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# Installation of Large Format Tile & Stone

## TDS-1193

### Use of Large Format Tile and Stone

Twenty to twenty five years ago choosing tile was simple. Floor tile was typically 200 mm x 200 mm and wall tile was 100 mm x 100 mm and there were a couple dozen options for colour on the floor and several options for wall tile colour. The old saying, "you can have any colour you want as long as it's white" was not far from the truth. With the tremendous advances in technology and materials, the average tile installation is no longer average. For many years the tile manufacturing trend was to create a wider variety of textures and colours for stone; but more recently there has been a trend to manufacture and install larger and larger tile.

Large format tile was considered to be 300 mm x 300 mm and was on the cutting edge of technology. Now tile is available from 10 mm x 10 mm glass mosaic to 1220 mm x 1220 mm porcelain and larger.

Some advantages of having large format tile installed include;

1. Narrow grout joints – rectified, large format tile allows for thinner grout joint widths
2. Easier maintenance – it is typically much easier to clean the face of tile than it is to clean grout.
3. Room size perception – the perception is that large tile makes the room in which it is installed appear larger

Amongst others, five of the main considerations with large format ceramic and stone tile are;

- Floor Flatness
- Lippage
- Thin Set Adhesive Coverage
- Movement Joint Requirement
- Curing/Protection

### Floor Flatness

Along with larger format size comes a greater requirement to have flatter and more regular surfaces to meet the required surface finish tolerance. However are the current Australian tiling standards for background surface tolerance relevant for this ever increasing format size? For instance, as stated in AS3958.1, for thin-bed ceramic tile installation when an adhesive will be used on a concrete floor, the maximum allowable variation in the plane is 5mm in 3m; and for thin-bed ceramic tile installation when an adhesive will be used on a wall, the maximum allowable variation in the plane is 4mm in 2m. Are these now to be regarded as a suitable tolerance, especially for the larger tiles of greater than 0.4m<sup>2</sup> in area or tiles with one side longer than 400mm? Perhaps consideration should be given to a maximum allowable variation of 3mm in 3m from the required plane with no more than 1.5mm in 600mm when measured from the high points in the surface, which is the surface tolerance of the recent ANSI A108.19-2017. Many gauged porcelain tile and slab manufacturers ask for +/- 2mm in 2m.

### Lippage

Lippage is defined as a condition where one edge of a tile is higher than an adjacent tile, giving the finished surface an uneven appearance (See picture 1-1). With the increased use of large format ceramic and stone tile on floors and walls, the issue of lippage is becoming more common place due to insufficient substrate flatness tolerances.. A ceramic or stone tile larger than 300 x 300mm can be considered large format and tiles of this size and over presents many challenges to the installer, even on flat planes due to tile manufacturing tolerances. Lippage can be exacerbated when the tile pattern is placed in a running bond pattern. The installer now has to deal with at least six points to ensure a level surface.

It is important to note that a certain amount of lippage is unavoidable and inherent in ceramic tile installations and may also be unavoidable due to the tile tolerances, in accordance with AS ISO 13006.



Picture 1-1 – Large format tile highlight imperfections in the substrate.

Since the ceramic or stone tile or slab facial dimensions are becoming much larger, the facial dimension tolerances are increasing. This can present problems when attempting to maintain tight joints. The joint width can be only as tight as the actual facial dimension range of the tile. In many cases, even rectified tiles (tiles that are calibrated to a tighter tolerance) will require a grout joint to be at least 4.5 mm in width depending on the size. Non-rectified tiles may necessitate a wider minimum grout joint width.

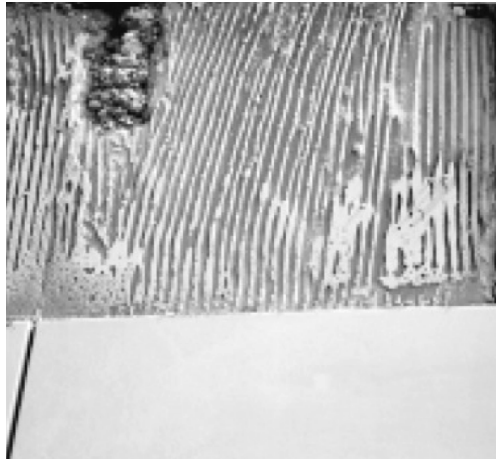
The ceramic tile industry is currently discussing ways in which to address this important issue. AS3958.1 & 2 will be revised to reflect the advancement in tile sizes and technology.

### Thin Set Adhesive Coverage

Complete bedding of the tile with the appropriate adhesive is another area that requires attention. Lack of thin set adhesive coverage can lead to cracked tile and grout and loss of bond to the tiles. Use the appropriate sized notch trowels (see picture 1.2) troweling technique and tap or twist the tiles in place to properly bed the tiles. Large format tiles should be back buttered with additional thin set adhesive to ensure that the appropriate coverage is achieved. Notice the lack of coverage in picture 1.3. To correct these errors, carefully remove the grout around the perimeter of the loose tiles and any hardened thin set adhesive so as to not disturb any tiles that are still well bonded and then replace using the appropriate troweling technique.



Picture 1.2 – 18 mm loop notch trowel with a medium bed adhesive used for large format tiles or stones. Trowel thin set adhesive in one direction holding trowel at a 45 degree angle. Notice the full ribbons of adhesive that left behind.



Picture 1.3 – Insufficient thin set adhesive coverage. Removal of a tile reveals many voids that are present in the hardened thin set adhesive. Trowel ribbons are inconsistent which will also lead to poor coverage and adhesive transfer to the backs of the tiles.



Picture 1.4 – Ceramic tile removed during the installation to verify proper coverage is being attained. Notice the lower right hand corner of the tile is lacking coverage. This will undoubtedly lead to a cracked tile.

Size of the tile will also determine exactly what tools are required to properly bed the tile. The simple logic is that the larger the tile, the larger the notch trowel size must be. A 6 mm x 6 mm square notch trowel might be fine for a 108 mm x 108 mm tile; it will not be suitable for installation of 500 mm x 500 mm tile. It is important that this be understood, and that the installer pulls tiles up after they are installed to make sure that the desired coverage is achieved and that the surface of the tile installation is flat and true. Industry standards require that a minimum coverage of 80% be attained for interior, non-wet areas, and a minimum coverage of 90% be attained for any interior, wet area or any exterior installation. There have been significant advances made in trowel technology over the past few years that help make the installer's job easier. General guidelines for trowel/tile size are;

5mm X 4mm V-notch	Mosaics to 108mm X 108mm wall tile	No Back-buttering (required)
6mm X 6mm Square notch	100mm to 150mm floor or wall tile	No Back-buttering (required)
6mm X 9mm Square notch	150mm to 300mm floor or wall tile	Back-butter 200mm X 200mm tile or larger
12mm X 12mm Square or round notch	330mm to 500mm floor or wall tile	Back-butter
18mm X 18mm round notch	500mm X 500mm or larger floor or wall tile	Back-butter

The chart above is intended as a guideline only and results should be checked during installation to make sure that proper coverage is achieved.

Choosing the best adhesive for the job is also important to assure a long-lasting installation. Some options are LATICRETE® 254 Platinum Adhesive, LATICRETE 335 Premium Flexible Adhesive, (as a full contact thin-set Adhesive), LATICRETE 4237 Latex Additive gauged with 211 Crete Filler Powder (for medium bed adhesives on floors and walls), LATICRETE 335 Rapid Premium Flexible Adhesive (for rapid setting, non-sag installations on walls or thin-set adhesive on floors). For installations that require sound control and/or crack isolation, use LATICRETE 125 Sound & Crack Adhesive. The practice of back-buttering is recommended for any tile that is larger than 200 mm x 200 mm to help achieve maximum coverage/bedding.

Once the tile has set firm, grout with LATICRETE SPECTRALOCK® PRO Premium Grout or LATICRETE PERMACOLOR™ Grout.

### Movement Joint Requirements

It is also important that proper allowance be made for movement in large format installations, just like ALL tile installations but a little more so. Allowance for movement should be made around the perimeter of the room, any hard abutments or in large expanses within the tiled area as outlined in AS3958.1 & 2. The larger the tile, the less grout joints there are in the installation. Grout joints are known to absorb or take up strain from the various stresses imposed in tile installations and if this relief is reduced by the reduction of joints as occurs with large format tiles, there is a greater need for wider or more closely spaced movement joints. For more information on movement joints please refer to AS3958.1 & 2 or the TCNA Handbook for Ceramic Tile Installation.

### Curing/Protection

Another issue that must be dealt with when using large format tiles and stones in commercial applications is the issue of curing and protection. Larger tile and stones will require a longer cure time due to the fact that the adhesive simply cannot cure quickly, especially under a dense porcelain bodied tile.

Most adhesive manufacturer's will have varying suggestions on when an installation can be opened to other trades and traffic (including traffic from other trades, hand trucks, carts, scissor lifts, and other heavy machinery or vehicles).

While there is no empirical data/formula that specifically address the cure rate in relation to the facial dimensions of tile, some manufacturers have had good experience in maintaining a minimum 7 day cure at 21°C. Once the areas are opened to vehicular traffic, protect the newly tiled floors. It is important to note that even rapid setting latex fortified Portland cement thin set adhesives must be allowed to cure for a minimum of 7 days at 21°C. Although rapid setting adhesives allow grouting and light foot traffic on newly tiled floors, heavy traffic and work can still damage the installation. In addition, allow a longer cure period when temperatures are below 21°C, when humidity levels exceed 60% R.H. or when large format porcelain bodied tiles are utilised.

### References:

AS3958.1 - 2017

TCNA Handbook for Ceramic Tile Installation 2017 edition.

ANSI A108.19 - 2017

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