

# Slip resistance

## DIN EN 16165:2021-12 Determination of slip resistance of pedestrian surfaces – Methods of evaluation

As part of the revisions of country-specific standards, in December 2021 a European standard was developed with DIN EN 16165, which lays down uniform measurement methods for the slip resistance of floor coverings; these methods are binding for all European countries.

### Test procedure

- Testing by walking barefoot on an inclined surface
- Testing by walking on an inclined surface wearing shoes
- Pendulum testing
- Tribometer testing

## Slip resistance of floor tiles


The EU Construction Products Regulation No. 305/2011 requires floor coverings to be safe to use. This imposes the observance of special requirements pertaining to slip resistance in areas where a danger of accidents is to be assumed. The corresponding standards were drawn up by the Committee for workplaces (ASTA) and published in form of technical regulations.


These requirements also include those for slip resistance – specification sheet ASR A1.5. Technical regulations for workplaces - Flooring, current version of March 2022 (formerly BGR/GUV-R 181, or DGUV Rule 108-003 for commercial areas) and for barefoot areas the specification sheet 'DGUV Information 207-006 – Floor coverings for wet barefoot areas' (previously BGI/GUV-I 8527, updated version of May 2020) of the DGUV accident-insurance association. These two sets of rules serve as a basis and are also used for other areas of use.

Areas subject to a danger of slipping (e.g. circulation areas in public buildings, retail and wholesale premises, swimming pools, sanitary rooms, Handicraft and industrial firms) require slip-resistant floor coverings, e.g. consisting of glazed or unglazed vitreous or porcelain stoneware tiles with a slightly rough, rough or profiled surface. When small-format tiles are used, the high proportion of joints has a positive effect on the degree of slip resistance.

Slip-resistant coverings in publicly accessible areas are distinguished according to those that are walked over barefoot or in footwear. No rules have been issued to date with regard to areas for private use – such as in private bathrooms and kitchens or guest rooms and their bathrooms in hotels. When installing floor-flush showers, the use of tiles with slip-resistance for bare-foot areas is recommended. Sanitary areas designed for accessibility are governed by the requirements under DIN 18040-1 in public buildings and DIN 18040-2 in private homes.

The requirements stipulated by the slip resistance are defined in the regulations mentioned below.

With our slip-resistant tiles, you will find the symbols  slip resistance in commercial areas,

 slip resistance in barefoot areas and information about the relevant classification groups.

# Slip resistance

## Slip-resistance properties in commercial applications

### Responsible institutions:

Federal Institute for Occupational Health and Safety,  
Friedrich-Henkel-Weg 1-25, D-44149 Dortmund -  
www.baua.de

Main Association of Employers' Liability Insurance  
Associations, Alte Heerstraße 111, D-53757 Sankt  
Augustin - www.dguv.de

### Area of application:

Floors in work rooms and work areas where there is a  
risk of slipping

### Regulations:

„BGV Professional Association regulations for occupa-  
tional safety and health“ (Published by: Main Association  
of Employers' Liability Insurance Associations) Leaflet  
„ASR A1.5 - Technical Regulations for workplaces - Floors“  
(Published by: Federal Institute for Occupational Health  
and Safety, Committee for workplaces - ASTA)

### Test method:

DIN EN 16165 Annex B

Determination of slip resistance of pedestrian surfaces  
– Methods of evaluation.

DIN EN 16165 combines, inter alia, the test methods  
pursuant to DIN 51130 (R classes), DIN 51097 (A-B-C  
classes) and DIN 51131 (coefficient of sliding friction  $\mu$ ). The DIN standards have been withdrawn but are  
retained as test methods and are described in DIN EN  
16165.

### Walking method:

Inclined plane

### Assessment groups:

Angle of inclination

	Lower limit value	Upper limit value
<b>R9</b>	6°	10°
<b>R10</b>	> 10°	19°
<b>R11</b>	> 19°	27°
<b>R12</b>	> 27°	35°
<b>R13</b>	> 35°	



**R9:** 6° – 10°    **R10:** 10° – 19°    **R11:** 19° – 27°    **R12:** 27° – 35°    **R13:** > 35°

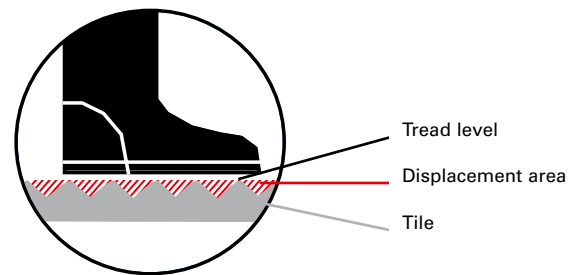
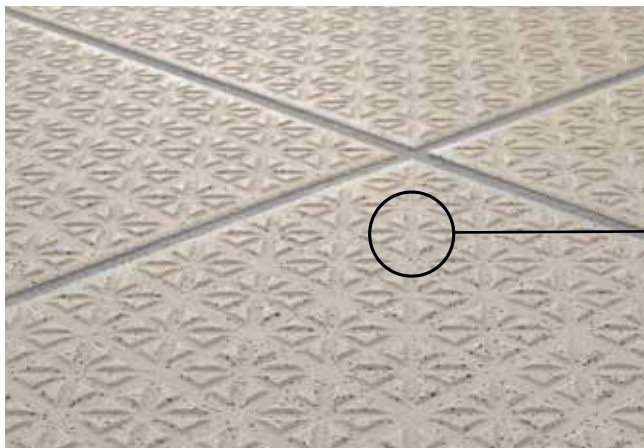
The slip resistance of tiles is tested on an inclined plane  
with a predetermined angle of inclination and classified  
according to rating groups **R9** to **R13**.

# Slip resistance

## Working rooms and areas with risk of slipping in accordance with ASR A1.5 (Technical Regulations for Workplaces, March 2022 issue)

Working rooms and areas are classified according to five assessment groups based on the magnitude of the risk of slipping. Coverings in group R9 are subject to the lowest requirements, while the most stringent requirements apply to group R13 coverings. Working rooms and areas where a displacement space is necessary under the tread level in order to discharge substances that are particularly conducive to slipping are indicated by a „V“ in conjunction with a number specifying the minimum volume of the displacement space.

Designation of displacement space	Minimum volume of the displacement space below the walking area
<b>V4</b>	4 cm <sup>3</sup> /dm <sup>2</sup>
<b>V6</b>	6 cm <sup>3</sup> /dm <sup>2</sup>
<b>V8</b>	8 cm <sup>3</sup> /dm <sup>2</sup>
<b>V10</b>	10 cm <sup>3</sup> /dm <sup>2</sup>



The displacement area is the cavity (marked red) between the raised sections of the tile beneath the tread level.

## Working rooms and areas with risk of slipping in accordance with ASR A1.5

No.	Working rooms and traffic routes	Slipping risk assessment group (standard guideline)	Displacement area with number specifying minimum volume
<b>0</b>	<b>General working rooms and areas *)</b>		
0.1	Entrance areas, indoors **)	R9	
0.2	Entrance areas, outdoors	R11 or R10	V4
0.3	Stairs, indoors ***)	R9	
0.4	Stairs, outdoors	R11 or R10	V4
0.5	Sloping ramps, indoors ***) (for inclines of 3% or more; wheelchair ramps, compensating slopes, one R group higher than for the V value of the access flooring, transport routes)	One R-group higher necessary for the entrance covering	V-value of entrance, covering, where applicable
0.6	Sanitary rooms		
0.6.1	Toilets	R9	
0.6.2	Changing or washrooms	R10	
0.7	Break rooms (e.g. day rooms, canteens)	R9	
0.8	First aid rooms and similar facilities (see ASR A4.3)	R9	
<b>1</b>	<b>Manufacture of margarine, edible fats and oils</b>		
1.1	Fat melting	R13	V6
1.2	Edible-oil refinery	R13	V4
1.3	Manufacture and packing of margarine	R12	
1.4	Manufacture and packing of edible fat, bottling of edible oil	R12	
<b>2</b>	<b>Milk treatment and processing, cheese production</b>		
2.1	Processing of fresh milk, including buttery	R12	
2.2	Cheese production, storage and packing	R11	
2.3	Ice cream manufacture	R12	
<b>3</b>	<b>Manufacture of chocolates and confectionery</b>		
3.1	Sugar boiling plant	R12	
3.2	Cocoa production	R12	
3.3	Preparation of raw mass	R11	
3.4	Production of slabs, hollow moulded forms and chocolates	R11	
<b>4</b>	<b>Manufacture of breads and pastries (bakeries, cake and biscuit manufacturers)</b>		
4.1	Preparation of dough	R11	
4.2	Areas where fats and liquid mixtures are processed	R12	
4.3	Washing-up rooms	R12	V4
<b>5</b>	<b>Slaughtering, meat handling, meat processing</b>		
5.1	Abattoir	R13	V10
5.2	Gut cleaning areas	R13	V10
5.3	Meat jointing	R13	V8
5.4	Sausage and cold meats kitchen	R13	V8
5.5	Boiled sausage area	R13	V8
5.6	Preserved sausage area	R13	V8
5.7	Sausage drying room	R12	

# Slip resistance

## Working rooms and areas with risk of slipping in accordance with ASR A1.5

5.8	Gut storage	R12	
5.9	Curing, smoking room	R12	
5.10	Poultry processing	R12	V6
5.11	Slicing and packing area	R12	
5.12	Butchery with shop	R12	V8****)
<b>6</b>	<b>Handling and processing of fish, manufacture of delicatessen products</b>		
6.1	Handling and processing of fish	R13	V10
6.2	Manufacture of delicatessen products	R13	V6
6.3	Manufacture of mayonnaise	R13	V4
<b>7</b>	<b>Preparation and processing of vegetables</b>		
7.1	Manufacture of sauerkraut	R13	V6
7.2	Manufacture of canned vegetables	R13	V6
7.3	Sterilisation areas	R11	
7.4	Rooms in which vegetables are prepared for processing.	R12	V4
<b>8</b>	<b>Wet areas in food and drink manufacture (if not specifically mentioned)</b>		
8.1	Storage and fermenting cellar	R10	
8.2	Bottling, fruit juice manufacture	R11	
<b>9</b>	<b>Kitchens, dining rooms</b>		
9.1	Gastronomic kitchens (restaurant and hotel kitchens)	R12	
9.2	Commercial kitchens in homes, schools, day nurseries, sanatoriums	R11	
9.3	Commercial kitchens in hospitals and clinics	R12	
9.4	Large-scale commercial kitchens in canteens, district kitchens	R12	
9.5	Fast food kitchens, convenience food outlets and snack bars	R12	
9.6	Defrosting and re-heating kitchens	R10	
9.7	Tea and coffee kitchens, B+B kitchens, ward kitchens	R10	
9.8	Washing-up areas		
9.8.1	Washing-up areas for 9.1, 9.4, 9.5	R12	V4
9.8.2	Washing-up areas for 9.2	R11	
9.8.3	Washing-up areas for 9.3	R12	
9.9	Dining rooms, guest rooms, canteens incl. serving areas	R9	
9.10	Counter area, cabinet area	R10	
<b>10</b>	<b>Cold storage rooms, deep freeze rooms and depots</b>		
10.1	For non-packaged goods	R12	
10.2	For packaged goods	R11	
<b>11</b>	<b>Sales areas and shops</b>		
11.1	Receiving room for meats		
11.1.1	For unpackaged goods (e.g. loose in transport boxes)	R11	
11.1.2	For packaged goods	R10	
11.2	Receiving room for fish	R11	
11.3	Serving area for meats and cold cuts		
11.3.1	For non-packaged goods	R11	
11.3.2	For packaged goods	R10	
11.4	Serving area for breads and pastries, non-packaged goods	R10	
11.5	Serving area for dairy and delicatessen products, non-packaged goods	R10	
11.6	Serving area for fish		
11.6.1	For non-packaged goods	R12	
11.6.2	For packaged goods	R11	
11.7	Serving areas other than 11.3 – 11.6	R9	
11.8	Meat preparation room		
11.8.1.	For meat preparation other than covered in 5.	R12	V8
11.8.2.	For meat processing other than covered in 5.	R11	
11.9	Flower arranging rooms and areas	R11	
11.10	Sales areas with fixed ovens		
11.10.1	For the production of breads and pastries	R11	
11.10.2	For the baking of prepared breads and pastries	R10	
11.11	Sales areas with fixed deep-fat fryers or grills	R12	V4
No.	Working rooms and traffic routes	Slipping risk assessment group (standard guideline)	Displacement area with number specifying minimum volume
11.12	Sales areas, customer-frequented areas	R9	
11.13	Preparation areas for food for self-service sale	R10	
11.14	Cash till, packing areas	R9	
11.15	Sales areas outdoors	R11 or R10	V4
<b>12</b>	<b>Public health service rooms</b>		
12.1	Disinfection areas (wet)	R11	
12.2	Sterilisation areas	R10	
12.3	Excrement areas, sink rooms, unclean nursing rooms	R10	
12.4	Pathology rooms	R10	
12.5	Rooms for medicinal baths, hydrotherapy, fango preparation	R11	
12.6	Washrooms for operating theatres, plaster casting rooms	R10	
12.7	Sanitary rooms, ward bathrooms	R10	
12.8	Rooms for medical diagnosis and therapy, massaging rooms	R9	
12.9	Operating theatres	R9	
12.10	Wards with hospital rooms and corridors	R9	
12.11	Medical practices, day clinics	R9	
12.12	Dispensing chemist's	R9	
12.13	Laboratories	R9	
12.14	Hairdresser's	R9	
<b>13</b>	<b>Laundries</b>		
13.1	Rooms with continuous-run washing machines or centrifugal washing machines	R9	
13.2	Rooms in which the laundry is removed from the machine dripping wet	R11	
13.3	Rooms for ironing and pressing	R9	
<b>14</b>	<b>Feed concentrate production</b>		
14.1	Dry feed production	R11	
14.2	Feed concentrate production using fat and water	R11	V4
<b>15</b>	<b>Manufacture of leather goods, textiles</b>		
15.1	Water workshops in tanneries	R13	
15.2	Areas with fleshing machines	R13	V10
15.3	Areas where glued leather occurs	R13	V10
15.4	Grease room for the manufacture of seals	R12	
15.5	Dye works for textiles	R11	
<b>16</b>	<b>Paint-shops</b>		
16.1	Wet rubbing down areas	R12	V10
16.2	Powder coating	R11	
16.3	Paint finish	R10	
<b>17</b>	<b>Ceramics industry</b>		
17.1	Wet-grinding (for ceramic material)	R11	
17.2	Mixers, working with materials such as tar, pitch, graphite, synthetic resins	R11	V6
17.3	Presses (Forming), working with materials such as tar, pitch, graphite, synthetic resin	R11	V6
17.4	Casting / die Casting areas	R12	
17.5	Glazing areas	R12	

# Slip resistance

## Working rooms and areas with risk of slipping in accordance with ASR A1.5

<b>18</b>	<b>Treatment and processing of glass and stone</b>		
18.1	Stone cutting, stone grinding areas	R11	
18.2	Glass moulding of hollow glass, container glass, structural glass	R11	
18.3	Grinding areas for hollow glass, sheet glass	R11	
18.4	Processing of insulating glass Working with desiccants	R11	V6
18.5	Packaging, dispatch of sheet glass, Working with anti-blocking agents	R11	V6
18.6	Etching and acid polishing units for glass	R11	
<b>19</b>	<b>Cement works</b>		
19.1	Cement washing area	R11	
<b>20</b>	<b>Storage rooms</b>		
20.1	Storage rooms for oils and fats, intended for partial removal (e.g. in workshops)	R12	V6
20.2	Storage rooms for packaged foods	R10	
20.3	Storage rooms outdoors	R11 or R10	V4
<b>21</b>	<b>Chemical and thermal treatment of iron, metal and glass</b>		
21.1	Pickling shops	R12	
21.2	Hardening shops	R12	
21.3	Laboratories	R11	
<b>22</b>	<b>Metal workshops</b>		
22.1	Electroplating rooms	R12	
22.2	Grey iron processing	R11	V4
22.3	Mechanical processing areas (e.g. lathe shop, milling shop), punching department, pressroom, drawing mill (pipes, wires)	R11	
22.4	Mechanical processing areas with increased use of oil and lubricating materials	R11	V4
22.5	Part cleaning areas, steaming areas	R12	
<b>23</b>	<b>Vehicle maintenance workshop</b>		
23.1	Repair and maintenance shop	R11	
23.2	Repair and inspection pit	R12	V4
23.3	Car wash, washing areas	R11	V4
<b>24</b>	<b>Aircraft maintenance workshops</b>		
24.1	Hangars	R11	
24.2	Repair hangars	R12	
24.3	Washing areas	R11	V4
<b>25</b>	<b>Sewage works</b>		
25.1	Pumping rooms	R12	
25.2	Rooms for sludge de-watering facilities	R12	
25.3	Rooms for raking facilities	R12	
25.4	Standing areas of workplaces, working and maintenance platforms	R12	
<b>26</b>	<b>Fire stations</b>		
26.1	Vehicle standing areas	R12	
26.2	Rooms for hose servicing equipment	R12	
<b>27</b>	<b>Functional rooms in the breathing apparatus training facility</b>		
27.1	Preparation room	R10	
27.2	Conditioning room	R10	
27.3	Training room	R11	
27.4	Air lock	R10	
No.	Working rooms and traffic routes	Slipping risk assessment group (standard guideline)	Displacement area with number specifying minimum volume
27.5	Mock-up dwelling	R11	
27.6	Heat acclimatisation room	R11	
27.7	Control station	R9	
<b>28</b>	<b>Schools and day nurseries</b>		
28.1	Entrance areas, corridors, recreation halls	R9	
28.2	Classrooms, group rooms	R9	
28.3	Stairs	R9	
28.4	Toilets, washrooms	R10	
28.5	Cookery rooms in schools (See no. 9.2, 9.6 or 9.7)		
28.6	Kitchens in day nurseries (See see also Item 9)	R10	
28.7	Machine rooms for woodwork	R10	
28.8	Special rooms for woodwork etc.	R10	
28.9	Playgrounds	R11 or R10	V4
<b>29</b>	<b>Banks</b>		
29.1	Bank counter areas	R9	
<b>30</b>	<b>Outside traffic routes</b>		
30.1	Paths	R11 or R10	V4
30.2	Loading ramps		
30.2.1	covered	R11 or R10	V4
30.2.2	not covered	R12 or R11	V4
30.3	Sloping ramps (from 3% incline; e.g. for wheelchairs, loading ramps)	R12 or R11	V4
30.4	Refuelling areas		
30.4.1	covered	R11	
30.4.2	not covered	R12	
<b>31</b>	<b>Parking areas</b>		
31.1	Garages, multi-storey and underground car parks not subject to the effects of the weather *****)	R10	
31.2	Garages, multi-storey and underground car parks subject to the effects of the weather	R11 or R10	V4
31.3	Parking areas outdoors	R11 or R10	V4
<b>32</b>	<b>Bathrooms</b>		
32.1	Individual and group changing rooms with lockers	R10	
32.2	Sauna and relaxation areas	R10	
32.3	Shower rooms and shower areas	R10	
32.4	Pool surrounds	R10	

\*) for floors in wet barefoot areas see GUV information 'Bodenbeläge für nassbelastete Barfußbereiche' (DGUV Information 207-006)

\*\*) Entrance areas in accordance with number 0.1 are areas accessed directly from outside and that may be wet if conditions are wet outside (see also Item 6, paragraph 3, use of mats to take up dirt and moisture). For adjacent areas or other large spaces, please observe Item 4 paragraph 10.

\*\*\*) Stairs, ramps in accordance with number 0.3 and 0.5 are those that may be wet if it is wet outside. For adjacent areas, please see Item 4 paragraph 10.

\*\*\*\*) If a uniform floor covering has been installed everywhere, on the basis of a hazard analysis (taking account of the cleaning method, the work flows and the amount of substances on the floor that are particularly conducive to slipping), the displacement area can be reduced to V4.

\*\*\*\*\*) Those pedestrian areas not affected by the risk of slipping as a result of the effects of the weather, such as driving rain or water that has been brought in from outside.

# Slip resistance

## Working rooms and areas with risk of slipping

Requirements for the safe installation of floors in workplaces are described in the “Technical Regulations for Workplaces (ASR)” ASR A1.5. They specify:

“Those areas that are normally in constant use should have a relatively homogenous slip resistance to prevent the risk of tripping or slipping. This could be the case if the slip resistance of the surfaces differs by more than one R group within a single floor (e.g. with coverings, markings or adhesive films) or adjacent floors”

We also recommend compliance with the following excerpts from the BGR /GUV-R 181 and DGUV Rule 108-003 of the of the DGUV accident-insurance association (DGUV).

In connected work places with differing slip risks, where employees move from one work place to the other, the same floor covering of the higher classification group should be used for the entire area.

To facilitate cleaning, smooth, non-profiled floor coverings can be used in areas that cannot be walked on.

Such areas include, for example, along the walls up to a distance of 15 cm, in corners and under machines and installations which are firmly fixed to the floor. This is the case, for example, along walls up to a distance of about 15 cm, in corners, in the case of lying cove bases and under machinery and equipment firmly anchored in the ground.

A rounded edge between the walls and floor e.g. cove skirting is easier to clean than a rectangular edge.

This is particularly true of rooms with hazardous materials or biological agents, as part of an effort to prevent undetected accumulation of such materials.

### Slip resistance in private areas

With regard to slip resistance, floor coverings in private areas are not subject to standard regulations. Independent of that, however, it is recommended to choose slip-resistant tiles according to your personal safety requirements. In accessible residential construction, the requirements of DIN 18040-2 must be observed, particularly where floor-flush shower areas are concerned.

# Slip resistance

## Slip-resistance properties in barefoot areas

### Responsible institutions:

German Statutory Accident Insurance (DGUV),  
Glinkastraße 40, D-10117 Berlin - www.dguv.de

### Area of application:

Wet barefoot areas, e.g. in swimming pools, hospitals, as well as changing rooms, washrooms and showers in sports centres and workplaces for which the statutory accident insurance agencies are responsible.

### Regulations:

Leaflet „DGUV Information 207-006 - Floor coverings for wet barefoot areas“ (previously BGI GUV-I 8527, updated version of June 2015)

Published by: German Statutory Accident Insurance (DGUV)

### Test method:

The test is conducted in accordance with DIN EN 16165 Determination of slip resistance of pedestrian surfaces – Methods of evaluation




### Walking method:

Inclined plane.

The slip resistance of tiles is tested on an inclined surface with a pre-determined angle of inclination and classified according to rating groups **A** to **C**.

If barefoot areas are also to be walked over in footwear, the requirements of ASR A1.5 must also be observed.

### Classification groups and areas of application:

Classification group	Lower limit value	Upper limit value	Areas
<b>A</b> 	12°	18°	Barefoot hallways and sanitary areas (mainly dry) Individual and group changing rooms with lockers Pool floors in the non-swimmer areas, where the water level exceeds 80 cm Sauna and relaxation areas (mainly dry)
<b>B</b> 	> 18°	24°	Barefoot hallways and sanitary areas, if not classified in A Showers and shower areas Steam baths Area surrounding the disinfectant sprayers Pool surrounds Pool floor in the non-swimmer areas, where the water level is less than 80 cm Pool floor in the non-swimmer areas in the tide effect pool Lift slab floors Paddling pools Steps and ladders outside the pool area provided these are not assigned to C Accessible surfaces of diving platforms and diving board installations which are not allocated to C Sauna and relaxation area, provided they are not assigned to A
<b>C</b> 	> 24°		Steps and ladders leading into the water Stairways leading to diving boards and water slides Surfaces of diving platforms and diving boards in the length which is reserved for the diver (the slip-resistant surface of the diving platforms and diving boards must lead around the front edge where it is gripped by users' hands and toes) Starting blocks Foot basins Inclined pool borders Kneipp pool, foot pool Ramps in the pool rim area with an inclination of > 6%

# The pendulum testing

## The pendulum test in compliance with CEN/TS 16165

The pendulum test in compliance with CEN/TS 16165

This test measures dynamic coefficient of friction (CoF). The test is designed to replicate a pedestrian heel strike, the point at which most slips occur.

When a pedestrian heel strikes a wet floor a fluid film is created between them, this can cause a slip.

This test works in wet conditions because it generates a similar fluid film between the slider and the floor.

It can be used to accurately test the slip potential on clean and dry or contaminated floors. The test also works with dry contaminants.

### Understanding pendulum data

Pendulum results are referred to as Pendulum Test Values (PTV).

When the test is operated properly, the PTV should be interpreted as shown in the table.

This table relates to pedestrians walking in a straight line on a level surface. For **other activities** or inclined surfaces, the table figures will change.

The slider referred to in the test data is also important.

There are two sliders commonly used, one for shod pedestrians, one for barefoot. You need to make sure the right slider has been used.

### Role of the different sliders

**Slider 96** (also known as Four-S rubber):

The **harder** of the two sliders is used to represent shod pedestrians.

Use in areas where pedestrians are likely to be wearing footwear.

**Slider 57** (also known as TRRL or TRL rubber):

The **softer** of the two sliders is used to represent barefoot pedestrians.

Use in areas such as swimming pools, bathrooms, changing areas.

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

## ABERDEEN

Art.-Nr.	Colour	96-wet	96-dry	57-wet	57-dry
2987	SB10, SB60, SB70, SB90	>36	>40	>36	>40
2577	SB10, SB60, SB70, SB90	>36	>40	>36	>40
2576	SB10, SB60, SB70, SB90	>36	>40	>36	>40
2988	SB10, SB60, SB70, SB90	>36	>40	>36	>40
2685	SB1M, SB6M, SB7M, SB9M	>36	>40	>36	>40
2526	SB1R, SB6R, SB7R, SB9R	>40	>40	>40	>40
2536	SB1V, SB6V, SB7V, SB9V	>40	>40	>40	>40
2617	SB10, SB60, SB70, SB90	>36	>40	>36	>40
2628	SB10, SB60, SB70, SB90	>36	>40	>36	>40
2628	SB1M, SB6M, SB7M, SB9M	>36	>40	>36	>40
2628	SB1R, SB6R, SB7R, SB9R	>40	>40	>40	>40
2628	SB1V, SB6V, SB7V, SB9V	>40	>40	>40	>40
2732	SB10, SB60, SB70, SB90	>36	>40	>36	>40

## ATLANTA

Art.-Nr.	Colour	96-wet	96-dry	57-wet	57-dry
2730	AL10, AL40, AL60, AL70, AL80, AL90	<36	>40	<36	>40
2660	AL10, AL40, AL60, AL70, AL80, AL90	<36	>40	<36	>40
2394	AL10, AL40, AL60, AL70, AL80, AL90	<36	>40	<36	>40
2810	AL10, AL40, AL60, AL70, AL80, AL90	<36	>40	<36	>40
2733	AL10, AL40, AL60, AL70, AL80, AL90	<36	>40	<36	>40

## HUDSON

Art.-Nr.	Colour	96-wet	96-dry	57-wet	57-dry
2987	SD1B, SD2B, SD7B, SD9B	>36	>40	>36	>40
2988	SD1B, SD2B, SD7B, SD9B	>36	>40	>36	>40
2577	SD1B, SD2B, SD7B, SD9B	>36	>40	>36	>40
2577	SD1L, SD2L, SD7L, SD9L	<36	>40	<36	>40
2577	SD1M, SD2M, SD7M, SD9M	>36	>40	>36	>40
2576	SD1B, SD2B, SD7B, SD9B	>36	>40	>36	>40
2576	SD1L, SD2L, SD7L, SD9L	<36	>40	<36	>40
2576	SD1M, SD2M, SD7M, SD9M	>36	>40	>36	>40
2526	SR1R, SR2R, SR7R, SR9R	>40	>40	>40	>40

## HUDSON

Art.-Nr.	Colour	96-wet	96-dry	57-wet	57-dry
2419	SD1B, SD2B, SD7B, SD9B	>36	>40	>36	>40
2852	SD1B, SD2B, SD7B, SD9B	>36	>40	>36	>40
2575	SD1M, SD2M, SD7M, SD9M	>36	>40	>36	>40
2525	SR1R, SR2R, SR7R, SR9R	>40	>40	>40	>40
2013	SD1B, SD2B, SD7B, SD9B	>36	>40	>36	>40

## LUCCA

Art.-Nr.	Colour	96-wet	96-dry	57-wet	57-dry
2761	LS06, LS60, LS70, LS90	<36	>40	<36	>40
2660	LS06, LS60, LS70, LS90	<36	>40	<36	>40
2733	LS06, LS60, LS70, LS90	<36	>40	<36	>40
2871	LS06, LS60, LS70, LS90	<36	>40	<36	>40
2870	LS06, LS60, LS70, LS90	<36	>40	<36	>40

## MERIDA

Art.-Nr.	Colour	96-wet	96-dry	57-wet	57-dry
2776	AJ10, AJ20, AJ60, AJ90	<36	>40	<36	>40
2679	AJ10, AJ20, AJ60, AJ90	<36	>40	<36	>40

## METALYN

Art.-Nr.	Colour	96-wet	96-dry	57-wet	57-dry
2730	BM06, BM10, BM40, BM60, BM61, BM70	<36	>40	<36	>40
2810	BM06, BM10, BM40, BM60, BM61, BM70	<36	>40	<36	>40
2660	BM06, BM10, BM40, BM60, BM61, BM70	<36	>40	<36	>40
2733	BM06, BM10, BM40, BM60, BM61, BM70	<36	>40	<36	>40
2394	BM06, BM10, BM40, BM60, BM61, BM70	<36	>40	<36	>40

## OAK PARK

Art.-Nr.	Colour	96-wet	96-dry	57-wet	57-dry
2793	HR00, HR10, HR20, HR30, HR80, HR90	<36	>40	<36	>40
2792	HR00, HR10, HR20, HR30, HR80, HR90	<36	>40	<36	>40



# The pendulum test

## OAK SIDE

Art.-Nr.	Colour	96-wet	96-dry	57-wet	57-dry
2793	HE10, HE20, HE30, HE80	<36	>40	<36	>40
2792	HE10, HE20, HE30, HE80	<36	>40	<36	>40

## PRO ARCHITECTURA 3.0

Art.-Nr.	Colour	96-wet	96-dry	57-wet	57-dry
2014	C411, C460, C471, C490, C491	<25	>36	<25	>36
2118	C411, C460, C471, C490, C491	>36	>36	<36	>36
2119	C411, C460, C471, C490, C491	>36	>36	>36	>36
2120	C411, C460, C471, C490, C491	>36	>36	>36	>36
2121	C411, C460, C471, C490, C491	>36	>36	<36	>36
2122	C411, C460, C471, C490, C491	>36	>36	>36	>36
2200	C211, C260, C261, C264, C265, C266, C270, C271, C272, C290, C291, C221, C227, C240, C244, C245, C255, C281, C411, C460, C461, C464, C465, C466, C471, C472, C490, C491	<36	>36	<36	>36
2205	C211, C290, C240, C244,	>36	>36	>36	<36
2213	C411, C460, C471, C490, C491, C211, C260, C270, C271, C290, C291	<25	>36	<25	>36
2214	C411, C460, C471, C490, C491	<25	>36	<25	>36
2215	C411, C460, C471, C490, C491	<36	>36	<36	>36
2218	C411, C460, C471, C490, C491	<25	>36	<25	>36
2219	C411, C460, C471, C490, C491	>36	>36	>36	>36
2225	C411, C491				
2226	C441, C491				
2231	C411, C460, C471, C490, C491	<25	>36	<25	>36
2247	C211, C290, C240, C244,	>36	>36	>36	<36
2248	C211, C260, C270, C271, C290, C291, C240, C244	<36	>36	<36	>36
2253	C411, C460, C471, C490, C491	>36	>36	>36	>36
2405	C211, C260, C270, C271, C290, C291	<36	>36	<36	>36
2600	C411, C460, C471, C490, C491	<36	>36	<36	>36
2702	C211, C290, C240, C244,	<36	>36	<36	>36
2706	C211, C260, C270, C271, C290, C291, C240, C244, C290, C411, C460, C471, C490, C491	<36	>36	<36	>36
3213	C300, C390, C344, C349	<36	>36	<36	>36
3214	C300, C390, C344, C349	<36	>36	<36	>36
3245	C300, C390, C344, C349	<36	>36	<36	>36
3246	C300, C390, C344, C349	<36	>36	<36	>36
3709	C300, C310, C311, C360, C361, C371, C372, C390, C391, C320, C335, C349, C352, C355	<25	>36	<25	>36
3753	C300, C310, C311, C360, C361, C371, C372, C390, C391	<25	>36	<25	>36

## PURE BASE

Art.-Nr.	Colour	96-wet	96-dry	57-wet	57-dry
2360	BZ06, BZ10, BZ40, BZ60, BZ70	>40	>40	>40	>40
2361	BZ06, BZ10, BZ40, BZ60, BZ70	>40	>40	>40	>40
2835	BZ06, BZ10, BZ40, BZ60, BZ70	>40	>40	>40	>40

## PURE LINE 2.0

Art.-Nr.	Colour	96-wet	96-dry	57-wet	57-dry
2750	UL10, UL60, UL61, UL62, UL70, UL72, UL80, UL90	<36	>40	<36	>40
2751	UL10, UL60, UL61, UL62, UL70, UL72, UL80, UL90	<36	>40	<36	>40
2752	UL10, UL60, UL61, UL62, UL70, UL72, UL80, UL90	<36	>40	<36	>40
2753	UL10, UL60, UL61, UL62, UL70, UL72, UL80, UL90	<36	>40	<36	>40
2754	UL10, UL60, UL61, UL62, UL70, UL72, UL80, UL90	<36	>40	<36	>40
2620	UL10, UL60, UL61, UL62, UL70, UL72, UL80, UL90	<36	>40	<36	>40
2617	UL10, UL60, UL61, UL62, UL70, UL72, UL80, UL90	<36	>40	<36	>40

## SPOTLIGHT

Art.-Nr.	Colour	96-wet	96-dry	57-wet	57-dry
2810	CM0M, CM6M, CM7M, CM9M	<36	>40	<36	>40
2810	CM0L, CM6L, CM7L, CM9L	>36	>40	>36	>40
2660	CM0M, CM6M, CM7M, CM9M	<36	>40	<36	>40
2660	CM0L, CM6L, CM7L, CM9L	>36	>40	>36	>40
2733	CM0M, CM6M, CM7M, CM9M	<36	>40	<36	>40
2394	CM0M, CM6M, CM7M, CM9M	<36	>40	<36	>40
2919	CM05, CM65, CM75, CM95	<36	>40	<36	>40
2030	CM0M, CM6M, CM7M, CM9M	<36	>40	<36	>40

## UNIT FOUR

Art.-Nr.	Colour	96-wet	96-dry	57-wet	57-dry
2361	CT10, CT60, CT61, CT62, CT70, CT80	>36	>40	>36	>40
2360	CT10, CT60, CT61, CT62, CT70, CT80	>36	>40	>36	>40
2680	CT10, CT60, CT61, CT62, CT70, CT80	>36	>40	>36	>40
2369	CT10, CT60, CT61, CT62, CT70, CT80	>36	>40	>36	>40
2363	CT10, CT60, CT61, CT62, CT70, CT80	>36	>40	>36	>40
2706	CT10, CT60, CT61, CT62, CT70, CT80	>36	>40	>36	>40

## URBAN JUNGLE

Art.-Nr.	Colour	96-wet	96-dry	57-wet	57-dry
2810	TC10, TC60, TC70, TC90	<36	>40	<36	>40
2660	TC10, TC60, TC70, TC90	<36	>40	<36	>40
2394	TC10, TC60, TC70, TC90	<36	>40	<36	>40
2733	TC10, TC60, TC70, TC90	<36	>40	<36	>40

## X-PLANE

Art.-Nr.	Colour	96-wet	96-dry	57-wet	57-dry
2357	ZM00, ZM10, ZM20, ZM60, ZM70, ZM90, ZM91	<36	>40	<36	>40
2356	ZM00, ZM10, ZM20, ZM60, ZM70, ZM90, ZM91	<36	>40	<36	>40
2349	ZM00, ZM10, ZM20, ZM60, ZM70, ZM90, ZM91	<36	>40	<36	>40
2392	ZM00, ZM10, ZM20, ZM60, ZM70, ZM90, ZM91	<36	>40	<36	>40
2353	ZM10, ZM20, ZM60, ZM70, ZM90, ZM91	<36	>40	<36	>40
2680	ZM00, ZM10, ZM20, ZM60, ZM70, ZM90, ZM91	<36	>40	<36	>40
2352	ZM00, ZM10, ZM20, ZM60, ZM70, ZM90, ZM91	<36	>40	<36	>40
2351	ZM00, ZM10, ZM20, ZM60, ZM70, ZM90, ZM91	<36	>40	<36	>40
2359	ZM00, ZM10, ZM20, ZM60, ZM70, ZM90, ZM91	<36	>40	<36	>40
2354	ZM00, ZM10, ZM20, ZM60, ZM70, ZM90, ZM91	<36	>40	<36	>40
2362	ZM00, ZM10, ZM20, ZM60, ZM70, ZM90, ZM91	<36	>40	<36	>40

# Tribometer testing

The tribometer (device for the measurement of wear, friction and lubrication) is fitted with glides and is pulled parallel to the surface of a floor covering at a constant speed. The force that this requires is evaluated over the length of the measuring section. To determine the coefficient of sliding friction ( $\mu$ ), this force is divided by the vertical force.

The test can be carried out in a wet state, in operating condition or in dry condition (original text from DIN 51131).

The tribometer test method can be used for all types of operating conditions and lubricants.

Value ( $\mu$ )	Application group
0 - 0,14	VG1
0,15 - 0,29	VG2
0,30 - 0,43	VG3
0,44 - 0,57	VG4
0,58 - 0,68	VG5
0,69 - 1,0	VG6

## ABERDEEN

Art.-Nr.	Colour code	Application group
2846	SB10, SB60, SB70, SB90	VG5
2987	SB10, SB60, SB70, SB90	VG5
2577	SB10, SB60, SB70, SB90	VG5
2576	SB10, SB60, SB70, SB90	VG5
2988	SB10, SB60, SB70, SB90	VG5
2685	SB1M, SB6M, SB7M, SB9M	VG5
2526	SB1R, SB6R, SB7R, SB9R	VG5
2536	SB1V, SB6V, SB7V, SB9V	VG5
2617	SB10, SB60, SB70, SB90	VG5
2135	SB10, SB60, SB70, SB90	VG5
2075	SB10, SB60, SB70, SB90	VG5
2013	SB10, SB60, SB70, SB90	VG5
2628	SB10, SB60, SB70, SB90	VG5
2628	SB1M, SB6M, SB7M, SB9M	VG5
2628	SB1R, SB6R, SB7R, SB9R	VG5
2628	SB1V, SB6V, SB7V, SB9V	VG5
2732	SB10, SB60, SB70, SB90	VG5

## HUDSON

Art.-Nr.	Colour code	Application group
2987	SD1B, SD2B, SD5B, SD6B, SD7B, SD8B, SD9B	VG4
2988	SD1B, SD2B, SD5B, SD6B, SD7B, SD8B, SD9B	VG4
2577	SD1B, SD2B, SD5B, SD6B, SD7B, SD8B, SD9B	VG4
2577	SD1L, SD2L, SD5L, SD6L, SD7L, SD8L, SD9L	VG3
2577	SD1M, SD2M, SD5M, SD6M, SD7M, SD8M, SD9M	VG5
2576	SD1B, SD2B, SD5B, SD6B, SD7B, SD8B, SD9B	VG4
2576	SD1L, SD2L, SD5L, SD6L, SD7L, SD8L, SD9L	VG3
2576	SD1M, SD2M, SD5M, SD6M, SD7M, SD8M, SD9M	VG5
2526	SD1R, SD2R, SD5R, SD6R, SD7R, SD8R, SD9R	VG4
2419	SD1B, SD2B, SD5B, SD6B, SD7B, SD8B, SD9B	VG4
2852	SD1B, SD2B, SD5B, SD6B, SD7B, SD8B, SD9B	VG4
2575	SD1M, SD2M, SD5M, SD6M, SD7M, SD8M, SD9M	VG5
2525	SD1R, SD2R, SD5R, SD6R, SD7R, SD8R, SD9R	VG4
2013	SD1B, SD2B, SD5B, SD6B, SD7B, SD8B, SD9B	VG4
2135	SD1B, SD2B, SD5B, SD6B, SD7B, SD8B, SD9B	VG4
2732	SD1B, SD2B, SD5B, SD6B, SD7B, SD8B, SD9B	VG4
2732	SB10, SB60, SB70, SB90	VG5

# Tribumeter testing

## PIER 45

Art.-Nr.	Colour code	Application group
2736	BR60, BR80, BR90	VG5
2632	BR60, BR80, BR90	VG5
2834	BR60, BR80, BR90	VG5
2016	BR60, BR80, BR90	VG5
2030	BR60, BR80, BR90	VG5

## PRO ARCHITECTURA 3.0

Art.-Nr.	Colour code	Application group
3245	C300, C390, C344, C349	VG4
3246	C300, C390, C344, C349	VG4
3213	C300, C390, C344, C349	VG4
3214	C300, C390, C344, C349	VG4
3215	C300, C390, C344, C349	VG2
3350	C300C,310 C311, C360, C370, C361, C371, C372, C390, C391, C320, C335, C349, C352, C355	VG2
3107	C300C,310 C311, C360, C370, C361, C371, C372, C390, C391, C320, C335, C349, C352, C355	VG2
2706	C211, C260, C270, C271, C290, C291, C240, C244, C411, C460, C471, C490, C491	VG4
2200	C211, C227, C260, C261, C264, C265, C266, C270, C271, C272, C290, C291, C221, C240, C244, C245, C255, C281, C411, C460, C461, C464, C465, C466, C471, C472, C490, C491	VG4
2205	C211, C290, C240, C244	VG4
2405	C211, C260, C270, C271, C290, C291	VG4
2247	C211, C290, C240, C244	VG4
2248	C211, C260, C270, C271, C290, C291, C240, C244	VG4
2213	C211, C260, C270, C271, C290, C291, C411, C460, C471, C490, C491	VG5
2119	C411, C460, C471, C490, C491	VG4
2120	C411, C460, C471, C490, C491	VG5
2215	C411, C460, C471, C490, C491	VG4
2219	C411, C460, C471, C490, C491	VG5
2121	C411, C460, C471, C490, C491	VG4
2122	C411, C460, C471, C490, C491	VG5
2253	C411, C460, C471, C490, C491	VG5
2600	C411, C460, C471, C490, C491	VG4
2118	C411, C460, C471, C490, C491	VG4
2214	C411, C460, C471, C490, C491	VG3
2218	C411, C460, C471, C490, C491	VG3
2014	C411, C460, C471, C490, C491	VG3
2231	C411, C460, C471, C490, C491	VG4
2225	C411, C491	VG4
2226	C411, C491	VG4

## UNIT ONE

Art.-Nr.	Colour code	Application group
3130	UT03	VG3
3177	UT01, UT02	VG4
3105	UT01, UT02	VG6
3244	UT01, UT02	VG4
3245	UT01, UT02	VG4
3709	UT01, UT02	VG3
2200	UT41, UT42	VG4
2706	UT41, UT42	VG4

## UNIT THREE

Art.-Nr.	Colour code	Application group
2216	GT20, GT30, GT50	VG4
2007	GT10, GT20, GT30, GT50	VG4
2118	GT20, GT30, GT50	VG4
2010	GK10, GK20, GK30, GK50	VG4
2001	GT10, GT20, GT30, GT50	VG4
2020	GT50	VG3
2121	GT20, GT30, GT50	VG4
2122	GT20, GT30, GT50	VG5
2003	GT20, GT30, GT50	VG5
2127	GT22	VG6
2011	GT20, GT30, GT50	VG4
2119	GT20, GT30, GT50	VG4
2120	GT20, GT30, GT50	VG5
2219	GT20, GT30, GT50	VG5
2200	GT20, GT30, GT50	VG4
2008	GT10, GT20, GT30, GT50	VG4

## UNIT FOUR

Art.-Nr.	Colour code	Application group
2361	CT10, CT60, CT61, CT62, CT70, CT80	VG5
2360	CT10, CT60, CT61, CT62, CT70, CT80	VG5
2680	CT10, CT60, CT61, CT62, CT70, CT80	VG5
2369	CT10, CT60, CT61, CT62, CT70, CT80	VG5
2363	CT10, CT60, CT61, CT62, CT70, CT80	VG5
2706	CT10, CT60, CT61, CT62, CT70, CT80	VG5
2874	CT10, CT60, CT61, CT62, CT70, CT80	VG5
2008	GT10, GT20, GT30, GT50	VG4

## X-PLANE

Art.-Nr.	Colour code	Application group
2357	ZM00, ZM10, ZM20, ZM60, ZM70, ZM90, ZM91	VG5
2356	ZM00, ZM10, ZM20, ZM60, ZM70, ZM90, ZM91	VG5
2358	ZM00, ZM10, ZM20, ZM60, ZM70, ZM90, ZM91	VG5
2349	ZM00, ZM10, ZM20, ZM60, ZM70, ZM90, ZM91	VG5
2392	ZM00, ZM10, ZM20, ZM60, ZM70, ZM90, ZM91	VG5
2353	ZM10, ZM20, ZM60, ZM70, ZM90, ZM91	VG4
2680	ZM00, ZM10, ZM20, ZM60, ZM70, ZM90, ZM91	VG5
2352	ZM00, ZM10, ZM20, ZM60, ZM70, ZM90, ZM91	VG5
2351	ZM00, ZM10, ZM20, ZM60, ZM70, ZM90, ZM91	VG5
2359	ZM00, ZM10, ZM20, ZM60, ZM70, ZM90, ZM91	VG5
2354	ZM00, ZM10, ZM20, ZM60, ZM70, ZM90, ZM91	VG5
2362	ZM00, ZM10, ZM20, ZM60, ZM70, ZM90, ZM91	VG5