3.0 INSTALLATION

3.1 Ordering

The consistency in colour and chip match of agglomerated stone tiles is superior to marble or granite. However, as the base product is natural, each slab’s colour may vary across production batches. It is, therefore, advisable to place orders in a single batch (depends on the limit to volume per batch) if possible, so that the manufacturer can blend raw materials in a single batch to minimize risk of tonality variation. It is also important to ensure that one does not install a mix of agglomerated stones from different batches.

Do note that for white agglomerated quartz tiles, small black specks may appear as it is not always possible to remove all the tiny black chips.

3.2 Quality Control at Factory

When ordering agglomerated stone from unknown sources, do consider making a trip down to the factory to have a look at the manufacturing processes and facilities used in the production. In addition, it may be necessary to verify with the manufacturer’s research laboratory on the research and type of tests done.

Things to look out for in the factory visit:
1. Source of stone
2. Storage condition of raw material (preferably sheltered)
3. Method of controlling the mix proportion
4. Method of production – vibro-compression
5. Method of curing – sheltered and period of curing
6. Method of cutting block to slab – gangsaw or diamond wire
7. Method of calibrating – preferably automated
8. Method of polishing – preferably automated
9. Method of cutting tiles from slab – laser guided
10. Method of quality control and sorting – i.e. Quality control by human or automated using imaging technology
11. Method of packing – preferably sealed
12. Establishment of the test laboratory

To ensure the production is in order, it is recommended to consider deployment of a qualified personnel at the factory to witness the entire production process all the way to packing and sealing the shipping containers.
3.3 Site Storage

Agglomerated stone tiles should be stored indoor and prevented from getting wet. Extra care should be taken to ensure that the edges on the surface of the agglomerated stone are not damaged or chipped during handling.

3.4 Tile Layout Plan, Shop Drawing & Method Statement

Prior to installation, approval should be sought for the proposed tile layout plan (especially for alignment with fittings), shop drawing (especially on details of movement joints) and method statement for the installation process.

Approved tile layout plan displayed on site wall for easy reference.
3.5 Quality Control before tiling

Prior to commencing the installation of tiles:

1. Clean substrate to ensure it is in good condition for installation and remove curing compounds, sealers, soil, mortar, dirt, dust, etc. that might affect the bonding
2. Seal all cracks with epoxy resin or approved method by the consultant
3. Check moisture level of substrate
4. Clean the agglomerated stone tile to remove dust that affect bonding

As resin based agglomerated stone tiles are sensitive to water, checking the moisture content of substrate is important before tiling. Normally, a quick check using a portable moisture meter (e.g., Tramex, Portimeter, etc) would suffice. The permissible moisture level will depend on the type of adhesive used and it is advisable to follow the adhesive supplier’s recommendation. The number of spots to be check is optional but do consider checking those spots near windows as the moisture level may be affected by rain.
3.6 Application of Sealer

Agglomerated stone tiles may require sealing depending on the manufacturer’s recommendations. Always ensure that the correct impregnator is used as most water based sealers will be repelled by the resin binder in the tile. The use of a solvent based product will be required in most cases. It is recommended to test on an un-laid tile before treating the whole area as some solvent products may cause damage to the surface structure and discolour the tiles.

Pre-sealing some resin tiles will make removal of the excessive grout residue easier. It will also protect against possible bleed, tram-lining or picture framing i.e. the shadowing that an unsealed tile can show if the face and edges are not sealed. This effect can be caused by moisture, sometimes contaminated with grout colourant, which can be absorbed into the edges of some resin tiles. Such staining can be very difficult to remove from these tiles. It is recommended to seek advice from the manufacturer or supplier.

3.7 Floor Tiling

The common bedding prepared for installation of floor tiles involves casting a 20 mm to 30 mm thick cement-sand floor screed over a concrete floor slab. The screed should be cured for a minimum of 14 days before laying of tiles, failing which, cracks or debonding of tiles may occur due to inadequate surface preparation. Do check and rectify any hollowness or cracks and ensure levelness of not more than 3 mm gap over 2 m prior to tiling. Self-levelling (non-shrink type) may be required to correct the level.

Do consider using pre-packed quick drying screed to reduce curing time and for better quality control on the mix.
For screedless floor system, floor tiles can be directly glued to the concrete slab with a thin-bed (non-shrink type) adhesive of up to 10mm thick. In view of the thickness of the thin bed adhesive, it is recommended to check with adhesive supplier for the right size of notched trowel to be used. Do ensure that the concrete slab is properly cured (minimum 28 days) and cracks are rectified prior to tiling.

Ensure proper sequence and tools used for installing agglomerated stone tiles.

During installation, proper tile spacer (usually made of plastic) should be used to ensure consistent tile joints and also to provide expansion joints at all edges to wall.

Use plastic spacers to ensure consistency of width of tile joints.
3.8 Wall Tiling

The common background for agglomerated stone tiles is cement-sand render as it is dimensionally stable and of sufficient cohesive strength. The thickness should not be more than 20 mm thick and applied in minimum of 2 coats with mechanical keys to prevent sagging or sliding during application. Common methods for creating mechanical keys are by spatterdash and bonding coat methods. Additional anchored metal lathing should be considered if the render is too thick.

For cement-sand render bedding, do allow a minimum of 10 days for curing before tile installation. It should also be checked for hollowness, crack and a levelness of not more than 3 mm gap over 2 m.

For tiling agglomerated stone tiles over highly deformable substrates such as plywood or board partitions where the chances of downward movement on a vertical surface is generally high, the adhesive will need to be fast setting, deformable, slip resistant and extended time for large format agglomerated tiles (i.e. type C1 or C2 FTE/S2 as per BS EN 12004).

3.9 Tile Levelling System

To reduce or eliminate lippages when installing agglomerated stone tiles, especially large format type, a suitable tile levelling system should be considered. It is usually designed with a 2-in-1 function as a tile spacer as well. This will help reduce/eliminate the need to level the edges by grinding and ensure consistency of the joint width.

Use of tile levelling system to eliminate/reduce lippages

Do note that this does not mean checking on the tile sizes and flatness are not required. It will generally eliminate/reduce lippages if the tile sizes and flatness are within acceptable tolerance.
3.10 Grouting

Grouting can be done once the tile adhesive has set. Pre-packed cementitious grout should be mixed with the amount of water recommended by the manufacturer.

Reaction resin adhesives may require longer curing time.

Grouting should not be unduly delayed as open joints might collect general building dust and deleterious substances. Avoid using excessive amount of water during the grouting process.

Cement based grout should be cleaned off within the recommended working time and with minimum amount of water. Reaction resin grout should be also cleaned off within the recommended working time and ensure that all traces are removed from the face of the tile.

It is essential that all the joints are completely filled with grout to ensure that the grout is long lasting. This can be accomplished by making several passes over the same area from different directions with the grout float. For thick agglomerated stone tile, it is recommended to consider using a modified tool to push in the grout.

For thin joint width like 1.5mm, reaction resin grout will be better able to fill up the joint and prevent water from entering the agglomerated stone at the edges.

Raking tool to compact grout in narrow joints.
For internal corner tile-to-tile joint and joint between fittings (e.g. bath tub, window etc.), do consider filling it up with colour-matching caulkking rather than grouting for better prevention of water slipping through and accommodation of movement.

Please note that some impregnator or sealer manufacturers may specify a minimum time before commencement of the grouting process in order to leave sufficient curing time for impregnators/sealers. It is recommended to follow the manufacturer's guidelines.

3.11 Cutting Tiles

Additional health safety precautionary measures should be taken at this stage. Prolonged inhalation of crystalline silica released during sizing, cutting, grinding and polishing of agglomerated quartz can lead to silicosis (scarring of the lungs). Agglomerated quartz tiles generally contain around 93% of crystalline silica, which is much higher as compared to 45% typically found in granite.

In addition to silicosis, scientific evidence suggests that occupational exposure to crystalline silica puts workers at increased risk of other serious health conditions like chronic obstructive lung disease, lung cancer, kidney and connective tissue disease, and tuberculosis.

The proposed control measure is to do wet cutting, grinding and shaping i.e. wet Suppression. Ventilation and filtration systems (LEV Suppression) should be used to collect silica-containing dust at its source.

The operator must wear appropriate PPE, e.g. N95 Respirator. Tiles should be wiped dry after cutting. Care should also be taken to immediately remove any residue from the tile before fixing, especially from the back and side. It is not possible to cut these tiles using a standard scribe and snap cutter.
Resin based agglomerated stone tiles should be drilled with a drill with a water feed and dried immediately afterwards.

Cutting of agglomerated stone tile with diamond blade cutter and feed with water to control dust
3.12 Protection

After tiling, the tiled area should be kept off limits to any traffic and cured in a well-ventilated dry condition at a duration as recommended by the adhesive supplier. Windows should be closed to prevent the tiled area from exposure to rain. As a guide, normal set will require 28 days to be fully cured as compared to fast set which normally cures after 48 hours.

Traffic over tiled surface should be kept to a minimum. This can be achieved by proper planning of the sequence of processes and locking up the tiled area. Only authorised access should be allowed with proper record and handing over.

For light traffic, plastic corrugated sheets are recommended as the cushion will minimise damages arising from falling objects and point loads (e.g. ladder). The plastic corrugated sheets will not be damaged by water and can be recycled. In addition, always ensure that the joints are tightly sealed with good waterproofed tape to hold the sheets in place as well as prevent water and dirt from entering through the joints.

To barricade tiled area to prevent traffic
Ensure all joints of protection are sealed with waterproofing tape to prevent water and dirt to enter.

For heavy traffic area, plywood should be considered with all joints sealed. Do note that the plywood may stain the flooring. As such, do consider lining the back of plywood with white laminate or another layer of plastic sheet to prevent staining.

3.13 Workmanship Tolerances

The general applicable good workmanship standards according to BCA CONQUAS standards for floor and wall tiling are as follows:

- a. Not more 3 mm gap over a 1.2 m straight edge for levelness of surface
- b. Not more than 4 mm over 300 mm for squareness of corners
- c. Not more than 3 mm over 1 m for verticality of surface
- d. Falls provided for wet area and in the right direction
- e. No hollowness detected when tapped with a hard object
- f. No visible damages like chips and cracks
- g. Consistent tile joint width
- h. No stains on tile and joint
- i. No tonality issue or as approved by the consultant
Tile layout should be in accordance to approved tile layout plan. Where skirting is of the same material, the skirting joint is expected to align with the tile joint unless otherwise specified.

Any repaired area should not be visible, patchy or rough.

### 3.14 Repair

Minor scratches on agglomerated stone tiles can be repaired by buffing, while deep scratches can be repaired by grinding.

Lippages can be repaired by grinding and polishing. Special lippage disc is required for heavy grinding of serious lippages that are over 1.5mm. Otherwise, at least 4-5 stages of diamond disc grinding are required starting from 50 and/or 120 grit, 220 grit, 400 grit and 800 grit. 1,800 grit grinding may be required if the surface still appears dull. A gross meter may be required to check the degree and consistency of gloss especially at an angle.

Chipped and cracked agglomerated stone can be patched with a proper stone repair kit. The material used for filling should be as strong as the agglomerated stone.

Hollowed area can be filled by injecting grout of the approved type. Normally 2 drilled holes are required to pump in the filler and for venting out to ensure complete filling.

If the repaired areas are still visible or hollow, replacement of the tile will be the only option. However, a slight variance in the tonality have to be expected especially if the replacement agglomerated stone comes from different batches.

*Do consider using proprietary stone repair kit for better repair work and finishing*
3.15 Final touch

To achieve a seamless look, a final polishing and sealing is recommended after installation. Wavy reflection, distorted silhouette of straight edges especially at an angle may not be acceptable to some owners even though there are no lippages and the evenness of the agglomerated stone floor is within the tolerance of not more than 3 mm gap over 1.2 m length. It is also recommended to consider checking with a gloss meter especially at an angle to ensure consistency in the polishing/reflection.

3.16 Cleaning after installation

After the grouting is completely dry, the floor may need a gentle wash to remove any grout residue, grease or grime marks that may have occurred during the installation processes.

Do avoid using acid based cleaner as it will react with agglomerated marble tiles as well as alkaline based cleaner as it will stain agglomerated quartz tiles. It is recommended to use a pH neutral cleaner in conjunction with a white non-scratch pad. Always follow the product manufacturer’s instruction. As a precaution, it is also recommended to first try it out on a test area to determine suitability of the product. If the problem persists, do contact the manufacturer or supplier for other appropriate product and application advice.