

ocean+ merchant pty ltd

Unit 3 40 - 46 McEvoy Street  
Waterloo NSW 2017 Australia  
Email: info@oceanandmerchant.com

tel: + 61. 2. 9310 4088

fax: + 61. 2. 9310 4096

## Slip Resistance

First and foremost it is important to note that there is no worldwide standard test for slip resistance. With over 20 different slip meters having been invented since the first device in the 1930's it is not surprising it is such a contentious issue. In fact there is a wide range of variants that can interfere with slip resistance. These can be in the form of the wide range of contaminants such as water, soaps and fats that are often found on walking surfaces but also in the fact that the slip resistance of tiles can vary from one production run to another. Even poor maintenance can compromise the friction that is available in a tile.

"Slip resistance is based on the fictional force necessary to keep a shoe from slipping on a walking surface under conditions likely to be found on the surface." – ADAAD Appendix (Americans with Disabilities Act Accessibility Guidelines)

Slip resistance has even had its own unit of measurement made for it called the Coefficient of Friction (COF). It is measured by determining the amount of force required to create the movement of an object across a surface.

One of the first modes of measuring slip resistance was 'The James Machine' which was developed in the 1940's. This was one of the first portable testing systems. Its design and building was backed by The Chemical Manufacturers Association and many of the leading floor manufactures. However this test was used for strictly dry floors only, the logic being that a wet floor was the consequence of poor maintenance.

The two most popular and widely known ways of testing slip resistance is the ramp test and the pendulum test.

The Pendulum test involves a specified weight with a surface or "sensor" such as leather (being considered the slipperiest shoeing available) rubber or neolite, these being the products commonly found as the soles of shoes. This weight is swung against the surface in question. The more pressure required to pull the weight, the more resistance exists on the floor.

The Ramp test is simpler to explain and is truer to real life situations; however this test can not be taken on an existing floor which is its downfall. The test is carried out by an operator standing either barefoot or shoe shod on a ramp. The ramp is then slowly tipped, at the moment of slippage the level of elevation is measured in degrees. If the operator is barefoot the ramp is lubricated with water. Alternatively is he is wearing shoes the ramp is lubricated with engine oil. Thus the idea is that the tiles are tested for the extremist of conditions.

Slip resistance is measures from 0-1 with increments measured in tenths of a point. The Closer to 0 a surface is the less slip resistant.

< 0.5 – Not a slip resistant product.

>0.5 – Meets OSHA recommendations for slip resistant walking or working surfaces,

> 0.6 – Meets ADA recommendations for slip resistant accessible routes (level surfaces)

> 0.7 – Higher level of slip resistance for special situations.

The barefoot ramp test is rated from A-C

A = Person slips between 12-18 Degrees

B = 18-24 Degrees

C = 24 > Degrees

Rating	Description
A	Suitable for a slope up to 12%
B	Suitable for a slope up to 18
C	Suitable for a slope up to 24%

It is from the Shoe shop ramp test that we get the most well known measurement for slip resistance that is R9-R13.

R10 = person slips between 10-19 Degrees angel of elevation.

R11 = 19-27 Degrees

R12 = 27-35 degrees

R13 => 35 degrees

	Ramp	Pendulum
<b>Dry Shod</b>	R9	Minimum 40
<b>Wet Shod</b>	Minimum R10	Minimum 40
<b>Wet Barefoot</b>	B = Pool surrounds C = Showers	Not currently available

Rating	Description
R9	Suitable for a 10% slope
R10	Suitable for a 19% slope
R11	Suitable for a 27% slope
R12	Suitable for a 35% slope
R13	Suitable for a slop of greater than 35%

### R9

This level of Slip resistance can vary quite widely with some tiles being quite slippery to tiles of moderate slip resistance. Tiles with an R9 will be required for general walking areas in shopping centers but can also be found in residential areas.

### R10

This is technically one step up from R10 however the difference between R9 and R10 can be very minimal. An R10 rating will be required for Hotel entry foyers, external walkways, shopping centre foods courts and occasionally on stair nosing (note that an R10 is only the rating required for stair nosing in dry conditions).

### R11-12

Will be required on external ramps and stair nosing. R12 is required in similar areas but can be used for production areas & for council specifications.

### R13

This slip resistance rating is relatively young; (being only around 20 years old) was designed specifically for increased demands of meat processing plants. Places where fats, bloods and other proteins and fluids commonly end up on the ground and underfoot. This slip finish has a superior performance to any other paver or tile system.

#### DISCLAIMER

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Country specific recommendations, depending on local standards, codes of practice, building regulations or industry guidelines, may effect specific installation recommendations.

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