



## COMPARISON OF THE US AND UK STANDARDS FOR TILE ADHESIVES

The standards under review are the British Standard 5890 and the American National Standards Institute ANSI 118. For the purpose of this comparison we are looking at section 118.4 of the ANSI code referring to polymer fortified adhesives and Class AA of BS 5980, the most onerous classification.

**Tile Type:** The type of tile used in the test is extremely important. The tile properties particularly water absorption and hence porosity, influence the way the adhesive bonds to the tile. BS 5980 uses a tile of very high water absorption (30-35%) for both shear and tensile bond strength. ANSI 118.4 specifies the use of three different types for shear bond strength testing. Glazed wall tile with a water absorption of 13-15% (section F5.1) unglazed ceramic mosaic with water absorption of 0-0.5% (section F5.2) and quarry tile with water absorption not exceeding 5% (section F5.3).

Modern tiles, particularly those for external use water absorptions of 0-7%. BS 5980 is therefore not a representative of the contemporary in site conditions. Homogenous tiles typically have water absorptions in the 0-0.5% range and the ANSI 118.4 Section F5.2 test is therefore the most representative of such installations. Even internal glazed ceramic wall tile have absorptions of 13-15% far below that of the tiles used in BS 5980. 30-35% water absorption is simply unrepresentative of modern conditions.

**Test Type:** Where a sample is tested in tension, a force is applied perpendicular to the tile surface until the bond fails. In a shear test, the adhesive bond is failed by pushing the tile and whatever is bonded to past each other causing failure in shear. Shear stresses arise from daily heating/expansion and cooling/contraction of the tile and from changes in dimension of the substrate material, most often due to creep and shrinkage. Even where appropriate expansion joints are installed, the forces arising from these types of movement are quite substantial. Thus as a measure of the performance of the adhesive, shear strength is by far the most important. It should be noted that the ANSI code does not refer to tensile adhesion strength at all for this reason.

**Bond Strength values:** Pass criteria for tensile and shear bond strengths under BS 5980 are given as 950N and 8.9kn respectively for Class AA adhesives (the most onerous requirement). These are loads applied to the sample prepared in accordance with test method, not strength. Using the area of the sample tested, these translate to approximately 0.17 and 1.0Mpa respectively.

Both values are well below what is readily achievable with modern tiles and polymer fortified adhesives. ANSI 118.4 requires shear bond strength of 2.1 Mpa for wall tiles, 1.4 Mpa for ceramic mosaics (equivalent to homogenous tiles in water absorption) and 1.0 Mpa for quarry tiles. Laticrete premium grade adhesives meet and exceed the above values of shear bond strengths.

**Conclusion:** As a method of assessing materials for modern tiles in typical installation conditions BS 5980 is simply out of date. ANSI 118.4 tests tiles typical of those used in situ in current industry practice, designers can even select the type of tile they wish to specify for. There is new standard that is prevalent in Europe and UK, Euro Norm EN 12004, which will replace the BS in the UK.

