



SLIP-PROOF PROPERTIES DETERMINATION OF SLIP-PROOF PROPERTIES

Many countries have specific regulations for classifying the slip hazards of a flooring, in order to prevent people from slipping and falling. As a general rule, the safety of a flooring depends on its slip-proof properties, the correct installation and cleaning of its surface. Additionally, when selecting a flooring, it is important that we also consider its conditions of use and as a consequence, its intended use.

a) **Standard DIN 51130 (Germany)**: this standard is applied for the classification of tiles according to their slipperiness in workplaces walked on with **footwear** (see table ...). The test makes use of a tilting ramp made from the material being tested, to which a lubricant agent is applied. It is then walked on by a test subject, wearing appropriate footwear. The test records the maximum inclination angle of the ramp at which the test subject still feels safe.

DIN 51130	Series	Angle of Inclination
R9	Arkasa - Brazil - Catalana - Contempora Sabbiato – Cube - Granigliati - Life - Maya(naturale e lappato) – Tinte unite - Pietra di Noto - Thermae (V4) - Tinte Unite – Wish	> 6° - 10° low friction
R10	Index - Langhe –Pianelle -Piazze Romane - Quarzi - Terra e Fuoco	> 10° - 19° normal friction
R11	Design Fiammato - Life TXTD - Percorsi d'Italia (V4) - Pietre di Keope (V6)	> 19° - 27° increased friction
R12	Granigliati Strutturati (V4) L.Tecnica 20x20 Ant A (V6) L.Tecnica 20x20 Ant B (V4)	> 27° - 35° high friction
R13		> 35° very high friction

In the presence of substances that promote slipping, a flat and slip-resistant surface is not enough. In these cases, floorings are classified in relation to the displacement volume beneath the walking surface level, measured in cm^3/dm^2 . The larger the volume, the safer the floor.



V4 4 cm^3/dm^2
V6 6 cm^3/dm^2
V8 8 cm^3/dm^2

Support level
Containment volume V
Drainage level



b) **Standard DIN 51097 (Germany)**: this standard is applied for the classification of tiles according to their slipperiness in areas walked on barefoot. The test and subsequent evaluation of the results are conducted as with standard DIN 51130, contaminating the tilting ramp with a solution of soap and water.

DIN 51097	Angle of Inclination
CLASS A	≥ 12°
CLASS B	≥ 18°
CLASS C	≥ 24°

DIN 51097	Series
CLASS A	Catalana – Life
CLASS A+B	Arkasa - Cube - Granigliati Strutturati - Index - Langhe - Pianelle - Piazze Romane - Quarzi - Terra e Fuoco - Wish
CLASS A+B+C	Cinque Terre - Design Fiammato - Imperatori - Life TXTD - Percorsi d'Italia - Pietre di Keope - Thermae - Titani - L. Tecnica 20x20 Ant A -L.Tecnica 20x20 Ant B

c) **DM 236/89 (Italy)**: for certain categories of building, this Ministerial Decree requires that slip-resistant floorings are used, or specifically, floorings with a coefficient of friction, when both wet and dry, measured with the BCRA Rep. CEC 6-81 (British Ceramic Research Association) method, greater than **0.40** surface. The test is conducted using a portable instrument (TORTUS), which moves at a constant speed over the surface: the instrument measures the coefficient of friction produced during the test.



SLIP-PROOF PROPERTIES
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 (The German Federation of institutions for statutory accident insurance and prevention)

0	Workplaces and rooms in general *	
0.1	Entrance areas, indoors **	R9
0.2	Entrance areas, outdoors	R11 o R10 V4
0.3	Stairs ***	R9
0.4	Outdoor stairs	R11 o R10 V4
0.5	Common areas (lavatory, locker rooms, showers)	R10
	Recreation rooms (work canteens, break rooms)	R9
	First aid rooms	R9
1	Production of margarine, edible fats and oils	
1.1	Melting fat	R13 V6
1.2	Edible oil refineries	R13 V4
1.3	Margarine production and packaging	R12
1.4	Edible fat production and packaging, and edible oil bottling	R12
2	Milk production and processing, cheese production	
2.1	Fresh milk processing and butter production	R12
2.2	Cheese production, storing and packaging	R11
2.3	Ice-cream production	R12
3	Chocolate and confectionery production	
3.1	Boiling sugar	R12
3.2	Cocoa production	R12
3.3	Base pastry production	R11
3.4	Chocolate bars, hollow confectionery and chocolates production	R11
4	Bakery production (bakeries, confectioners, bakery products with long shelf-life)	
4.1	Pastry production	R11
4.2	Fats or other liquid materials processing areas	R12
4.3	Washing rooms	R12 V4
5	Meat butchering, transformation and processing	
5.1	Slaughterhouse	R13 V10
5.2	Offal and entrails processing area	R13 V10
5.3	Meat cutting up and boning	R13 V8
5.4	Sausagemeat preparation	R13 V8
5.5	Cooked cold-cut meat production	R13 V8
5.6	Cured cold-cut meat production	R13 V6
5.7	Cold-cut meat curing room	R12
5.8	Store for guts	R12
5.9	Brine area, smokehouse	R12
5.10	Poultry processing	R12 V6
5.11	Meat and sliced product preparation and packaging	R12
5.12	Production rooms with outlet	R12 V8
6	Fish processing and transformation, grillroom	
6.1	Fish processing and transformation	R13 V10
6.2	Grillroom	R13 V6
6.3	Mayonnaise production	R13 V4
7	Vegetable production and processing	
7.1	Sauerkraut production	R13 V6
7.2	Canned vegetable production	R13 V6
7.3	Sterilization rooms	R11
7.4	Preparation areas for vegetables to be processed	R12 V4
8	Wet production areas of foodstuffs and beverages	
8.1	Ageing and fermentation cellars	R10
8.2	Beverage bottling, fruit juice production	R11

9	Kitchens, dining halls	
9.1	Catering kitchens (restaurant or hotel kitchens)	
9.1.1	Up to 100 meals a day	R11 V4
9.1.2	Over 100 meals a day	R12 V4
9.2	Kitchens in institutes, schools, kindergartens, sanatoriums	R11
9.3	Kitchens in hospitals and clinics	R12
9.4	Industrial kitchens for university and work canteens	R12 V4
9.5	Fast-food and snack-bar kitchens	R12 V4
9.6	Kitchens for defrosting and heating up meals	R10
9.7	Kitchens in companies, guesthouses and hospital units	R10
9.8	Washing-up areas	
9.8.1	Washing-up areas for facilities in points 9.1, 9.4, 9.5	R12 V4
9.8.2	Washing-up areas for facilities in point 9.2	R11
9.8.3	Washing-up areas for facilities in point 9.3	R12
9.9	Dining halls, restaurant rooms, work canteens, incl. corridors used for supply and service	R9
10	Cold rooms, cold stores	
10.1	For unpacked goods	R12
10.2	For packed goods	R11
11	Points of sale, sales areas	
11.1	Goods and meat delivery area	
11.1.1	For unpacked goods	R11
11.1.2	For packed goods	R10
11.2	Goods and fish delivery area	R11
11.3	Staff corridors for meat and cold-cut counter	
11.3.1	For unpacked goods	R11
11.3.2	For packed goods	R10
11.4	Staff corridors for bakery and confectioner counter, unpacked goods	R10
11.5	Staff corridors for dairy produce and grill, unpacked goods	R10
11.6	Staff corridors for fish counter	
11.6.1	For unpacked goods	R12
11.6.2	For packed goods	R11
11.7	Staff corridors, except areas from point 11.3 to 11.6	R9
11.8	Meat preparation areas	
11.8.1	For meat processing, except areas mentioned in point 5	R12 V8
11.8.2	For meat transformation, except areas mentioned in point 5	R11
11.9	Areas for preparing bunches of flowers	R11
11.10	Commercial spaces with fixed ovens	
11.10.1	For bakery production	R11
11.10.2	For heating up pre-packed food (bread, confectioneries)	R10
11.11	Commercial spaces with fixed fryers or grills	R12 V4
11.12	Commercial spaces, customer rooms	R9
11.13	Areas for preparation of self-service food	R10
11.14	Cash desk and packaging areas	R9
11.15	Outdoor commercial spaces	R11 or R10 V4
12	Public health/assistance rooms	
12.1	Disinfection rooms (with water)	R11
12.2	Prewashing sterilization rooms	R10
12.3	Rooms for the unit waste storage	R10
12.4	In-house units	R10
12.5	Rooms for thermal baths, hydrotherapy, mud preparation	R11
12.6	Washing area before entering operating theatres, plaster rooms	R10
12.7	Sanitary facilities, bathrooms in hospital units	R10
12.8	Rooms for medical diagnosis and therapy, massage rooms	R9
12.9	Operating theatres	R9
12.10	Hospital with in-house units and corridors	R9
12.11	Surgeries, day hospital	R9
12.12	Pharmacies	R9
12.13	Laboratories	R9
12.14	Hairdressing salons	R9
13	Laundries	
13.1	Rooms with washlines or washers/extractors	R9
13.2	Rooms where laundry isn't spin-dried	R11
13.3	Rooms for ironing	R9
14	Concentrated feed production	
14.1	Dry feed production	R11
14.2	Concentrated feed production using water and fats	R11 V4
15	Hides and textile production	
15.1	Tannery rooms with water delivery system	R13
15.2	Rooms with defleshing equipment	R13 V10
15.3	Rooms with waste of hide tanning	R13 V10
15.4	Areas where hides are waterproofed with grease	R12
15.5	Textile dyeing	R11
16	Lacquering/ Spray painting units	
16.1	Wet grinding units	R12 V10
17	Ceramic tiles manufacturer	
17.1	Wet grinders of ceramic raw materials	R11
17.2	Mixers; processing materials such as tar, pitch, graphite, synthetic resins	R11 V6
17.3	Pressing (moulding); processing materials such as tar, pitch, graphite, synthetic resins	R11 V6
17.4	Casting units	R12
17.5	Glazing units	R12

18	Stone and glass processing and working	
18.1	Stone cutting and grinding	R11
18.2	Glass shaping: blowing, glass for jars, glass for building industry	R11
18.3	Hollow glass and glass plate grinding units	R11
18.4	Insulating glass production; use of desiccants	R11 V6
18.5	Glass plate packaging and dispatching, use of release agents	R11 V6
18.6	Glass acid polishing plant	R11
19	Cement factories	
19.1	Cement washing areas	R11
20	Warehouses	
20.1	Oil and fat warehouses	R12 V6
20.2	Canned food warehouses	R10
20.3	Outdoor warehouses	R11 o R10 V4
21	Chemical and thermal treatments for iron and metal	
21.1	Pickling units	R12
21.2	Hardening units	R12
21.3	Laboratories	R11
22	Metal machining and processing	
22.1	Galvanizing units	R12
22.2	Cast iron machining	R11 V4
22.3	Machining units (for ex. turning, milling), moulding units, drawing (pipe)	R11 V4
22.4	Parts washing units, steam treatment	R12
23	Vehicle repair shops	
23.1	Service and repair units	
23.2	Service and inspection pits	R11
23.3	Washing room and areas	R12 V4 R11 V4
24	Aircraft repair plants	
24.1	Aircraft hangars	
24.2	Servicing plants	R11
24.3	Washing areas	R12 R11 V4
25	Waste water treatment plants	
25.1	Pumping rooms	
25.2	Sludge dewatering units	R11
25.3	Filtering plant units	R12 R12
26	Fire stations	
26.1	Vehicle parks	
26.2	Fire hose maintenance areas	R12 R12
27	Banks	
27.1	Window areas	R9
28	Garages	
28.1	Garages not exposed to the weather	R10
28.2	Garages exposed to the weather	R11 o R10 V4
28.3	Outdoor car parks	R11 o R10 V4
29	Schools and kindergartens	
29.1	Entrance areas, corridors, recreation rooms	R9
29.2	Classrooms	R9
29.3	Stairs	R9
29.4	Toilet and lavatory	R10
29.5	Kitchens for practical sessions in schools (see n°9)	R10
29.6	Kindergarten kitchens (see n°9)	R10
29.7	Wood machine areas	R10
29.8	Practical work areas	R10
29.9	Playgrounds	R11 o R10 V4
30	Company outdoor environments	
30.1	Pavements	R11 o R10 V4
30.2	Loading ramps	
30.2.1	Sheltered	R11 o R10 V4
30.2.2	Not sheltered	R12 V4
30.3	Sloping loading ramps (for wheelchairs for ex)	R12 V4
30.4.1	Refuelling facilities	R12
30.4.2	Sheltered refuelling facilities	R11

Edited by:

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* For floors in wet areas to be walked on barefoot, please refer to informative report GUV-I 8527.

** The entrance areas in n°0.1 are directly accessible from the outside; moisture or dirt can enter or be carried in.

*** Stairs where moisture or dirt can enter or be carried in.