COEFFICIENTS OF FRICTION

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It is recognised that slips, trips and falls are the most frequent cause of accidental injury. Slippery pedestrian surfaces such as tiles with little or no non-skid grit are a significant contributing factor in pedestrian falls. Falls in the workplace account for 19 per cent of all workplace injuries sustained, yet very few companies have their floors tested.

The coefficient of friction of a surface can be measured using the Pendulum Friction Test Machine, which measures the friction of the surface when wet, and provides information relating to the slipperiness of a surface. Generally, most pedestrian surfaces are relatively slip resistant when dry; however liquid spills and other contaminants can significantly reduce the coefficient of friction. Anti-slip flooring is readily available for most applications and simple precautions such as non-skid strips (tape), floor coatings and floor finishes can significantly reduce the probability of a person slipping on a surface.

Surface Type	Average BPN	Min BPN	Max BPN	Number of Tests
Vinyl Tiles	25	14	40	18
Tiled Surface	27	9	61	54
Timber	31	13	47	6
Parquetry	32	16	52	10
Painted Concrete	40	19	85	14
Other	41	24	75	10
Concrete Unpainted	50	34	74	5
Carpet	64	45	90	4

The British Pendulum Number (BPN) of a surface is measured by either the Pendulum (wet) Friction Test Machine or the Tortus (dry) Friction Test Machine. In order for the friction tests to be valid, wet floor tests must be conducted using the Pendulum Friction Test Machine according to the procedures specified in AS 4663 – 2004: *Slip Resistance Measurement of Existing Pedestrian Surfaces*. The Pendulum Friction Test Machine is an internationally recognised friction testing device suitable for most surfaces.

The authors have analysed the results of 121 friction tests conducted by Delta-V Experts staff evaluating floor surfaces as a result of legal action, and found that the most common surfaces tested are 'tiled surfaces', accounting for 45 per cent of the tests analysed. Vinyl tiles, on average, have the lowest coefficient of friction of surfaces tested. Of the 121 tests analysed, 85 per cent of surfaces failed to comply with the requirements of the relevant standard at the time of testing or HB197. HB197 is a publication by CSIRO and Standards Australia, which provides a basis for establishing pedestrian surfaces for various locations and purposes. HB197 provides a minimum allowable coefficient of friction (or BPN) for a given surface and, accordingly, the surface is deemed to comply or fail to comply based on the test results. It is important to note that the results are biased as the results have been acquired through investigations conducted into incidents.

In supermarkets, either vinyl tiles or laminate are typically used. The vinyl tiles tested typically have a BPN of approximately 25. HB197 recommends that supermarkets have a BPN of at least 25 in dry areas and at least 35 in fresh fruit and vegetable areas. It is good practice to ensure that the flooring throughout a supermarket has a BPN of at least 35 to account for pedestrians carrying fresh fruit and vegetable throughout the supermarket. A good alternative which has been used previously is the use of carpet or textile flooring in supermarkets, to significantly reduce the risk of a person slipping. Specific retail flooring applications are available which provide a high coefficient of friction, high levels of hygiene, and have specific applications in high-traffic areas. Textile flooring utilises individual upright fibres. Similar flooring has been used in supermarkets, and for ramps and stairs, fire exits and in airports. Tiled or timber surfaces will generally allow water and objects to remain on the surface, creating a low coefficient of friction and increasing the probability of a person slipping. The use of carpet or textile flooring significantly reduces the risk, as moisture is absorbed and the coefficient of carpet is significantly higher when compared to a tiled or vinyl surface. ■

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