

Understanding Slip Ratings



The Problem

It is unfortunate, and indeed inconvenient, that a universal system for the classification of slip resistance and slip risk does not exist. There are a couple of likely reasons for this; Flooring systems are designed, produced and tested all around the world and individual countries will favour particular methods, and it is in the interests of flooring manufacturers/suppliers to favour 'easier' tests, or tests that serve the widest market.

Whether purchasing or specifying a tile, commissioning an anti-slip treatment or dealing with a slip accident claim it is always beneficial for responsible parties to understand the ratings that those selling products or services are using. Incorrect data, or even poor interpretation of the right data, will typically leave responsible parties (rather than the seller) exposed to legal action. We have put together this guide to help those responsible for the safety of others to provide safer surfaces, reduce accident rates and ultimately save time and money.



Common Slip Test Methods

Perhaps the most common test data used in the UK comes from Pendulum testing or Ramp testing, producing values as below.

Method	Condition	Rating
BS 7976 'Pendulum'	Shod/barefoot in dry/water wet	PTV
BS EN 13036 'Pendulum'	Shod in water wet	PTV
DIN 51130 'Ramp'	Safety boots in motor oil	R9-R13
DIN 51097 'Ramp'	Barefoot in soap solution	A, B or C

Important components of a useful test are that it is reliable and repeatable, that it is portable, that it reflects the conditions in end use, and that the data it produces can be interpreted meaningfully. All test methods will have benefits and drawbacks and there is no 'perfect' method. In lieu of a 'perfect' method, we use, and would strongly recommend, the regulator's preferred method. The preferred in situ slip test method of both the Health and Safety Executive and the UK Slip Resistance Group, is the BS 7976 Pendulum.



Pendulum Test Values (PTV's)

BS 7976-2 'Pendulum' testing produces a PTV (Pendulum Test Value), but just knowing the PTV isn't enough. A PTV should always be accompanied by the condition in which it was produced (dry or wet) and which slider was used (#96/4S for footwear and #55/TRL for barefoot). Without this additional information the PTV is meaningless.

It should be noted that the Pendulum can be operated to a variety of methods in addition to BS 7976. Alternative methods still produce PTV's but sit outside the recommendations from the HSE and UKSRG. If you want to be confident in the slip resistance of your floor you should seek BS 7976 Pendulum test results.

PTV's are classified into risk brackets as follows;

PTV Range	Risk of Slip
36PTV or greater	Low
25PTV to 35PTV	Moderate
24PTV or less	High

It is widely accepted that the risk of slipping increases exponentially below 36PTV. A commonly cited study gives the rate of slips/falls at particular PTV's. For instance, at 36PTV the likelihood of slipping is 1 in 1,000,000, whereas at 24PTV it predicts a 1 in 20 chance of slipping. In our experience these figures typically overestimate the rates at which accidents actually occur.

The requirements for slip resistance vary depending on environment. A workplace, for instance, should (under Reg 12 of the WHS&W Act) have a slip resistant floor regardless of cost/practicality, whereas a public space requires reasonable measures to be taken to ensure a safe floor. In order to demonstrate a 'safe' floor, those responsible should seek a 'low risk of slip' classification (36PTV or greater) in the conditions of end use. If the floor can be kept clean and dry in end use then wet PTV's are arbitrary, but if someone slips on a wet surface responsible parties are highly likely to be liable.

For every single personal injury case in which we have given evidence it has been the 'low risk of slip' 36PTV boundary which has been of crucial importance. A 'moderate' or 'high' risk of slipping has been treated as similarly insufficient provision of a safe walking surface.

If you have a recent BS 7976-2 'Pendulum' test certificate that shows your floor achieves 36+PTV in the conditions of end use you can be confident your surface is 'safe' in terms of slip resistance, and it is very likely will be able to successfully defend any slip injury prosecution or personal injury claim.



R Values (DIN 51130)

R9 to R13 values are produced by a German method in common operation, DIN 51130. The R values classify the angle at which an operator slips when walking on a sample in oily conditions with safety footwear.

R9 is the most slippery, with slips occurring between 6° and 10°. R13 is the least slippery, with slips occurring at angles in excess of 35°.

R values remain perhaps the most common slip test rating quoted, possibly because R9 is often misunderstood as being 'anti-slip', a favourable circumstance for those selling flooring products.

Despite the widespread use of the method, there are serious limitations. Tests cannot be conducted on in situ surfaces (without physically removing the floor from site and sending it to a lab) and tests reflect grip experienced by those in safety footwear in oil contaminated conditions (uncommon in real life situations).

It may be that German institutions hold evidence that suggests that particular R values equate to particular slip accident rates, in the same way that UK institutions do with PTV's, however we are not aware of any such data. The DIN 51130 and BS 7976 methods do not correlate, and it is impossible to obtain a PTV from an R value or vice-versa. This means the view from a UK laboratory (such as us) can only be that R values are a poor indication of the risk of a slip occurring. It is certainly the case that R values should not be relied upon to demonstrate a safe surface to a UK legal system.

If you must rely on R values alone, it is *likely* that an R11 or R12 surface will present a (wet) 36PTV or greater result and an associated (wet) low risk of slip classification.



A, B or C Ratings (DIN 51097)

Similar to DIN 51130, the DIN 51097 test measures the angle at which an operator slips when walking on a flooring sample. Crucially, this test is conducted with a barefoot operator and soapy water contamination. These contaminants more closely match the conditions which can be found in wet leisure environments and in our opinion these results can be considered a good indication of the slip resistance an end user could expect in the same conditions.

Results are classified as 'A', 'B' or 'C', with 'A' being most slippery and 'C' being least slippery. It is widely quoted that 'B' classification surfaces are suitable for wet areas such as showers or wet steps, however we would strongly advise against use of 'B' classification surfaces in any wet barefoot area. A 'C' classification is a good indication that the surface will present a safe level of grip in wet conditions for barefoot users.

The method still suffers from the main drawback of not being suitable for in situ testing. This is compounded by the fact that flooring surfaces in wet leisure environments will typically change rapidly with contamination/cleaning cycles and warrant regular testing, arguably more than any other environment. The wide classification brackets further hamper the usefulness of the method.

Ramp tests conducted by the Health and Safety Laboratory using the same sole and contaminant types as BS 7976 Pendulum testing have shown good correlation, so it is reasonable to assume that DIN 51097 and barefoot BS 7976 results would show similar correlation. If DIN 51097 results are the only ones available, it is expected that a 'C' rating will usually mean a wet barefoot Pendulum result of 36PTV or greater and an associated 'low risk of slip' classification.



Other Test Methods

There are a wide range of less common slip test ratings, with new methods and ratings emerging all the time. It is important to note that for the UK market, BS 7976 Pendulum test values should be considered above all others. If you are faced with a rating which you cannot decipher, those providing the rating should be in a position to give further advice. If you require an expert and independent view, we will always be happy to help at Munro.