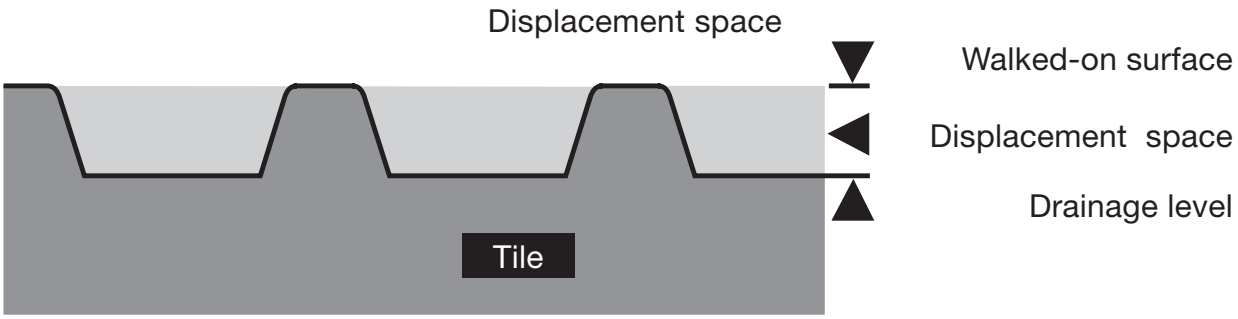
## 3.1 SLIP RESISTANCE | INDUSTRIAL AND COMMERCIAL AREAS

| TEST AT "INCLINED PLANE" | | Commercial areas |
|---|---|---|
| **Assessment groups** | **Angle of inclination** | |
| **R9** | >6° – 10°<br>low coefficient of adhesion |  |
| **R10** | >10° – 19°<br>normal coefficient of adhesion |  |
| **R11** | >19° – 27°<br>increased coefficient of adhesion |  |
| **R12** | >27° – 35°<br>high coefficient of adhesion |  |
| **R13** | >35°<br>very high coefficient of adhesion |  |

The indicated angles of inclination exclusively serve for the assignment of the valuation groups and can not be equated with the angles of inclination of slopes/ramps.




| Displacement space / Minimum volume | |
|---|---|
| **V4** | 4cm³ / dm² |
| **V6** | 6cm³ / dm² |
| **V8** | 8cm³ / dm² |
| **V10** | 10cm³ / dm² |

**Displacement space**
The displacement space (V4-V10) is the open space between the upper walked-on surface and the drainage level of profiled surfaces.

**Coefficient of Friction | Slip Resistance**
Workshop rules as well as accident prevention regulations require floors to be smooth, slip-resistant and easy to clean. Special protective measures against slipping are necessary where there is a risk as a result of the use of water, oil, slush, grease or waste. This should be taken into consideration when choosing the surface material. This clear requirement is based on investigations carried out by the insurance companies, which proved that slipping is the primary cause of accidents.

**Valuation Groups | Assessment groups**
In a detailed table the required valuation groups are assigned to work areas where there is a high risk of slipping. Information is available from Deutsche Gesetzliche Unfallversicherung and AGROB BUCHTAL.

## LEGAL BASIS

**Publisher**
Bundesanstalt für Arbeitsschutz und Arbeitsmedizin
(Federal institute for safety at work and occupational medicine)
**Available at:**
Download at: www.baua.de

| | | | |
|---|---|---|---|
| **0** | **General work rooms and areas*)** | | |
| 0.1 | Entrance areas, indoors**) | | R9 |
| 0.2 | Entrance areas, outdoors | | R11 (oder R10 V4) |
| 0.3 | Stairs, indoors***) | | R9 |
| 0.4 | Outdoor stairs | | R11 (oder R10 V4) |
| 0.5 | Inclined ramps, indoors***)<br>(e.g. for wheel chairs, compensation slopes, routes of transport) | One R-group higher than that required for the covering of the access area | V-value of the covering of the access area, where applicable |
| 0.6 | Sanitary rooms | | |
| 0.6.1 | Toilets | | R9 |
| 0.6.2 | Changing rooms and washrooms | | R10 |
| 0.7 | Break rooms (e.g. recreation room, company canteens) | | R9 |
| 0.8 | First aid rooms and comparable facilities (see ASR A4.3) | | R9 |

| | | | |
|---|---|---|---|
| **1** | **Manufacture of margarine, edible fats and oils** | | |
| 1.1 | Melting of fat | | R13 V6 |
| 1.2 | Cooking oil refinery | | R13 V6 |
| 1.3 | Margarine production and packaging | | R12 |
| 1.4 | Cooking fat production and packing, oil bottling | | R12 |

| 2 | **Milk processing, cheese production** | | |
|---|---|---|---|
| 2.1 | Fresh milk processing and butter production | | R12 |
| 2.2 | Cheese production, storage and packaging | | R11 |
| 2.3 | Icecream manufacturing | | R12 |

| 3 | **Chocolate and confectionery production** | | |
|---|---|---|---|
| 3.1 | Sugar processing | | R12 |
| 3.2 | Cocoa production | | R12 |
| 3.3 | Production of raw mixtures | | R11 |
| 3.4 | Fabrication of chocolate bars and shells and filled chocolates | | R11 |

| 4 | **Production of bread, cakes and pastries (bakeries, cake shops, production of long-life bakery products)** | | |
|---|---|---|---|
| 4.1 | Dough preparation | | R11 |
| 4.2 | Rooms in which predominantly fats or liquid mixtures are processed | | R12 |
| 4.3 | Washing-up rooms | | R12V4 |

| 5 | **Slaughtering, meat processing** | | |
|---|---|---|---|
| 5.1 | Slaughter-house | | R13V10 |
| 5.2 | Tripe processing room | | R13V10 |
| 5.3 | Meat sectioning | | R13V8 |
| 5.4 | Sausage kitchen | | R13V8 |
| 5.5 | Boiled sausage unit | | R13V8 |
| 5.6 | Raw sausage unit | | R13V6 |
| 5.7 | Sausage drying room | | R12 |
| 5.8 | Gut store | | R12 |
| 5.9 | Salting and curing rooms, smoking establishments | | R12 |
| 5.10 | Poultry processing | | R12V6 |
| 5.11 | Cold cuts and packaging unit | | R12 |
| 5.12 | Workshop with sales area | | R12V8****) |

| 6 | **Fish processing, production of delicatessen** | | |
|---|---|---|---|
| 6.1 | Fish processing | | R13V10 |
| 6.2 | Production of delicatessen | | R13V6 |
| 6.3 | Manufacture of mayonnaise | | R13V4 |

| 7 | **Processing of vegetables** | | |
|---|---|---|---|
| 7.1 | Production of sauerkraut | | R13V6 |
| 7.2 | Vegetable tinning | | R13V6 |
| 7.3 | Sterilizing rooms | | R11 |
| 7.4 | Rooms in which vegetables are prepared for processing | | R12V4 |

| 8 | **Wet areas in food and beverage production (if not specifically mentioned)** | | |
|---|---|---|---|
| 8.1 | Storage cellars | | R10 |
| 8.2 | Beverage bottling, fruit juice production | | R11 |

| 9 | **Catering establishments** | | |
|---|---|---|---|
| 9.1 | Kitchens in the catering trade (restaurant kitchens, hotel kitchens) | | R12 |
| 9.2 | Kitchens catering for homes, schools, day-care facilities for children, sanatoria | | R11 |
| 9.3 | Kitchens catering for hospitals, clinics | | R12 |
| 9.4 | Large kitchens catering for industrial and university canteens, and contract catering | | R12V4 |
| 9.5 | Food preparation kitchens (fast food kitchens, convenience restaurants and snack bars) | | R12V4 |
| 9.6 | Kitchens for heating up frozen meals | | R10 |
| 9.7 | Coffee and tea kitchens, hotel garni kitchens and ward kitchens | | R10 |
| 9.8 | Washing-up rooms | | |
| 9.8.1 | Washing-up rooms for 9.1, 9.4, 9.5 | | R12V4 |
| 9.8.2 | Washing-up rooms for 9.2 | | R11 |
| 9.8.3 | Washing-up rooms for 9.3 | | R12 |
| 9.9 | Dining rooms, guest rooms, canteens including serving counters | | R9 |

| 10 | Cold stores, deep freeze stores | | |
|---|---|---|---|
| 10.1 | for unpacked goods | | R12 |
| 10.2 | for packed goods | | R11 |

| 11 | Sales outlets, shops | | |
|---|---|---|---|
| 11.1 | Reception of goods, meat | | |
| 11.1.1 | for unpacked goods | | R11 |
| 11.1.2 | for packed goods | | R10 |
| 11.2 | Reception of goods, fish | | R11 |
| 11.3 | Serving counters for meat and sausage | | |
| 11.3.1 | for unpacked goods | | R11 |
| 11.3.2 | for packed goods | | R10 |
| 11.4 | Serving counters for bread, cakes and pastries, unpacked goods | | R10 |
| 11.5 | Serving counters for dairy products and delicatessen, unpacked goods | | R10 |
| 11.6 | Serving counters for fish | | |
| 11.6.1 | for unpacked goods | | R12 |
| 11.6.2 | for packed goods | | R11 |
| 11.7 | Serving counters, except for nos. 11.3 to 11.6 | | R9 |
| 11.8 | Meat preparation rooms | | |
| 11.8.1 | for meat preparation, except for no. 5 | | R12V8 |
| 11.8.2 | for meat processing, except for no. 5 | | R11 |
| 11.9 | Florists shops | | R11 |
| 11.10 | Sales areas with ovens | | |
| 11.10.1 | for the production of bread, cakes and pastries | | R11 |
| 11.10.2 | for the warming up of prefabricated bread, cakes and pastries | | R10 |
| 11.11 | Sales areas with chip pans or grills | | R12V4 |
| 11.12 | Shops, customer rooms | | R9 |
| 11.13 | Preparation areas for food for self-service shops | | R10 |
| 11.14 | Cash register areas, packing areas | | R9 |
| 11.15 | Outdoor sales areas | | R11 (oder R10V4) |

| 12 | Health service rooms | | |
|---|---|---|---|
| 12.1 | Disinfection rooms (wet) | | R11 |
| 12.2 | Pre-cleaning areas of sterilization | | R10 |
| 12.3 | Faeces disposal rooms, discharge rooms, unclean nursing work rooms | | R10 |
| 12.4 | Pathological facilities | | R10 |
| 12.5 | Rooms for medical baths, hydrotherapy, fango preparation | | R11 |
| 12.6 | Washrooms of operating theatres, plastering rooms | | R10 |
| 12.7 | Sanitary rooms, ward bathrooms | | R10 |
| 12.8 | Rooms for medical diagnosis and therapy, massage 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 | Pharmacies | | R9 |
| 12.13 | Laboratories | | R9 |
| 12.14 | Hairdressing salons | | R9 |

| 13 | Laundry | | |
|---|---|---|---|
| 13.1 | Rooms with continuous-flow washing machines or with spin-drier | | R9 |
| 13.2 | Rooms with washing machines at which the clothes are taken out dripping wet | | R11 |
| 13.3 | Ironing rooms | | R9 |

| 14 | Fodder concentrate production | | |
|---|---|---|---|
| 14.1 | Dried fodder production | | R11 |
| 14.2 | Fodder concentrate production using fat and water | | R11V4 |

| 15 | Leather production, textiles | | |
|---|---|---|---|
| 15.1 | Wet areas in tanneries | | R13 |
| 15.2 | Rooms with fleshing machines | | R13V10 |
| 15.3 | Areas where leather scraps accumulate | | R13V10 |
| 15.4 | Rooms for making leather impermeable by means of grease | | R12 |
| 15.5 | Dye mills for textiles | | R11 |

| 16 | Paint shops | | |
|---|---|---|---|
| 16.1 | Wet grinding areas | | R12V10 |
| 16.2 | Powder coating | | R11 |
| 16.3 | Painting | | R10 |

| 17 | Ceramics industry | | |
|---|---|---|---|
| 17.1 | Wet grinding mills (processing of ceramic raw materials) | | R11 |
| 17.2 | Mixers; handling of materials like tar, pitch, graphite and synthetic resins | | R11V6 |
| 17.3 | Presses (shaping); handling of materials like tar, pitch, graphite and synthetic resins | | R11V6 |
| 17.4 | Moulding, pressure die casting areas | | R12 |
| 17.5 | Glazing areas | | R12 |

| 18 | Glass and stone processing | | |
|---|---|---|---|
| 18.1 | Stone cutting, stone grinding | | R11 |
| 18.2 | Glass shaping of hollow glass ware, container ware | | R11 |
| 18.3 | Grinding areas for hollow glass ware, flat glass | | R11 |
| 18.4 | Insulating glass manufacture; handling of drying agents | | R11V6 |
| 18.5 | Packaging, shipping of flat glass; handling of anti-adhesive agents | | R11V6 |
| 18.6 | Etching and acid polishing facilities for glass | | R11 |

| 19 | Cast concrete factories | | |
|---|---|---|---|
| 19.1 | Concrete washing areas | | R11 |

| 20 | Storage areas | | |
|---|---|---|---|
| 20.1 | Storage areas for oils and fats | | R12V6 |
| 20.2 | Storage areas for packed food | | R10 |
| 20.3 | Outdoor storage areas | | R11 (oder R10V4) |

| 21 | Chemical and thermal treatment of iron and metal | | |
|---|---|---|---|
| 21.1 | Pickling plants | | R12 |
| 21.2 | Hardening shops | | R12 |
| 21.3 | Laboratory rooms | | R11 |

| 22 | Metal processing, metal workshops | | |
|---|---|---|---|
| 22.1 | Galvanizing shops | | R12 |
| 22.2 | Grey cast iron processing | | R11V4 |
| 22.3 | Mechanical processing areas (turnery, milling shop), punching room, pressroom, drawing shop (pipes, wires) and areas exposed to increased stress by oil and lubricants | | R1V4 |
| 22.4 | Parts cleaning areas, exhaust steam areas | | R12 |

| 23 | Vehicle repair workshops | | |
|---|---|---|---|
| 23.1 | Repair and servicing bays | | R11 |
| 23.2 | Working and inspection pits | | R12V4 |
| 23.3 | Car washing halls, washing areas | | R11V4 |

| 24 | Aircraft repair workshops | | |
|---|---|---|---|
| 24.1 | Aircraft hangars | | R11 |
| 24.2 | Repair hangars | | R12 |
| 24.3 | Washing halls | | R11V4 |

| 25 | Sewage treatment plants | | |
|---|---|---|---|
| 25.1 | Pump rooms | | R12 |
| 25.2 | Rooms for sludge draining facilities | | R12 |
| 25.3 | Rooms for screening equipment | | R12 |
| 25.4 | Stands of workplaces, scaffolds and maintenance platforms | | R12 |

| 26 | Fire brigade buildings | | |
|---|---|---|---|
| 26.1 | Vehicle parking places | | R12 |
| 26.2 | Rooms for hose maintenance equipment | | R12 |

| 27 | Functional rooms in the respiratory protection training facility | | |
|---|---|---|---|
| 27.1 | Preparation room | | R10 |
| 27.2 | Fitness room | | R10 |
| 27.3 | Training room | | R11 |
| 27.4 | Sluice | | R10 |

| | | | |
|---|---|---|---|
| 27.5 | Target room | | R11 |
| 27.6 | Acclimatization room | | R11 |
| 27.7 | Control room | | R9 |

| **28** | **Schools and day-care facilities for children** | | |
|---|---|---|---|
| 28.1 | Entrance areas, corridors, assembly halls | | R9 |
| 28.2 | Class rooms, group rooms | | R9 |
| 28.3 | Stairs | | R9 |
| 28.4 | Toilets, washrooms | | R10 |
| 28.5 | Instructional kitchens in schools (also see no. 9) | | R10 |
| 28.6 | Kitchens in day-care facilities for children (also see no. 9) | | R10 |
| 28.7 | Machine rooms for wood processing | | R10 |
| 28.8 | Special rooms for handicrafts | | R10 |
| 28.9 | Schoolyards | | R11 (oder R10V4) |

| **29** | **Financial institutions** | | |
|---|---|---|---|
| 29.1 | Counter areas | | R9 |

| **30** | **Plant traffic routes in outdoor areas** | | |
|---|---|---|---|
| 30.1 | Footpaths | | R11 (oder R10V4) |
| 30.2 | Loading platforms | | |
| 30.2.1 | covered | | R11 (oder R10V4) |
| 30.2.2 | not covered | | R12 (oder R11V4) |
| 30.3 | Sloping ramps (e.g. for wheel-chairs, loading platforms) | | R12 (oder R11V4) |
| 30.4 | Tank-up areas | | |
| 30.4.1 | covered | | R11 |
| 30.4.2 | not covered | | R12 |

| **31** | **Parking areas** | | |
|---|---|---|---|
| 31.1 | Garages, car-parks not exposed to weather influences*****) | | R10 |
| 31.2 | Garages, car-parks exposed to weather influences | | R11 (oder R10V4) |
| 31.3 | Open-air parking areas | | R11 (oder R10V4) |

***)** For floors in wet areas walked on barefoot, see the DGUV information 207-006 “Floor coverings in wet barefoot areas” (previous GUV-I 8527).

****)** Entrance areas according to number 0.1 are all areas with direct access from outside and in which moisture from outside can be brought (also see point 6 para. 3, utilization of products absorbing dirt and moisture). For adjoining areas or other rooms with large surfaces, point 4 para. 10 of ASR A1.5/1,2 has to be observed.

*****)** Stairs and ramps according to numbers 0.3 and 0.5 are those possibly exposed to moisture brought in from outside. For adjoining areas, point 4 para. 10 of ASR A1.5/1,2 has to be observed.

******)** If the same floor covering was laid in all areas, the displacement space can be lowered down to V4 after a risk assessment (taking into consideration the cleaning method, the working processes and the quantity of slippery substances on the floor).

*******)** The pedestrian areas which are not subject to a risk of slipping because of weather influences such as driving rain or moisture brought in.

Floors in rooms must not present any irregularities, cavities or dangerous slopes; stumbling must be impossible on these floors.

Floors are to be designed without inclination. Exception: functional inclinations, e.g. for the drainage of liquids.

In areas which must be continuously frequented in the scope of their normal utilization, the slip resistances of the different floor surfaces must not differ from each other to such an extent that there may be a risk of stumbling and slipping. This may be the case if the surface qualities within one floor covering (e.g. because of covers, markings or films glued on the floor) or of adjoining floors differ from each other with regard to the slip resistance by more than one R-group.

Entrances of buildings have to be designed in such a way that dirt and moisture brought in do not cause a risk of slipping. This can be achieved by providing clean-off zones in the form of mats absorbing the dirt and the moisture, which are specially designed for the expected pedestrian traffic with regard to their length, width and the material used and are at least 1.5 m long in the direction of walking over the whole width of the passage.

If liquids or slippery substances get on the floor to such an extent that there is a risk of slipping for persons, adequate measures have to be taken. Fluid liquids, for example, can be discharged by a sufficient slope of the floor (e.g. a slope of at least 2 per cent in the case of liquids with a flow behaviour similar to that of water). The discharge of liquids via traffic routes should be avoided, if possible. An adequate measure against the risk of slipping due to slippery substances such as e.g. oil or leftovers are floor coverings with a sufficient displacement space.