SLIP RESISTANCE

IMMINENT CHANGES TO THE AUSTRALIAN STANDARDS?

by Richard Bowman

Since 'The New Australian Slip Resistance Standard', was published in late 1994, readers have been able to keep abreast of the issues in this controversial topic in a series of articles: 'Changing Slip Resistance Standards', 'Due Care in Selecting Tiles for Slip Resistance', 'Resolving Grey Areas of Slip Resistance', 'Slip Resistance Standards Provide No Unconditional Guarantees', and 'Progress on the Slip Resistance Front'. This article hopefully completes the cycle before adoption of the new Australian slip resistance standards. We asked Richard Bowman for a concise update on changes in the draft standards.

"Not slip resistance again!" might be some peoples' initial reaction attitude to this article. However, since the public is increasingly refusing to tolerate any unnecessary risk, architects expect that tile merchants and manufacturers will be able to provide technical information that will enable them to select products appropriately.

If one extrapolates from a recent American paper, the total annual economic cost of fall injuries in Australia can be estimated to be $3 billion. Unless action is taken, we should expect this cost to increase due to population growth, and particularly due to ageing of the population.

There are many factors that can cause slip and fall accidents, other than the characteristics of a new tile: its condition at the time of the incident, the presence and type of contaminant, the type and condition of any footwear, the activity that the victim was undertaking, the physical and mental state of the victim, the quality of lighting or degree of visibility, and any change of level or slopes. Since many circumstances are obviously out of the hands of those involved in the tile selection process, it is important that these parties minimise their risk.

While anyone can stumble on any surface due to missteps, and no floor surface will provide a guarantee that a slip, trip and fall accident will not occur, an unplanned excursion to floor level can injure both pride and body. Since most accidents occur unexpectedly, they generally take place too rapidly for the victim to precisely reconstruct the facts. In such circumstances, we have a natural psychological tendency to blame the floor for the incident and to absolve ourselves of any responsibility. Where serious injury results, this can lead to litigation.

One of the purposes for which standards are used, is to provide a frame of reference in cases of litigation. AS 3661 should thus be examined in the light of whether it provides reasonable guidance, and whether this guidance is unambiguous.

An Evaluation of AS 3661.1

This standard recognises two test methods in establishing minimum requirements for the slip resistance of new and existing pedestrian surfaces in both wet and dry conditions. It has higher minimum requirements for ramps and sloped areas.

One of the major difficulties with AS 3661.1 was a problem of its application. Wet areas were defined as 'all external areas plus those internal areas that are normally wet during use'. The possibility that it might be called up in the Building Code of Australia (BCA) was recognised in the note 'It is anticipated that Regulatory Authorities may specify the areas required to be slip resistant and whether these areas are to be considered wet or dry'.

However, the standard was not called up, and architects have been left to interpret the note 'Water should be excluded from all dry areas, for instance by the appropriate design of entrance foyers', when trying to determine what the requirements might be for various locations. For instance, accidental contamination should be expected more frequently in a shopping centre food court than in the shopping centre itself. However, the floor will not normally be wet during use. Furthermore, there are limited design measures that the architect can take to prevent accidental spillage. In this regard, there is an associated note, 'Building operators should ensure correct maintenance procedures are carried out'.

The standard 'may not apply to heavily profiled surfaces where the surface has been specifically manufactured to be highly slip resistant'. Although such surfaces are primarily intended to provide drainage or entrapment of anticipated contaminant materials (particularly during the routine operation of commercial and industrial facilities) this recognises the limitations of the accepted test methods.

The wet pendulum test essentially reflects the quantity and the quality of contact between the rubber slider and the floor surface. The test is affected by the planarity of the surface, where lower results are obtained on curved surfaces due to a smaller effective contact area. It can be appreciated that if this curvature does not affect the slip resistance that is available to the pedestrian, it will rank the slip resistance of surfaces in a different order than subjective human experience. Some product ranges, with consistent surface roughness characteristics, have exhibited a wide range of measured slip resistance due to differences in planarity. In recognising that the measured slip resistance may be more a function of the large scale surface geometry than on the effective contact between the slider and the floor surface, we must accept the possibility that some products that pass the compliance requirement may be less slip resistant than some that fail. This tends to correlate with practical experience where several accidents have reportedly occurred on surfaces that originally passed the compliance requirement. Such a situation raises several issues about the controllability of factors in fall causation, such as whether the characteristics of the surface have changed through wear or due to poor maintenance, but also those of the actions and footwear of the victim. AS 3661.1 recognised that other factors need to be considered.

The standard also recognised that the inclining ramp test method may be more suitable for some laboratory measurements, and that other test methods could be used to meet the specified compliance requirements, for example test procedures based on force plates.

There has also been criticism of the use of a single rubber to represent all footwear solings. Although it is impractical to test each floor material with several soling materials, several accidents have occurred in wet barefoot areas where the tiles have passed the AS 3661.1 wet compliance requirement. It should be noted that the inclining ramp barefoot test method has been found to be far

c.48

more sensitive than the pendulum method for determining wet barefoot slip resistance.

The Proposed Standards

Since AS 3661 was failing to meet consumer needs, it was important that its replacement address all the relevant issues, many of which were discussed in 'Slip resistance standards provide no unconditional guarantees'. The standards' prime customers were recognised to include the manufacturers and providers of pedestrian flooring surfaces, the Australian Building Codes Board (ABCB), architects, property owners and the general public.

The ABCB requires a standard that differentiates between the performance of products, so that it can legislate any slip resistance requirements that are considered necessary for new buildings. At the same time, the standards must provide a means for product manufacturers to demonstrate compliance with quality assurance schemes. Property owners also require recognised procedures for monitoring the condition of existing floors, that would also be suitable for the forensic investigation of accident sites (in a consistent manner).

The standards must provide architects with a simple means of identifying which products are suitable for particular applications. At the same time, they must recognise that product slip resistance characteristics are only one of the design factors that contribute to the risk of slip and fall accidents. Furthermore, the standard test procedures should only be seen as capable of providing a limited indication as to product suitability.

It has been decided that there should be two new standards 'Slip resistance classification of new pedestrian surface materials' and 'Slip resistance measurement of existing pedestrian surfaces', together with a handbook on slip resistance.

The proposed standard for new products contains Table 1. It should be noted that the use of two rubbers creates the possibility of differing product classifications, but it is anticipated that most tile manufacturers will use the Four S rubber (with paver manufacturers using the TRRL rubber). The proposed slip resistance handbook will provide guidance on the selection of products. An example of some general guidance is given in Table 2.

Table 1 Classification Of Pedestrian Surface Materials When Wet

Class	Pendulum*, Mean BPN		Contribution of the floor surface to the risk of slipping when wet
	Four S rubber	TRRL rubber	
V	>55	>45	Very low
W	45-54	40-44	Low
X	35-44	-	Moderate
Y	25-34	-	High
Z	<25	-	Very high

*While either test method may be used, the test report shall specify which method was used.

Since most tile manufacturers have only publicised those tiles that comply with AS 3661.1 on CSIRO's slip resistance Internet database, the industry is unlikely to be aware of the new classifications that other tiles will receive when tested with the pendulum. To aid in this transitional process, CSIRO will offer manufacturers the opportunity to have the slip resistance classifications of their products listed (on the web at http://www.dbce.csiro.au/slip/pubs).

In recognising that the pendulum can discriminate against resilient flooring products, and that it may not adequately discriminate between some products, the standard for new products will incorporate the German standards for pedestrian slip resistance. Although these inclining ramp test methods can only be used in a laboratory, the associated German regulations are credited with having substantially reduced the number of industrial accidents caused by slipping. The slip resistance handbook will include details of the German requirements. Although sufficiently comprehensive to enable architects to select products for a wide range of different occupational contexts, these requirements do not provide for every situation, for example ramps and external walkways.

Table 2 Pedestrian flooring selection guide – minimum recommendations for specific locations

Location	Pendulum	Ramp
External colonnade and walkways	W	R10
External ramps, walkways	V	R11
Entry foyers hotel, office, public buildings wet	X	R9
Entry foyers hotel, office, public buildings dry	Z	R9
Shopping centre excluding food court	Z	R9
Shopping centre - food court	Y	R9
Internal ramps, slopes dry	Y	R9
Communal changing rooms	X	A
Swimming pool surrounds and communal showers	W	B
Toilet facilities in offices, hotels, shopping centres	X	R10
Internal stair nosings (dry)	X	R10
Stair nosings (wet)	W	R11

The ramp requirements in Table 2 were mainly taken from the German regulations. The pendulum requirements were then intuitively derived. Some people may consider that some recommendations provide an insufficient factor of safety. However, it must be recognised that it is the ABCB that will determine whether these or any other requirements should become mandatory. It is unlikely that the BCA will incorporate any requirements until the industry becomes familiar with the classifications, and satisfies itself that they are not unduly onerous.

Although the new standards will be released in September for public comment, the handbook has still to be completed. However, interested parties will be able to obtain some of the proposed details from CSIRO's slip resistance web site (http://www.dbce.csiro.au/pubs/slip).

In summary, AS 3661.1 sought compliance, where there were vague guidelines. The new standards take more of a risk management approach where the handbook will provide design and maintenance advice, including risk assessment checklists. This change in philosophy is encapsulated in the classification descriptor 'contribution of the floor surface to the risk of slipping'. ■

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