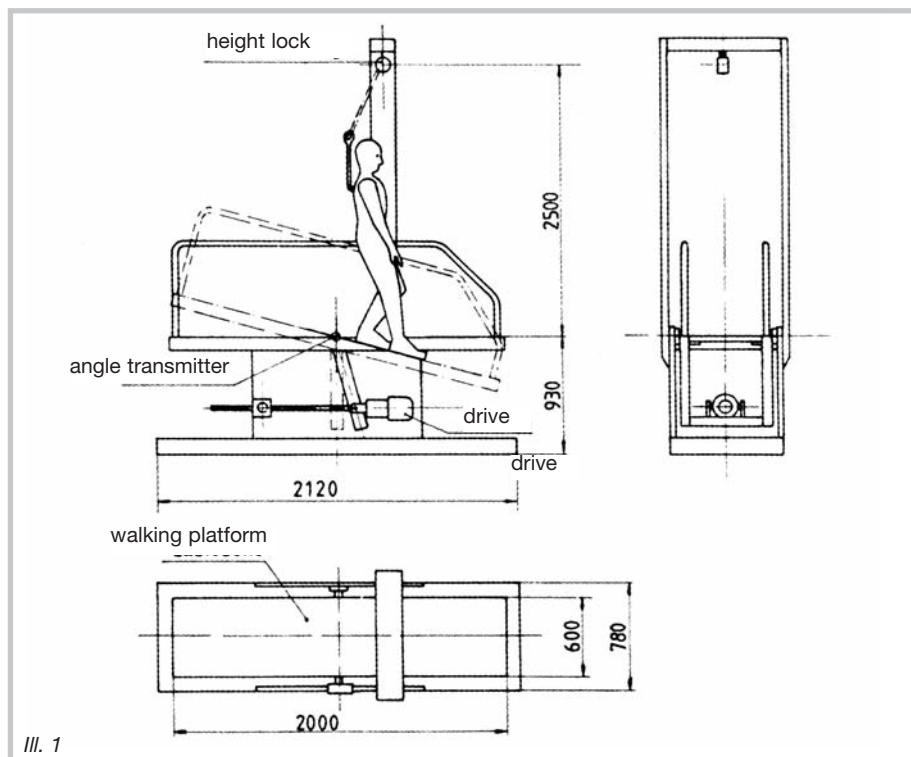


# SLIP RESISTANT FLOOR COATINGS

## Test Method according to DIN 51130

In work places and areas where there is a risk of slipping, slip-resistant flooring is essential. In Germany, the method for testing slip-resistance is governed by DIN 51130 "Testing Flooring; Determination of the Slip-Resistant Property; Work Places and Work Areas with an Increased Risk of Slipping; Walking Method; Inclined Plane". The mean angle of inclination calculated from a series of measurements determines to which of five classification groups a flooring will be assigned. The classification group (Table 1) is used as a standard for the degree of slip resistance - flooring in group R 9 meets the lowest requirement, and group R 13 meets the highest requirements.

As a rule, flooring in areas where the potential for slipping is high, because of large quantities of contaminants that promote slipping, also require larger displacement spaces. Table 2 shows the minimum volumes of displacement space.



### Test persons / test shoes

Test persons wear form B safety shoes, shoe model S1 according to DIN EN 345 part 1 and 2 with soles on a nitrile rubber base, type "Picasso" with a profile shown in III. 2. These are made by Lupos Schuhfabrik GmbH, Rheinstraße 12, D-41836 Hückelhoven. The test persons are secured with a safety harness that prevents falling but allows them to walk on the floor being tested.

### Test method

A plane, torsionally rigid platform 600 mm wide and 2000 mm long with an inclination that can be adjusted lengthwise from 0° to 45° is used as the testing device (III. 1). The angle speed of the platform is a maximum 1° per second, i.e. at least 45 seconds are needed to walk through the entire 45° angle. The movement can be controlled by the test person, and can be continuous or in 0.5° steps. A metre attached to the testing device measures the degree of inclination of the platform compared to the horizon with an accuracy of 0.5° ± 0.2°. Railings are placed along the sides of the testing device for the safety of the test persons.

Total mean value	Class group
from 6° to 10°	R 9
more than 10° to 19°	R 10
more than 19° to 27°	R 11
more than 27° to 35°	R 12
more than 35°	R 13

Table 1: Assignment of the total mean value for angles of inclination into classification groups of slip resistance

Minimum volume of the displacement space	Designation of the displacement space
4 cm <sup>3</sup> /dm <sup>2</sup>	V 04
6 cm <sup>3</sup> /dm <sup>2</sup>	V 06
8 cm <sup>3</sup> /dm <sup>2</sup>	V 08
10 cm <sup>3</sup> /dm <sup>2</sup>	V 10

Table 2: Assignment of the designation of displacement space to minimum volumes



Number	Work places and areas and routes connecting work areas	Slip hazard (R-group)	Displacement space with code
0	Work places and areas in general <sup>1)</sup>		
0.1	Entrance areas, indoors <sup>2)</sup>	R 9	
0.2	Entrance areas, outdoors	R 11 or R 10	V 04
0.3	Stairs, indoors <sup>3)</sup>	R 9	
0.4	Stairs, outdoors	R 11 or R 10	V 04
0.5	Rest areas (e.g. common rooms, canteens)	R 10	
	Pause rooms (e.g. common rooms, works canteens)	R 9	
	First-aid rooms	R 9	
1	Production of margarine, edible fats and oils		
1.1	Fat melting facilities	R 13	V 06
1.2	Edible oil refineries	R 13	V 06
1.3	Production and packaging of margarine	R 12	
1.4	Production and packaging of edible fat, filling of edible oil	R 12	
2	Milk treatment and processing, cheese production		
2.1	Fresh milk treatment and processing including butter making	R 12	
2.2	Cheese production, storage and packaging	R 11	
2.3	Ice cream production	R 12	
3	Production of chocolate and sweets		
3.1	Sugar production	R 12	
3.2	Cacao production	R 12	
3.3	Raw material production	R 11	
3.4	Production of chocolate bars, hollow bodies and boxed chocolates	R 11	
4	Production of baked goods (bakeries, patisseries, long-life baked goods)		
4.1	Dough preparation	R 11	
4.2	Mainly fat or liquid material processing	R 12	
4.3	Sculleries	R 12	V 04
5	Slaughtering, meat treatment and processing		
5.1	Slaughter houses	R 13	V 10
5.2	Slaughter and gutting	R 13	V 10
5.3	Meat cutting	R 13	V 08
5.4	Sausage preparation	R 13	V 08
5.5	Cooked sausage department	R 13	V 08
5.6	Raw sausage department	R 13	V 06
5.7	Sausage drying room	R 12	
5.8	Gut storage	R 12	
5.9	Salting, smoking	R 12	
5.10	Poultry processing	R 12	V 06

Number	Work places and areas and routes connecting work areas	Slip hazard (R-group)	Displacement space with code
5.11	Cold meats and packaging department	R 12	
5.12	Workshops with sale	R 12	V 08 <sup>4)</sup>
6	Treatment and processing of fish, production of delicatessens		
6.1	Treatment and processing of fish	R 13	V 10
6.2	Delicatessen production	R 13	V 06
6.3	Mayonnaise production	R 13	V 04
7	Vegetable treatment and processing		
7.1	Sauerkraut production	R 13	V 06
7.2	Production of preserved vegetables	R 13	V 06
7.3	Sterilisation rooms	R 11	
7.4	Rooms in which vegetables are prepared for processing	R 12	V 04
8	Wet areas in food and beverage production (unless specifically mentioned)		
8.1	Storage cellars, fermentation cellars	R 10	
8.2	Filling of beverages, fruit juice production	R 11	
9	Kitchens, pantries		
9.1	Catering kitchens (restaurant and hotel kitchens)		
9.1.1	up to 100 settings a day	R 11	V 04
9.1.2	more than 100 settings a day	R 12	V 04
9.2	Kitchens for community feeding in homes, schools, nurseries, care homes/institutions	R 11	
9.3	Kitchens for community feeding in hospitals, clinics	R 12	
9.4	Large-scale kitchens for community feeding in cafeterias, canteens, remote kitchens	R 12	V 04
9.5	Preparation kitchens (fast food kitchens, snack operations)	R 12	V 04
9.6	Final preparation and heating kitchens	R 10	
9.7	Coffee and tea kitchens, kitchens in bed and breakfasts, station kitchens	R 10	
9.8	Sculleries		
9.8.1	Sculleries for 9.1, 9.4, 9.5	R 12	V 04
9.8.2	Sculleries for 9.2	R 11	
9.8.3	Sculleries for 9.3	R 12	
9.9	Dining rooms, guest rooms, canteens, service and serving hallways	R 9	
10	Refrigerated rooms, deep-freeze rooms, cool rooms, frozen food storage		
10.1	for unpackaged goods	R 12	
10.2	for packaged goods	R 11	
11	Sales areas, sales rooms		
11.1	Receipt of meat		
11.1.1	for unpackaged goods	R 11	
11.1.2	for packaged goods	R 10	

Number	Work places and areas and routes connecting work areas	Slip hazard (R-Group)	Displacement space with code
11.2	Receipt of fish	R 11	
11.3	Service aisle for meat and sausage/cold cuts		
11.3.1	for unpackaged goods	R 11	
11.3.2	for packaged goods	R 10	
11.4	Service aisle for bread and bakery goods, unpackaged goods	R 10	
11.5	Service aisle for dairy and delicatessen products, unpackaged goods	R 10	
11.6	Service aisle for fish		
11.6.1	for unpackaged goods	R 12	
11.6.2	for packaged goods	R 11	
11.7	Service aisles with the exception of 11.3 to 11.6	R 09	
11.8	Meat preparation rooms		
11.8.1	For preparing meat with the exception of No. 5	R 12	V 08
11.8.2	For processing meat with the exception of No. 5	R 11	
11.9	Rooms and areas for arranging flowers	R 11	
11.10	Sales areas equipped with baking ovens		
11.10.1	For the production of baked goods	R 11	
11.10.2	For baking semi-finished baked goods	R 10	
11.11	Sales areas equipped with deep fat fryers or grills	R 12	V 04
11.12	Sales rooms, customer rooms	R 9	
11.13	Preparation areas for foods sold in self-serve areas	R 10	
11.14	Cashier areas, bagging areas	R 9	
11.15	Outdoor sales areas	R 11 or R 10	V 04
<b>12</b>	<b>Rooms for health services/welfare work</b>		
12.1	Disinfection rooms (wet)	R 11	
12.2	Cleaning areas to prepare for sterilisation	R 10	
12.3	Faeces rooms, disposal of liquids into the sewer, unclean nursing rooms	R 10	
12.4	Dissection/autopsy rooms	R 10	
12.5	Rooms for medical baths, hydro-therapy, mud bath preparation	R 11	
12.6	Scrub rooms for operation theatres, application of plaster casts	R 10	
12.7	Sanitary rooms, station baths	R 10	
12.8	Rooms for medical diagnostics and therapy, massage rooms	R 9	
12.9	Operating theatres	R 9	
12.10	Stations with sick bays and corridors	R 9	
12.11	Medical surgeries, day clinics	R 9	
12.12	Drug stores	R 9	
12.13	Laboratory rooms	R 9	
12.14	Hair dressers	R 9	

Number	Work places and areas and routes connecting work areas	Slip hazard (R-Group)	Displacement space with code
<b>13</b>	<b>Laundries</b>		
13.1	Places with continuous washing machines, tubes and spinning machines	R 9	
13.2	Places with washing machines and removal of dripping wet laundry	R 11	
13.3	Places for ironing and mangles	R 9	
<b>14</b>	<b>Production of concentrated animal feed</b>		
14.1	Dry feed production	R 11	
14.2	Production of concentrated feed using fat and water	R 11	V 04
<b>15</b>	<b>Leather production, textiles</b>		
15.1	Water workshops in tanneries	R 13	
15.2	Places with de-fleshing machines	R 13	V 10
15.3	Places with glued leather waste	R 13	V 10
15.4	Grease rooms for the production of seals	R 12	
15.5	Dye shops for textiles	R 11	
<b>16</b>	<b>Paint shops</b>		
16.1	Wet sanding areas	R 12	V 10
<b>17</b>	<b>Ceramic industry</b>		
17.1	Wet mills (processing ceramic materials)	R 11	
17.2	Mixers – for handling e.g. tar, pitch, graphite, synthetic resins	R 11	V 06
17.3	Presses (shaping) – for handling e.g. tar, pitch, graphite, synthetic resins	R 11	V 06
17.4	Casting areas	R 12	
17.5	Glazing areas	R 12	
<b>18</b>	<b>Treatment and processing of glass and stone</b>		
18.1	Stone sawing facilities, stone grinding shops	R 11	
18.2	Shaping of hollow glass, glass for vessels, glass for construction	R 11	
18.3	Grinding areas for hollow glass, plate glass	R 11	
18.4	Production of insulation, glass handling of drying agents	R 11	V 06
18.5	Packaging, shipment of plate glass, handling of anti-blocking agents	R 11	V 06
18.6	Etch and acid polishing facilities for glass	R 11	
<b>19</b>	<b>Concrete plants</b>		
19.1	Concrete washing areas	R 11	
<b>20</b>	<b>Storage areas</b>		
20.1	Storage areas for oils and fats	R 12	V 06
20.2	Storage areas for packaged foods	R 10	
20.3	Outdoor storage areas	R 11 oder R 10	V 04
<b>21</b>	<b>Chemical and thermal treatment of iron and metals</b>		
21.1	Pickling plants	R 12	
21.2	Hardening shops	R 12	

Number	Work places and areas and routes connecting work areas	Slip hazard (R-Group)	Displacement space with code
21.3	Laboratories	R 11	
<b>22</b>	<b>Metal working and processing, metal workshops</b>		
22.1	Electroplating rooms	R 12	
22.2	Grey cast iron casting work	R 11	V 04
22.3	Mechanical work areas e.g. turnerys, milling shops, press rooms, pressing plants, drawing shops and areas with higher oil-lubricant loads	R 11	V 04
22.4	Partial cleaning areas, volatilisation areas	R 12	
<b>23</b>	<b>Workshops for repairing vehicles</b>		
23.1	Work areas for repair and maintenance	R 11	
23.2	Work and test pits	R 12	V 04
23.3	Wash halls, washing areas	R 11	V 04
<b>24</b>	<b>Workshops for repairing aircraft/ships</b>		
24.1	Aircraft hangers	R 11	
24.2	Shipyards halls	R 12	
24.3	Wash areas	R 11	V 04
<b>25</b>	<b>Sewage treatment plants</b>		
25.1	Pump rooms	R 12	
25.2	Sludge dehydration plants	R 12	
25.3	Screening plants	R 12	
25.4	Standing areas in work places, working platforms and maintenance landings	R 12	
<b>26</b>	<b>Fire departments</b>		
26.1	Vehicle parking areas	R 12	
26.2	Places for maintaining hoses	R 12	
<b>27</b>	<b>Banks</b>		
27.1	Counter service areas	R 9	
<b>28</b>	<b>Parking areas</b>		
28.1	Garages, high rise and underground garages protected from weather <sup>5)</sup>	R 10	
28.2	Garages, high rise and underground garages exposed to weather	R 11 or R 10	V 04
28.3	Outdoor parking areas	R 11 or R 10	V 04
<b>29</b>	<b>Schools and nurseries</b>		
29.1	Entrance areas, corridors and rest areas	R 9	
29.2	Class rooms, group rooms	R 9	
29.3	Stairs	R 9	
29.4	Toilets and wash rooms	R 10	
29.5	Teaching kitchens in schools (see also No. 9)	R 10	
29.6	Kitchens in nurseries (see also No. 9)	R 10	
29.7	Machine rooms for wood working	R 10	

Number	Work places and areas and routes connecting work areas	Slip hazard (R-Group)	Displacement space with code
29.8	Special rooms for working	R 10	
29.9	School yards	R 11 or R 10	V 04
<b>30</b>	<b>Company traffic roads in outdoor areas</b>		
30.1	Side walks	R 11 or R 10	V 04
30.2	Loading ramps		
30.2.1	Covered	R 11 or R 10	V 04
30.2.2	Not covered	R 12	V 04
30.3	Inclined ramps (e.g for wheelchairs, loading bridges)	R 12	
30.4	Tanking areas		
30.4.1	Covered	R 11	
30.4.2	Not covered	R 12	

- 1) For floors in wet barefoot areas, see GUV Information "Flooring for wet barefoot areas" (GUV-I 8527, formerly GUV 26.17)
- 2) Entrance areas according to number 0.1 are areas that are entered directly from the outdoors and in which moisture from outside can be tracked in (see also paragraph 4 of section 4, The use of mats to take up dirt and moisture). For connecting areas or other large areas, section 3.4 of these professional trade association rules are to be observed.
- 3) Stairs according to number 0.3 are those on which moisture from outside can be tracked in. For connecting areas, section 3.4 of these professional trade association rules is to be observed.
- 4) If uniform flooring is laid all over, the displacement space can be reduced to V4 based on a risk analysis (taking the cleaning procedure, work sequences and the amount of slip promoting substances that fall on the floor into consideration)
- 5) Pedestrian areas that are not at risk for slipping caused by the influence of weather such as driving rain or tracked in water.

# Slip Prevention and Job Safety

