

SLIP

RESISTANCE

Why is Slip Resistance so Important?

It is about health, wellness and liability. Below are some statistics about **SLIP & FALL**:

- They account for over 1 million hospital visits
- The leading cause of workers compensation claims
- Floors and flooring material contribute directly to more than 2 million fall injuries each year.
- Incidences of fall go up with each decade of life.
- Compensation and Medical Costs totaled \$60 - \$70 billion annually
- The average cost of an incident is \$30,000-\$40,000

We need to be aware of these issues and guide our clients to the correct material for the correct situation.

It never fails that your client loves the high polished porcelain tile, and they want to install it directly outside their tub, shower or pool. While beautiful when wet it could be deadly, maybe that is an exaggeration, but how about they live with it for 2 weeks and then want a refund because it is "too slippery". We do not want to get into this situation, so you need to understand slip resistance. In the US our ANSI standard is based on the DCOF, Dynamic Coefficient of Friction. In a commercial setting this responsibility lies on the specifier, but as a partner we must be able to advise competently.



"If you fall, I'll be there"

-Floor

AREAS TO ASK THE QUESTIONS

- Shower/Steam area
- Pool Deck
- Lobby Entry
- Ramps and Inclines
- Automotive or Commercial Kitchen
- Elderly Care Facilities
- Hospitals

DCOF

The US standard for tile is ANSI 137.1 and they give suggestions on what the DCOF of a tile needs to be depending on use. It is in section 6.2.2.1.10. The test method is described in-depth in ANSI A326.3. There are a lot of variables that contribute to a tile being slippery, type of shoe, water and/or other contaminants. This is why understanding the tile use is critical. ANSI has further clarified the designation with the following Product Use Classification:

(ID) Interior Dry > .42 Dry DCOF

(IW) Interior Wet > .42 Wet DCOF or Manufacturer-Declared

(IW+) Interior Wet Plus – Manufacturer-Declared

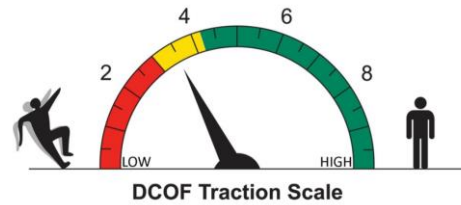
(EW) Exterior Wet – Manufacturer-Declared

(OG) Oil/Greases – Manufacturer-Declared

Dynamic Coefficient of Friction (DCOF)

Sometimes called kinetic coefficient of friction. This is the ratio of the force necessary to keep a surface already in motion sliding over another surface divided by the weight (or normal force) of the sliding object. Different contaminants such as dirt, water, soap, oil or grease can change this value.

There are other testing procedures used in different areas of the world. Sometimes you will see their slip rating designation. The next page has a chart and with the compiled data of different tests. While this is not 1 for 1 accurate it can give you a rule of thumb or guidance to make general decisions. If you have a tile that has a value near the line you can always get clarification from the factory.



DCOF 0.42

The minimum for potentially wet and level applications

Comparison Chart

Slip Hazard Property	Example	US ANSI DCOF	US OLD SCOF	Foot Covering Ramp Test	Barefoot Ramp Test	Flat Surface Pendulum Test (PTV)	Incline Surface Pendulum Test (PTV)
Dry & Level Interior (ID)	homes, lobbies, retail, cafeteria, hospital, (excluding food areas)	Any	.21 - .27	R9 & R10	Group A	P11 – P34	P2 – P25
	Old COF Standard	.38	.60				
Wet & Level Interior (IW)	entry areas, supermarket produce (occasional water)	>0.42	.33- .44	R11 & R12	Group B	P34 – P70	P25-P61
Exterior Applications (EW)	public showers, steam room, locker rooms	>0.60	.64 - up	R13	Group C	P70+	P61+
Pool Decking (IW+) (min footwear)	walkways, gazebos or patios	>0.60	.64 - up	R13	Group C	P70+	P61+
Oil (O/G)	automotive, food preparation	>0.60	.64 - up	R13	Group C	P70+	P61+
Ramps & Inclines	wheelchair ramp, sidewalks, driveways	>0.65	.64 - up	R13	Group C	P70+	P61+

*Use this chart a reference. Confirm intended use with the manufacture.

DIN 51130

Although originally a German test method, the DIN 51130 has been an established worldwide test within the tile industry for a number of decades. The test itself consists of a platform area of the tiles over which an operator, placed in a harness, wearing rubber-soled boots, walks on the platform which has been lubricated with oil and is gradually raised at an angle, when the operator slips the angle is noted. After a number of repeat tests, the angle is averaged and is used to determine an 'R rating' for the tile.

DIN 51097

The DIN 51097 Barefoot test method is as the DIN 51130 except in this instance the lubricant used is water and the operator is barefoot. This test method is specifically designed for guidance relating to swimming pools etc. The angle achieved before slip equates to a letter rating: A, B or C and each letter is assigned to a specific area of use.

DIN 51130 Shod Ramp Test

R9 - Best used in dry indoor areas: Bathrooms*, kitchens*, hallways*, living rooms, bedrooms and studies.
Generally smooth surface gloss or matt tiles which can produce a slip hazard when wet, as a shoe may slid over the tiles
**Suitable matting should be in place to absorb water splashes etc*

R10 - Best used in indoor or outdoor areas where there may be minimal wetting remaining on the surface: Bathrooms, kitchens, hallways, food courts, commercial areas with external entrances.
The tile surface will generally be a textured matt glaze, sometimes with a slight surface structure, designed to prevent shoes from sliding over their surface.

R11 - Best used in areas which may be subject to heavy wetting of the surface: Wetrooms, exposed balconies, patios.
The tile surface will usually be a heavier textured matt glaze, sometimes with a slight surface structure, designed to prevent shoes from sliding over their surface. Designed for both indoor and outdoor areas, where there can also be the presence of other surface contaminants, such as liquid soaps and leaf debris.

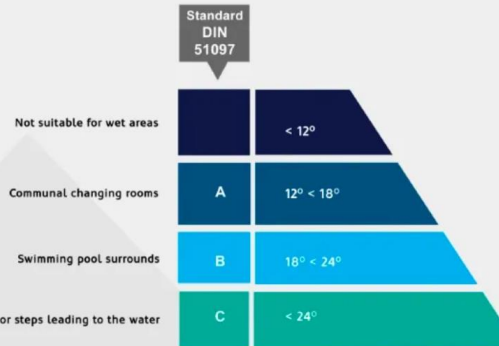
R12 - Best used in areas which may be subject to heavy wetting of the surface: Wetrooms, exposed balconies, patios, swimming pool surrounds, factory production lines, vehicle inspection pits.
The tile surface will often have deep recesses to drain water and other liquid contaminants from the raised surface areas

R13 - Best used in areas which may be subject to heavy wetting of the surface combined with other contaminants, steps or ramps: Commercial swimming pool and spa surrounds, Factory production lines, vehicle inspection pits
The tile surface will have very deep recesses to drain water and other liquid contaminants, such as oils from the raised surface areas and are designed for commercial areas including industrial process areas where there is dangerous equipment present



DIN 51097 Barefoot Ramp Test

The Barefoot test method is as the DIN 51130 except in this instance the lubricant used is water and the operator is barefoot. This test method is specifically designed for guidance relating to swimming pools etc. The angle achieved before slip equates to a letter rating: A, B or C and each letter is assigned to a specific area of use.



BS7976 and UNE ENV 12.633 Pendulum Tests

There are a number of pendulum tests although the main two used in the tile industry are the BS7976 and the UNE ENV 12.633 tests. As the name suggests, a swinging imitation heel is dropped from a 90o angle sweeping over the tile surface. The surface of the tile offers frictional resistance, slowing the heel and reducing the angle reached on the other side. From this a PTV (Pendulum Slip Value) can be determined.

