

F1 Car Tyres and Tile Adhesives: What do they have in common?

Formula One teams pay great attention to 'tyre strategy' and monitor it continually throughout races. Although the tyres cost only a tiny fraction of the tens of millions to build an F1 car, they recognise that in addition to the drivers' skills, the right choice of tyres is important for keeping the cars track-bound all the way to the chequered flag.

In tiling installations, adhesives are the workhorse equivalents of F1 car tyres; they are important but are barely noticed. Property owners typically take a direct interest in tile selection and readily invest time and money on it but, borrowing the analogy from F1 racing, a winning 'adhesives strategy' is sometimes lacking. With finishing tiles evolving and increasing in variety and complexity – size, thickness, material type, physical characteristics, and cost – adhesive selection is more important than ever for service-life performance and durability.

The property of a tile adhesive most commonly looked for in its performance is the bond strength or 'tensile adhesion strength'. This is undoubtedly important but other properties which affect the final result – whether or not the tile stays whole and well-bonded to the substrate in service - are less obvious.

Consider two other characteristics of tile adhesives. Firstly, the 'open time'. This is defined in the international standard, ISO 13007-1, as "the maximum interval after application at which tiles can be embedded in the applied adhesive and meet the specified tensile adhesion strength requirement." In other words, the open time is a measure of the amount of time you have for fixing the tile in its final position on the fresh adhesive. This can be critical in painstaking installations such as floors with intricate patterns where tile positioning takes longer. Another example is installation under faster drying conditions e.g. outdoors in hot weather. It is recommended good practice to provide shading but even when this is done, the open



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Marble tiles installed in The St. Regis Kuala Lumpur's bathrooms and public washrooms with Keraflex Maxi S1 (deformable adhesive) on drywalls and Keraflex on floor slabs.

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The training, competition and diving pools at The Aquatic Centre, KL Sports City - upgraded and re-tiled using MAPEI adhesives.

time will be appreciably shorter than the value obtained from testing under laboratory conditions. Nevertheless, an adhesive with an extended open time, identified with the "E" classification according to the ISO 13007-2 standard, gives the installer a relatively longer working period. Examples of adhesives with extended open time are Keraflex and Adesilex P9, both of which are classified C2TE. Failure to abide by the adhesive's open time limitation will mean weakened adhesion and the increased potential of de-bonding, even if everything looks fine on completion.

Secondly, 'deformability', defined in ISO 13007-1 as "the capacity of a hardened adhesive to be deformed by stresses between the tile and the fixing surface without damage to the installed

surface." The need for deformability in an adhesive increases with the supporting substrate's propensity to move under load (e.g. deflection, vibrations), and with the tile size. Small-sized tiles fixed on stable, grounded slabs pose no problems whereas large format tiles – 800 mm and bigger – installed with rigid adhesives on large, suspended slabs (in shopping malls, for example) face the increased likelihood of failure. A deformable adhesive, acting as the intermediate layer between the tile and the support, is able to absorb most of the displacement and minimise the transfer of stresses to the bond lines and the tile. The deformability of adhesives is tested according to ISO 13007-2 and materials which pass the test are classified either as "S1, deformable adhesive", or "S2, highly

deformable adhesive". Examples of Mapei's deformable adhesives are Keraflex Maxi S1, classified "C2TE S1", and Kerabond T + Isolastic, classified "C2 S2".

The given examples show that much of the guess-work in adhesive selection and specifications can be eliminated, first of all, by identifying the important criteria for installation and service, and then matching these with the performance characteristics in the ISO 13007 classifications.

If you would like a more comprehensive coverage of the subject, please contact us at mapei@mapei.com.my to arrange a training programme. This can be conducted in your premises (classroom only) or in our plant (classroom and practicals). □