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Sustainable Slip Resistance: Testing an Opportunity for Innovation

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Building regulations have reduced most societal risk throughout the developed world, whilst individual risks such as slip & falls have been gaining prominence. This is by emphasised by European Union Directive 89/106/EEC which applies to construction products, such that they must be fit for their intended use over their working life to ensure the safety of occupants throughout the life cycle of a building. Ideally the slip resistance of surfaces will not change over time; however, through the integration of slip resistance within a quality management framework, testing and monitoring has identified that many seemingly slip resistant materials will reduce significantly over time. Thus test results obtained on factory fresh surfaces are illusory, misleading designers into specifying products that may be potentially hazardous within weeks or months of installation.

The aim of this study was to develop a method to identify and differentiate those ceramic tiles which have a propensity to drop in slip resistance rapidly and to predict the loss of slip resistance over the long term. A Gardco linear motion washability and wear tester was used to evaluate 4 grades of abrasive pads with 3 different weights on one type of ceramic tile to formulate the accelerated wear test methodology. A 3M green scotch-brite abrasive pad with weight of 1000gms with a rate of 50 cycles per minute over a 300mm path length was found to best represent existing data from onsite testing using the wet pendulum method. Indicative results suggest that 100 & 500 cycles equates to approximately 2 months and 1 year respectively in medium to high use commercial buildings.

Further wet pendulum testing was conducted on 10 ceramic tiles with the accelerated wear test method over 100, 500, 1000 & 5000 cycles. Samples of the ceramic tiles were subjected to accelerated wear using a buffing machine to represent 5000 cycles and the slip resistance was evaluated using inclining ramp test methods. Significant changes were measured between factory fresh ceramic tiles and those that had undergone accelerated wear, such that many surfaces reduced to a hazardous level if they were installed in certain situations. The results were dependant on the tile itself and exhibited reductions of slip resistance between 19 and 60%, with the greatest reduction generally within the first 500 cycles, where the reduction then stabilised.

This study stresses the importance of portable test methods, to correlate slip resistance with pedestrian use, cleaning procedures and time in an attempt to predict the sustainable slip resistance of ceramic tiles. The impact of accelerated wear techniques are highlighted by multinational companies, such as Westfield's and McDonalds who have implemented internal standards based on this test methodology. This enables organisations that design, construct and procure their own assets, to minimise their exposure to risk in slip and fall incidents and litigation and provides ceramic tiling manufacturers a method to differentiate their products against their competitors whilst satisfying the end users needs: thus providing an opportunity for innovation.