5.0 INSTALLATION

Close supervision should be provided on both in-process and finishes work. In order to achieve high overall quality of buildings, it is important that quality control be driven by the site management to ensure that a project can meet its workmanship requirements.

Site supervisor should be adequately trained and display competency in his works. Quality control starts with good planning and it is a good practice to prepare an Inspection and Test Plan, ITP (refer Appendix A) which summaries the project's inspection, acceptance criteria and the frequency of inspection.

Appendix B shows the inspection checklist for stone installation. Site supervisor should carry out the listed in-process inspection to ensure those steps are being properly done.

5.1. ADHESIVE PREPARATION

To prevent poor performance and failure, adhesive should be mixed with consistent proportions in accordance to the manufacturer's recommendations and instructions. In order to achieve homogenous paste free of lumps, only mechanical mixer, clean container and potable water are to be used for mixing of adhesive. The mixing quantity of the adhesive should be limited such that the mixed paste could be used up within pot life of the particular product. Tampering to the adhesive that is about to set by adding water or liquid latex admix will compromise with the adhesive's performance and may give rise to adhesion failure. Figure 5.1.a and Figure 5.1.b illustrate adhesive preparation for 1-component adhesive and 2-component adhesive respectively.

Amount of water in accordance to manufacturer's specs

Pouring measured water into clean container

Adding powdered polymer into container

Mixing with an electric mixer

Adhesive mix ready for use

Figure 5.1.a. 1-component adhesive preparation

Additive (component 1) in accordance to manufacturer's specs

Pouring component 1 into a clean container

Adding powdered polymer (component 2) into the container

Mixing with electric mixer at low speed

Adhesive mix ready for use

Figure 5.1.b. 2-component adhesive preparation

5.2. LAYING STONES

A scratch coat of adhesive should be applied onto the substrate with the flat side of the trowel, followed by spreading the adhesive on top of the scratch coat using a notched trowel. It is recommended to trowel the adhesive in one direction such that the grooves are parallel and much lesser air will be later trapped under the stone. When spreading the adhesive, the area cover should be limited to $1m^2$ or within arm's length to prevent adhesive from setting before the stone is laid. It is also a good practice to apply a coat of adhesive on the back surface of the stone.

The stone should be placed onto the combed adhesive in accordance with the setting out lines. Once the stone is placed in position, tapped uniformly to achieve good surface contact. Appropriate tile spacer should be used to ensure consistent joint width. A spirit level should be used to ensure that the stones are even and level. Alternatively, suitable tile levelling system as shown in Figure 5.2 could be used to level stones. It is usually designed for 2-in-1 function as a tile spacer as well.

Residues of adhesive should be removed immediately before it hardens while work is in progress. The finished surface should be protected and the adhesive should be given enough time to set before joint grouting work.

For screed-less substrate, stones can be directly laid onto the substrate. However, the substrate should be reasonably level to receive the stones. Alternatively, levelling mortar may be applied to correct the level. In view of the thickness of the adhesive, it is recommended to seek advice from the manufacturers on the right size of notched trowel to be used.

Spreading adhesive with flat side of trowel

Trowelling adhesive with notched-trowel

Adhesive fully trowelled

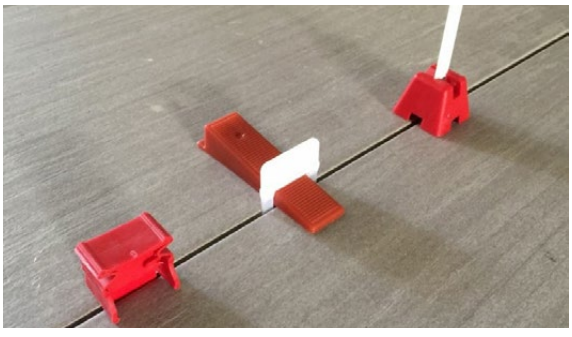
Wipe clean all sides

Applying adhesive on back surface of stone

Tapping on stone for uniformity

Tile spacer for consistent joint

Checking level



Different types of tile levelling system

Figure 5.2. Laying stones

5.3. GROUTING

Grouting can be carried out once the installation of stones are able to receive light foot traffic. The mixing method and procedure for preparing pre-packed cementitious grout paste should be in accordance to the manufacturer's recommendation. Dry or semi-dry mix should not be used to fill the grout joints.

Open grout joints collect dust or deleterious substances and reduce the quality of the grouting. Hence, it is recommended to fill the grout joints as soon as possible. To achieve consistency of pointing colour, it is advisable to grout to one location e.g. bedroom, kitchen, etc. in one operation using the same mix ratio. Grout joints should be filled completely with grout paste by using a soft trowel.

The grout should be given enough time to set and the surplus thereafter cleaned off with adequate tools and cleaning agents. For most grouting products, a damp hard cellulose sponge and clean water should suffice. Once cleaning process is done, the grout should be protected long enough for proper setting and hardening before foot traffic is allowed.

Grout preparation similar to adhesive preparation

Filling grout joints with
firm rubber trowel

Cleaning surplus with sponge
after grout had set

Figure 5.3. Grouting

5.4. MOVEMENT JOINT INSTALLATION

The depth of the movement joint should be controlled, as specified by the sealant manufacturers, by proper filling material and compressible backer-rod with closed pores. To prevent shrinkage cracks to propagate into the stone layer, movement joint to divide continuous stone finish on large floors and walls should also be extended into the underlying screed or render works.

The joints should be sealed by sealant of adequate durability and movement accommodation factor (MAF). In any cases, the instructions from the sealant manufacturers should be followed strictly.

5.5. FINAL PROCESS AFTER INSTALLATION

Final polishing and sealing newly installed or rectified stones are strongly recommended to enhance the shine and provide stain protection before handing over. It is also recommended to consider checking with a gloss meter especially at an angle to ensure consistency in the polishing / reflection.

5.6. INSPECTION OF COMPLETED WORKS

The finished works should be inspected to ensure they meet the client's requirements and standards. Table 5.6 shows the inspection checklist for the final inspection of natural stonework.

Table 5.6. Checklist for final inspection of natural stonework

CONQUAS® assessment checklist

1. Finishing

Standards

- No paint stain or marks
- Consistent colour tone

- Floor divider provided where required or as specified in approved drawings

2. Alignment and Evenness

Standards

- Evenness of surface not more than 3mm per 1.2m
- Lippage between stones not more than 0.5mm

- Fall in wet areas in right direction towards water discharge point or outlet

- Consistent joints and aligned
- Consistent skirting size and joint align with floor if of same material

- Stones meet at right angle and not more than 4mm over 300mm
- Straight edge (stones to stones) and aligned

3. Crack & Damages

Standards

- No visible cracks / defects

4. Hollowness

Standards

- No hollow sound when tapped with CONQUAS rod

5. Jointing

Standards

- Consistent colour and neat pointing

- Consistent joint size and aligned

- No visible gap between wall and skirting