SLIP RESISTANCE

EN 14231 Pendulum testers

Slips and trips are the most common cause of injuries at work:
• 95 per cent of major slips result in broken bones
• they are estimated to cost the UK economy more than £1 billion a year in terms of staff replacements, claims and lost business; the human cost is incalculable
In UK one slip or trip accident is estimated to happen every three minutes.
In each country the are laws that requires that walking surfaces be safe, that effective means of drainage be provided where necessary, and that contamination be avoided as far as reasonably practicable
For this reason, there are many methods to measure the slipperiness of flooring. The problem is very complex and a proper evaluation should follow a holistic approach. We'll talk about the standard european EN 14237 and en give indications on the use of results, without going into detail

EN 14273 – UNI EN 14237 - British pendulum	
	This simulates the action of a shod foot slipping by swinging an imitation heel clad with standard soling rubber over the test surface. EN 7976 *Pendulum testers* defines the apparatus and test method, while other standards, EN 14231 *Natural stone tiles*, refine the test method for particular floor coverings. PTVs can be obtained for dry surfaces and surfaces contaminated with water. The test EN 14273 for the natural stone is made with rubber TTR or TTRL. The result is a number variable from 0 to 150 (where 0 is no friction and 150 is maximum)

USING THE RESULTS_

The criteria for judging the results of slip resistance tests are based on the work of the Building Research Station in the 1960's, supported by the experience of investigators and bodies such as the former GLC over the last 40 years. This work suggested that for unencumbered, able bodied, working aged people a ***PTV level of 36 or above represented an acceptably low risk*** of slipping when walking in a straight line on a level surface. This table below is based on these results, and is used for readings with both Slider 96 and Slider 55:

Slip potential classifications for PTV

Slip Potential	***PTV***
High	0-24
Moderate	25-35
Low	36+

The friction required for other situations may be higher, for example, on slopes, when pushing loads, changing direction and moving more quickly.
When walking on a slope, a higher level of slip resistance is required than on the level to achieve the same degree of safety. The target PTV on a slope compared to a level walkway needs to be increased by: 100 x tangent a (a is the slope angle)
Calculating the required slip resistance for slopes will show that steeper angles (>10°) give rise to requirements that are not commonly achieved by flooring materials in wet conditions. Where slopes are introduced to aid manual handling the additional friction required by the activity should be considered too.

INTRODUCTORY GUIDE TO THE SLIP RESISTANCE OF PEDESTRIAN SURFACE MATERIALS HB 197 : 1999 STANDARDS AUSTRALIA,

EN 12347 test results	AS/NZS 4586 Classification
> 44	V
40 - 44	W
35 - 39	X
20 - 34	Y
< 20	Z

PEDESTRIAN FLOORING SELECTION GUIDE - MINIMUM PENDULUM

Location	Pendulum
External colonnade, walkways and pedestrian crossings	W
External ramps	V
Entry foyers hotel, office, public buildings - wet	X
Entry foyers hotel, office, public buildings - dry	Z
Shopping centre excludinq food court	Z
Shopping centre - food court	X
Internai ramps, slopes (greater than 2 degrees) - dry	X
Lift lobbies above external entry level	Z
Other separate shops inside shopping centres	Z
Other shops with external entrances - entry area	X
Fast food outlets, buffet food servery areas	X
Hospitals and aged care tacililies - dry areas	Z
Hospital and aged care faciiities - ensuites	X
Supermarket aisles except fresh food areas	Z
Shop and supermarket fresh fruit and vegetable areas	X
Communal changing rooms	X
Shop and supermarket fresh fruit and vegetatile areas	X
Communal changing rooms	X
Swimming pool surrounds and communal shower rooms	W
Swimming pool ramps and stairs leading into water	V
Toilet facilities in offices, hotels, shopping centres	X
Undercover concourse areas of sports stadium	X
Accessible internai stair nosings (dry) - handrails present	X
Accessible internai stair nosings (wet) - handrails present	W
External stair nosings	W

TABLE 3
PEDESTRIAN FLOORING SELECTION GUIDE – MINIMUM PENDULUM OR RAMP RECOMMENDATIONSFOR SPECIFIC LOCATIONS

Location	Pendulum	Ramp
External colonnade, walkways and pedestrian crossing	W	R10
External ramps	V	R11
Entry foyers hotel, office, public buildings - wet	X	R10
Entry foyers hotel, office, public buildings - dry	Z	R9
Shopping centre excluding food court	Z	R9
Shopping centre – food court	X	R10
Internal ramps, slopes (greater than 2 degrees) - dry	X	R10
Lift lobbies above external entry foyer	Z	R9
Other separate shops inside shopping centres	Z	R9
Other shops with external entrances – entry area	X	R10
Fast food outlets, buffet food servery areas	X	R10
Hospitals and aged care facilities – dry areas	Z	R9
Hospital and aged care facilities – ensuites	X	A or R10
Supermarket aisles except fresh food areas	Z	R9
Shop and supermarket fresh fruit and vegetables areas	X	R10
Communal changing rooms	X	A
Swimming pool surrounds and communal shower rooms	W	B
Swimming pool ramps and stairs leading into water	V	C
Toilet facilities in offices, hotels, shopping centres	X	R10
Undercover concourse areas of sports stadium	X	R10
Accessible internal stair nosings (dry) – handrails present	X	R10
Accessible internal stair nosings (wet) – handrails present	W	B or R11
External stair nosings	W	R11

NOTE:
1. Appropriate measures need to be taken to exclude casual water from dry areas.
2. All floors with a wet pendulum classification of Z should have a dry friction classification of F unless normal usage dictates that the floor should have a low dry coefficient of friction, e.g. dance floors.
3. Table 5 contains higher requirements for some specific types of shops.
4. Refer to Tables 2, 4 and 5 in AS/NZS 4586 for derivation of classifications.

Tables 2 & 3 – From *An Introductory Guide to the Slip Resistance of Pedestrian Surface Materials HB 197 : 1999*, Standards Australia, Sydney, New South Wales.