ANALYSIS OF THE LIFE SPAN OF THEANTI-SLIP PERFORMANCE OF CERAMIC FLOORING

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1. INTRODUCTION

Slip resistance is a characteristic derived from the essential requirements envisaged in the CE mark for ceramic tiles and must be declared when it is a requirement of the national regulations of the destination EU Member State. In Spain, these regulations are set out in the Technical Building Code, specifically in DB SUA 'Safety of Use and Accessibility', which details the requirements relating to floor slipperiness in buildings or areas used by the public. A very important feature to be taken into account is that these requirements must be held throughout the entire working life of the flooring.

At present, the anti-slip performance of ceramic floorings is assessed on samples of the product when it leaves the factory, which only allows information to be obtained on how the product will perform when it is newly installed. Previous studies[1] have confirmed that changes occur rapidly in slip resistance, owing to wear caused by pedestrian traffic across the surface of the flooring.

2. STUDY IN REAL CONDITIONS

In order to quantify the real evolution of flooring anti-slip performance, a study was carried out on the life span of tile anti-slip performance in external flooring under real conditions, using the pendulum method to measure slip resistance according to standard UNE-ENV 12633 Annex A[2].

Two external access areas to a working building, which has a clocking system at its entrances, were used for this purpose. The clocking system provided information on the actual pedestrian traffic in order to correlate this with the evolution of the tile surface.

At the start of the study (September 2009), the coefficient of friction of the existing, originally installed tiles (laid in October 2005) was first evaluated. These were then replaced with new tiles of the same material and, with a view to determining their real evolution after they had been installed, they were regularly monitored by measuring their slip resistance value *in situ* (Figure 1).

During the first year, in which a high number of measurements were made, a very pronounced decrease in slip resistance was observed. This decrease subsequently tended asymptotically towards a practically constant value after 6 years' exposure (which corresponded to the values obtained for the originally installed tiles).

Figure 1. Study in real conditions

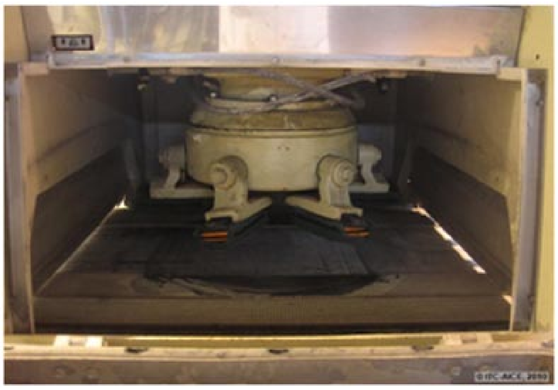

Figure 2. Polishing head grinding tool holders

3. LABORATORY WEAR SIMULATION

The laboratory test methods that are used to simulate the evolution of flooring subject to wear by pedestrian traffic generate worn surfaces that are too small to allow evaluation of the coefficient of friction with the methods that are currently used.

Therefore, in order to be able to study, on a laboratory scale, how changes in a flooring surface affect flooring anti-slip performance, a method needs to be developed that allows worn surfaces to be generated that simulate the actual process and that have a sufficiently large uniform area to be able to evaluate their slip resistance.

The apparatus used was a semi-industrial polishing head. In the test the flooring sample travels on a belt under the rotating head. The head has 6 grinding tool holders (Figure 2), in which different abrasive materials can be placed.

In order to establish the appropriate abrasive material, the information obtained in previous ITC wear simulation studies was used, whose results have led to the development of normative document UNE 138001:2008 IN[3]. The selected abrasive was a scouring pad, consisting mainly of quartz with a similar particle size to that of the quartz powder used in the cited document.

The apparatus used allows variables such as head rotating speed, belt speed, pressure applied on the sample, abrasive material, etc. to be controlled. After studying the influence of each of these variables, they were judiciously adjusted to enable real wear conditions to be reproduced, as may be observed in Figure 3.

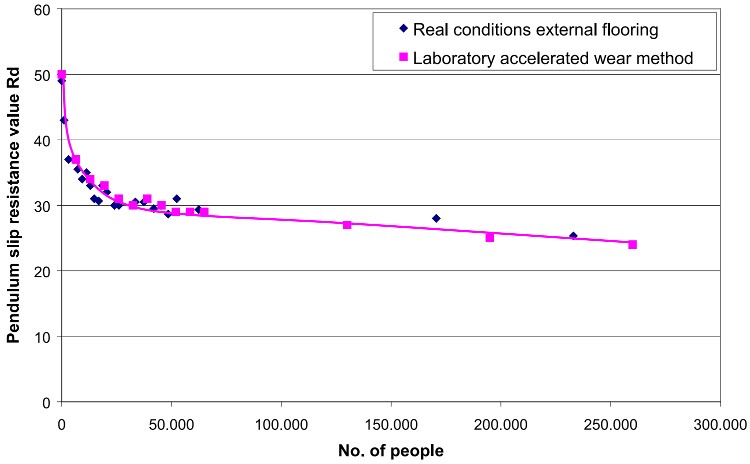

Figure 3. Comparison of real vs. laboratory conditions

4. CONCLUSIONS

- Certain types of surfaces can modify their anti-slip performance significantly in the course of their working life.
- The wear method developed generates sufficiently large, uniform surfaces to enable slip resistance measurements with the standard pendulum method to be made.
- Wear conditions were defined that allowed the changes produced by pedestrian traffic in actual external service conditions to be simulated. The correlation was validated by comparison with the results obtained of the *in situ* study.

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