TECHNICAL BULLETIN – TB201

VITREOUS PORCELAIN TILES

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INTRODUCTION & SCOPE

The physical properties of tiles' rear surfaces affect the ability of tile adhesives to form a satisfactory bond. These properties determine the types of tile adhesive recommended for installation.

Recent trends in porcelain tile manufacturing have seen a move towards faster firing times and higher firing temperatures. This has altered the properties of the tiles, and changes are now required regarding how they are bonded.

This bulletin examines the features of highly vitrified tiles and the types of adhesives required to bond them.

HISTORICAL ISSUES

Historically, vitrified porcelain tiles have been bonded with 'medium' range adhesives as the minimum. These are normally a cement base with either a liquid dispersion polymer or a 'dried' polymer powder added to the cement base.

The bonding mechanism combines mechanical bonds from crystal growth by hydrated cement phases into the tile matrix with chemical bonding to the surface by the polymer material (for simplicity, we will call this 'sticktion').

Some years ago, it was noted that traditional adhesives for bonding porcelain tiles were not performing as well as they used to. Examination of these new porcelains revealed that the back face of these tiles had a glass-like appearance with little surface texture. By contrast, older and less vitrified tiles have a rougher texture and less glassy appearance.

The highly glassy nature of these newer tiles means that the adhesives cannot easily develop a mechanical bond by crystal impingement. They must rely on the polymeric material's 'sticktion'. Low- to medium-quality polymer adhesives of the medium-quality range are no longer effectively holding these because they develop insufficient 'sticktion' to the surface. This effect can be exaggerated if the contact coverage is low. This is a difficult and common issue with large-format tiles.

IDENTIFICATION OF THESE TILES

These new tiles can be identified by inspecting the back face with a 10x magnification lens. If the back face looks glassy and 'glittery' and has no surface texture, then it is likely to be this type of tile.

Another indicator is if the manufacturer quotes a very high firing temperature (>1200^{0}C) for the tile processing. Very high temperatures create a glassy texture. ARDEX Technical Paper TP009 discusses these two subjects in detail.

A third indicator is whether a specific adhesive holds the tile in place. This can be checked by bonding a piece of the tile 150 x 150mm onto a concrete surface. It should be left for seven days and then struck off with a hammer and bolster. A higher-performing adhesive is required if the tile comes off easily and is relatively 'clean' on the back surface. If it shears cohesively inside the adhesive, then the result is satisfactory.

The following picture shows some examples of tile rear faces.

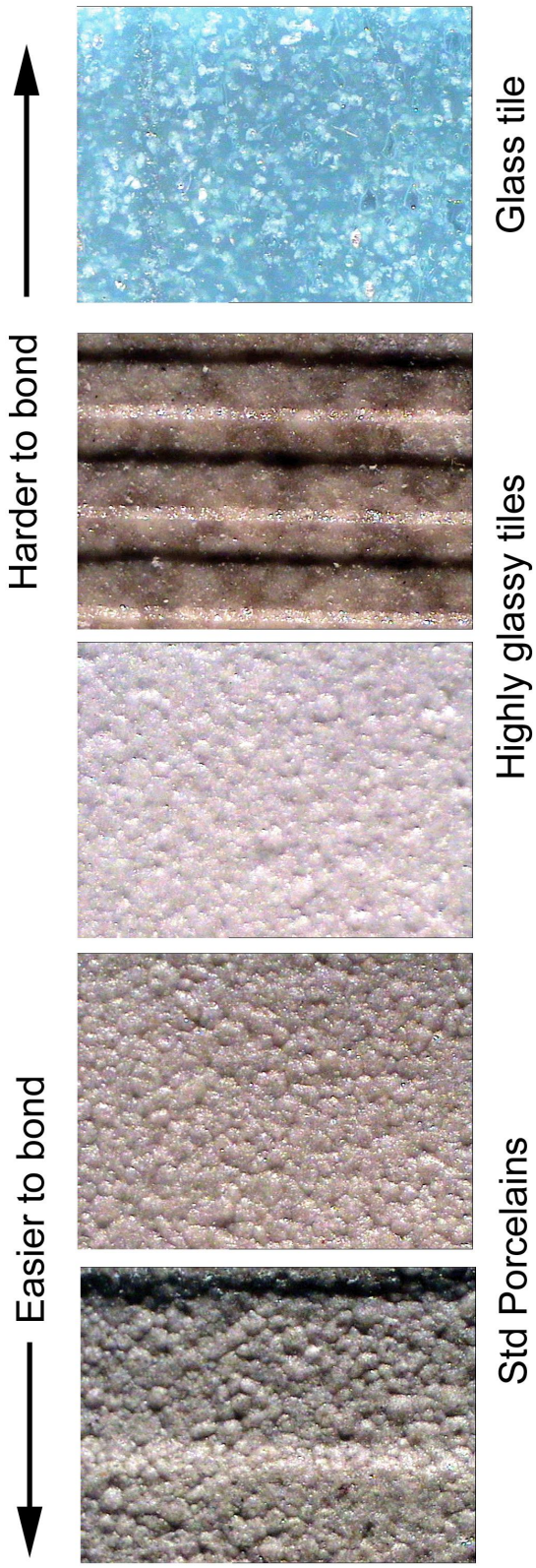

Figure 1: Magnified examples of the rear surface of tiles

RECOMMENDATIONS

If the tiles have been identified as highly vitrified and difficult to bond, the simplest solution is to select an adhesive with significant polymer modification. Another option is to use reaction polymer adhesives such as epoxies suitable for bonding tiles or natural stone.

Within the ARDEX range, the following adhesives should be considered suitable for bonding these tiles.

Cement-Liquid Dispersion Polymer Adhesives (nominally C2 class / S1-S2)

- ARDEX X77 + ARDEX E90
- ARDEX X78 + ARDEX E90
- ARDEX X18 + ARDEX E90
- ARDEX Optima (2 parts)

Rapid cure adhesives (nominally C2 class, F, S)

- ARDEX S28N + ARDEX E90 (dry internal applications)
- ARDEX Quickbond + Abalastic
- ARDEX Quickbond + ARDEX E90

Reaction polymer adhesives (R)

- ARDEX WA (adhesive/grout)
- ARDEX WA100
- ARDEX EG15 (when used with filler at the adhesive ratio).

REASON FOR REVISION-ISSUER
Content review, change of company slogan and address

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