fine fillers, synthetic resins, colored pigments and water-retentive additive. It is designed for use on tile surfaces that are dry when the grout is applied. The water retentive additive allows the grout to stay moist until the cement cures properly.

#### b. Epoxy based (RG) grout

The grout consists of epoxy resin, silica fillers, pigments and a hardener. They have very low water absorption, higher compressive strength, are resistant to staining and easy to maintain. Epoxy grout is a waterless mix formed by mixing a base material (part A) and a hardener (part B). These components are mixed on site just prior to grouting. Generally, epoxy grouts require no additional sealer to protect the surface. However, epoxy grout is costly and the method of application is slightly more difficult compared to cement based grouts. Also, when resistance to chemical attack is important, prior testing of the grout ingredients against the chemical should be considered before use.

## 6.2 ADDING LIQUID POLYMERIC ADDITIVE TO CEMENTITIOUS GROUTS

Several latex additives are available that can be added to both sanded and non-sanded grouts as a substitute for water. These additives are blends of acrylics and latex. They will lower the water absorption, increase the strength and improve colour retention of the grout. Some cementitious grouts are premixed with dried latex powder at the factory and therefore do not require additional additives.

The following are some typical locations where grouts with latex additives are commonly used:

- Floors subject to heavy traffic
- Floors and walls on flexible substrates such as plywood, board partitions and others
- Floors subject to frequent cleaning and jet washing or exposed to weather
- Floors to be ground and polished after installation
- Swimming pool tile joints



Fig. 6.1 – Adding liquid polymeric additives to cement grout enhances its performance.

## 6.3 SPECIFICATION AND PERFORMANCE CRITERIA FOR CEMENTITIOUS TILE GROUT (CG) BASED ON ISO 13007-3

FUNDAMENTAL CHARACTERISTICS FOR CG1 (NORMAL PERFORMANCE)	REQUIREMENT
Abrasion resistance	< 2000 mm <sup>3</sup>
Flexural strength under standard condition	> 2.5 N/mm <sup>2</sup>
Compressive strength under standard condition	> 15 N/mm <sup>2</sup>
Shrinkage	< 3 mm/m
Water absorption after 30 minutes	< 5 g
Water absorption after 4 hrs	< 10 g

FUNDAMENTAL CHARACTERISTICS FOR CG2 (IMPROVED GROUT)	REQUIREMENT
High abrasion resistance	< 1000 mm <sup>3</sup>
Water absorption after 30 minutes	< 2 g
Water absorption after 4 hrs	< 5 g

## 6.4 A TYPICAL APPLICATION OF NON-SANDED GROUT IN CERAMIC FLOOR TILING IN INTERNAL AREAS

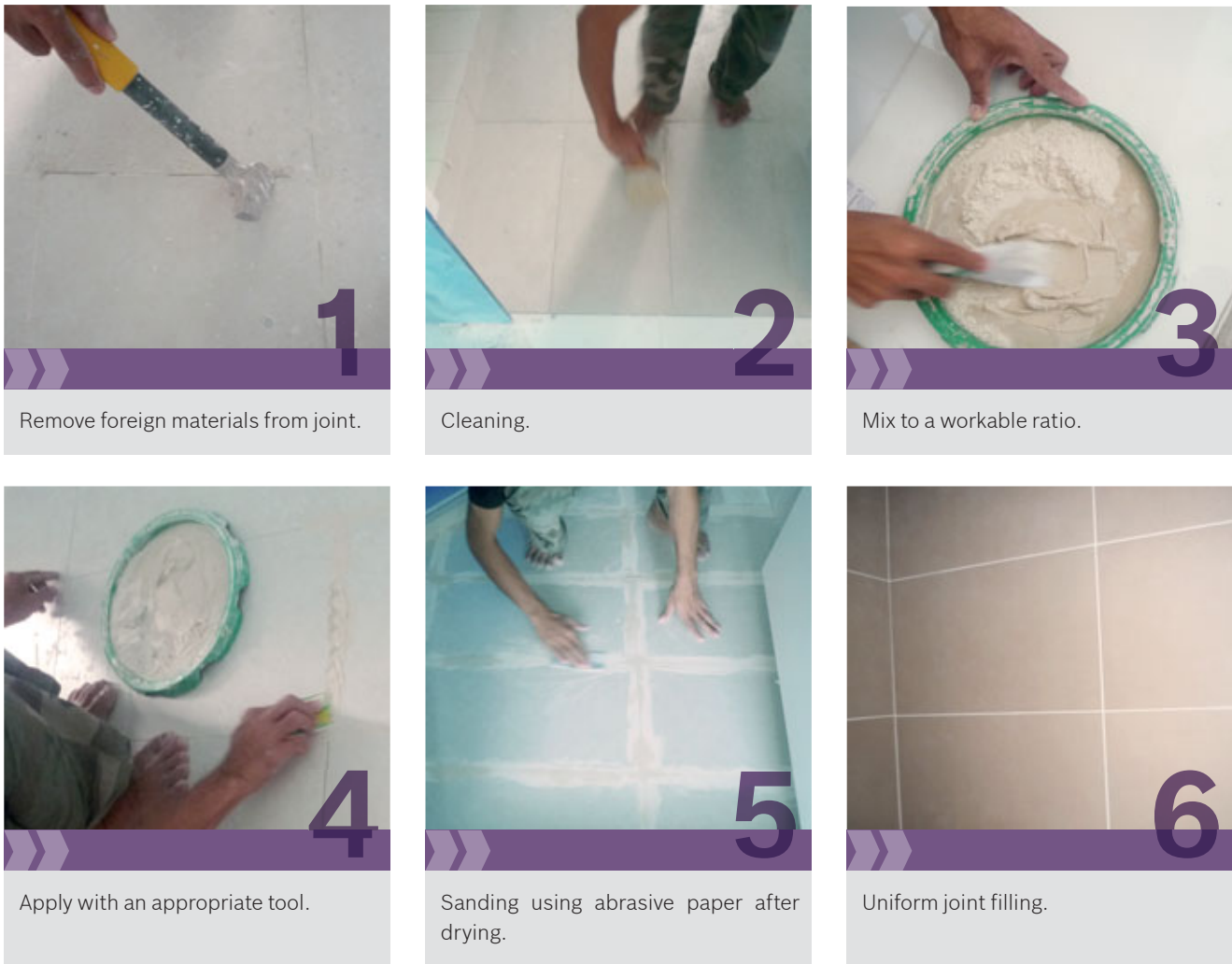


Fig. 6.2 – Application of grout in ceramic tiling.

## 6.5 COMPATIBILITY ISSUES BETWEEN GROUT AND NATURAL STONES

Natural stones are prone to staining because of their porosity and absorption characteristics. In some circumstances, the grout's ingredients such as colour pigments and additives can penetrate into the stone's microscopic pores where they are trapped and appear as stains in the stone. This can also be triggered during the wet polishing process.

The most vulnerable area in the natural stone is at "the edges". As the edges or side faces of the stones are often not of polished finish, this facilitates absorption leading to discoloration. Therefore it is strongly recommended to test the compatibility of the grout and stone materials before installation. Where the porosity and absorption rate of the natural stone are high, use of penetrating sealers on the stones prior to the installation can be considered.



Fig. 6.3 – Wet polishing on a marble floor.



The use of sanded grout with a polished marble installation presents another difficulty. Marble has smooth and soft surface. The fine sand in the grout may scratch the polished surfaces during or after installation. Hence, it is advisable to use non-sanded grout for polished marble surfaces.

In some cases, the grout may tend to emerge from marble joints because of its weak bonding or insufficient grout depth. This can occur after grinding and polishing or after certain period of regular mopping. This can be reduced by using some latex additives in the grout to improve the bonding property. Alternatively, where budget permits, epoxy grouting can be considered which will give better bonding and aesthetics.



Fig. 6.4 – Discoloration of grout and edge staining after polishing.



Fig. 6.5 – Emerging grouts from marble joints.

## 6.6 A TYPICAL APPLICATION OF EPOXY BASED GROUT ON A MARBLE FLOOR

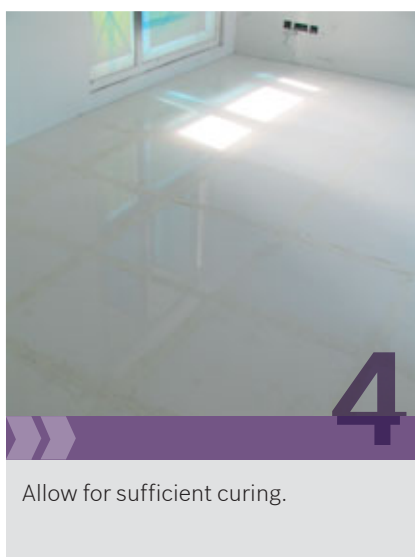


Fig. 6.6 – Application of epoxy grout in compressed marble flooring.



*Fig. 6.7 – Better aesthetics and smoother joints on a marble floor using epoxy grout after polishing.*

## 6.7 SUMMARY

Selecting the right grout is as important as selecting the right stone or tile. The manufacturer's instructions on product suitability, mixing, curing and applying the grout should be followed closely for optimum performance. Before proceeding, it is advisable to test its compatibility with the stone. More care should be taken for moisture sensitive and light coloured natural stones to avoid stain ingress. It should be noted that expansion joints on walls and floors must never be filled with grouting material as they are not designed for this purpose.