

## HSE slip resistance guidelines

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### Slip resistance

The slip resistance of a floor finish is the most important safety consideration. Effective and suitable slip resistant characteristics will reduce the likelihood of slipping, particularly for older, mobility impaired and visually impaired people.

Slip resistance of a floor depends upon many factors:

- The roughness of the surface.
- Whether it is wet or dry when in use.
- Whether the floor finish is regularly contaminated by liquids or other contaminants.
- The wear characteristics of the floor finish.
- Implementation of a suitable cleaning and maintenance schedule.

In addition to the above there are other factors that can affect the slip resistance and performance characteristics of a floor finish, these include:

- Lighting and glare.
- Humidity.
- Slopes and ramps.
- Visual or acoustic distractions.
- Type of footwear worn.

Where there is a change of floor material or texture there is an increased risk of slipping or tripping if the coefficient of friction values of the two materials varies greatly. This can be minimised by locating the material or finish change at predictable locations ie door or wall openings.

Slip resistant floor finishes are recommended for use in areas where safety is paramount ie entrances, ramps, stairs and landings, escape routes, commercial kitchen areas, areas adjacent to hazardous machinery or activities and areas subject to frequent wetting ie shower floors, swimming pool surrounds – this is not an exhaustive list.

Based on recommendations from the HSE, you should use floor finishes that achieve a Pendulum 4S (slider 96) of 36+ for shod foot areas, and/or a Pendulum TRL (slider 55) of 36+ for wet barefoot areas, to achieve a low slip potential environment. We personally suggest using a structured tile with Pendulum 4S (slider 96) of 40+ for external floor areas and Pendulum TRL (slider 55) of 40+ for wet barefoot areas, as good practice, due to possible slight variation from tile to tile and possible cleaning and maintenance issues.

The table below illustrates how the HSE categorise the results from the Pendulum test for both the 4s (slider 96) and TRL (slider 55).

Classification	Pendulum Test Value (PTV)
High slip potential	0 - 24
Moderate slip potential	25 - 35
Low slip potential	36+

### Maintaining slip resistance of floor finishes

The two main factors that affect the ongoing slip resistance performance of a floor finish are wear resistance and surface contaminants.

#### Wear resistance

Of all the floor finishes available to the commercial specifier un-glazed porcelain tiles have the greatest wear resistance. Correctly specified and installed unglazed porcelain tiles would be expected to last the lifetime of the building. The slip resistant characteristics of an un-glazed porcelain tile are maintained with the implementation of a suitable cleaning regime.

#### Surface contaminants

Areas subject to expected surface contaminants should incorporate the use of slip resistant floor tiles. The degree of slip resistance changes with the predicted contaminant – for example water as a contaminant has less of an effect on slip resistance than gear oil or margarine. Further details can be found on [www.hse.gov.uk](http://www.hse.gov.uk).

### Falls in floors

Where fluid contamination cannot be avoided HSE guidance recommends that floors be laid to falls so that the majority of the contamination drains away to properly constructed outlets. The use of profiled tiles allows the contaminant to collect in the low areas whilst the high areas remain relatively dry or at least above the surface of the contaminant. The degree of slope of a fall depends upon many factors including – surface contaminant, degree of usage, affected area etc. As an example a minimum fall of 1:50 is recommended in the “Specifiers Handbook for Inclusive Design – Internal Floor Finishes” available from RIBA Bookshops: [www.ribabookshops.com](http://www.ribabookshops.com).

### Locations subject to surface contamination

#### Swimming pools and wet areas

Floor finishes to wet barefoot areas (showers, wet change facilities, swimming pool steps and surrounds etc) must be slip resistant when wet and have a non-abrasive surface.

- Should be easy to keep clean so that the slip resistance of the floor material is maintained at all times.
- Should have a texture that is as comfortable as possible for bare feet.
- Should be laid to falls.
- Should incorporate flush drain covers wherever possible. Should use floor finishes that achieve either category “B” or category “C” slip resistance when tested by DIN51097 Wet Ramp Test. (Category “C” has greater slip resistance than category “B” – in certain locations only category “C” is suitable).

### Commercial kitchens

Hygiene and slip resistance are extremely important in commercial kitchens. Kitchens are likely to not only receive water contamination but also wet and dry foods and oils and greases from cooking either through spillage or splashing.

Floors for commercial kitchens should provide sufficient surface roughness to create a slip resistant finish. Roughness values of over 20 microns are normally adequate (“Specifiers Handbook for Inclusive Design – Internal Floor Finishes” available from RIBA Bookshops) for areas that are frequently or permanently wet.

Floor finishes should also be easy to clean and stain resistant to maintain hygiene.

**Further information on slip resistance and good practice for flooring is available from the HSE website [www.hse.gov.uk/slips](http://www.hse.gov.uk/slips)**

### Surface microroughness

Testing surface microroughness with a roughness meter, is subject to on-going research and subsequently is not subject of a British Standard like the Pendulum test. However when surface microroughness data is used to supplement pendulum data, research has shown it gives a good indication of slipperiness in water contaminated environments.

Surface microroughness has limitations, and is unsuitable for measuring undulating, profiled or very rough floors. Classic examples of this are raised profile tiles such as Kerastar Discface, which a roughness meter cannot measure effectively. Further information is available at [www.hse.gov.uk](http://www.hse.gov.uk).

### Ramp Tests

The German ramp test is used to generate the DIN 51130 R ratings and DIN 51097 ABC ratings used commonly in North Europe. These tests can only be carried out in a laboratory, so does not allow in-situ testing of materials.

R Ratings (DIN 51130) – This is a shod foot test which uses oil as a contaminant. These results are interpreted into 5 groups, R9 to R13. R9 being the slipperiest and R13 being the least. Please note: R9 is not suitable for areas requiring slip resistance. There are no such categories as R1 – R8.

ABC Ratings (DIN 51097) – This is a wet barefoot test where a soap solution is applied as a contaminant, the results from this test are placed into three categories:

**Class A** – Dry areas including dry changing areas, dry barefoot corridors.

**Class B** – As A plus pools surrounds, communal showers, pool beach areas, wet change areas.

**Class C** – As A and B plus pool surround inclines, walk through pools, Jacuzzi floors and seats, in lined pool edges and steps.

R and ABC rating have generally been used to assess product suitability in the UK. However this is changing dramatically in accordance with recommendations from the HSE with the preferred test method being the Pendulum test.