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

Consider three main issues when installing large format tile and stone:

- Lippage
- Thin Set Mortar Coverage
- Movement Joint Requirement
- Curing/Protection

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 increase in use of large format tile and stones on floors, the issue of lippage is becoming more common place. A tile or stone larger than 400 mm x 400 mm can be considered large format. Large format tile presents many challenges to the installer. As stated in the Australian Standard AS3958.1; for thin-bed ceramic tile installations when an adhesive will be used on a concrete floor: maximum allowable variation in the tile substrate is 5 mm in 3 m and for thin-bed ceramic tile installation when an adhesive will be used on a wall: maximum allowable variation in the tile substrate – 4 mm in 2 m, both from the required plane, when measured from the high points in the surface. Should the architect/designer require a more stringent finish tolerance (e.g. 3 mm in 3 m), the subsurface specification must reflect that tolerance, or the tile specification must include a specific and separate requirement to bring the subsurface tolerance into compliance with the desired tolerance. 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 AS4662. This discussion deals with the issue of excessive lippage.

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

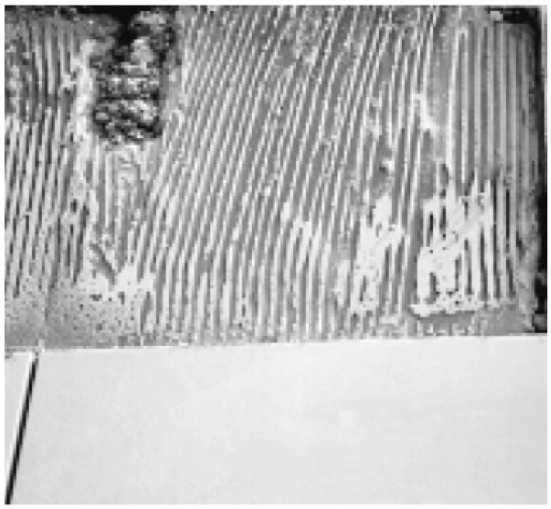
Since the tile and stone facial dimension is much larger, the facial dimension tolerance will also increase. This can present problems when attempting to maintain tight joints. The joint width can be only as tight as the actual facial dimension range of the tile. In many cases, even rectified tiles (tiles 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.

Adhesive Mortar Coverage

Complete bedding of the tile with the appropriate adhesive mortar is another area that requires attention. Lack of thin set mortar 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) for troweling technique and tap or twist the tiles in place to properly bed the tiles. Large format tiles can be back buttered with additional thin set mortar 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 mortar 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 mortar used for large format tiles or stones. Trowel thin set mortar in one direction holding trowel at a 45 degree angle. Notice the full ribbons of mortar that left behind.



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

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

† Use of a full contact mortar (e.g. LATICRETE® Sure Set™) will eliminate the need for back-buttering. Consult LATICRETE product data sheets for specific installation instructions.

Choosing the best adhesive for the job is also important to assure a long-lasting installation. Some options are LATICRETE® 335 Premium Flexible Adhesive, LATICRETE Sure Set™ (as a full contact thin-set mortar), LATICRETE 4-XLT (for non-sag installations on walls or medium bed mortar on floors), LATICRETE 335 Rapid Premium Flexible Adhesive (for rapid setting, non-sag installations on walls or thin-set mortar 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 Grout*; LATICRETE PermaColor™ Grout; LATICRETE Sanded Grout mixed with LATICRETE 1776 Grout Enhancer; or, LATICRETE Smooth Grout mixed with LATICRETE 1776 Grout Enhancer.

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 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.

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 mortar 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 mortars must be allowed to cure for a minimum of 7 days at 21°C. Although rapid setting mortars 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.

* United States Patent No.: 6881768 (and Other Patents)

References:

AS3958.1 & 2

TCNA Handbook for Ceramic Tile Installation 48th Edition. Tile Council of North America, Inc. Anderson, SC, 2011.

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