

Technical Bulletin

Permissible loads on screed-flush trunking systems and screed-covered ducting systems

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This technical bulletin provides you with information on specific technical subjects. It is based on the current rules and regulations and on our current test results. The contents of this document is not legally binding.

1 Load capacities for installation systems

Underfloor electrical installation systems are subjected to loads. They must be able to resist normal loads occurring at the place of installation, whilst continuing to function. The loads may be of different kinds, either from people just walking over the top, from the feet of furniture right up to loads from vehicles and transportation aids.

1.1 What is the effect of these loads?

The influence of loads on floors (ceiling constructions) – and thus on the installation systems installed there – is direct. The weight of the load creates a force on a certain area of the ground. If we consider this force on a specific area, e.g. on one m², then we talk about a **load capacity**, taken from the viewpoint of subconstruction. Load capacities are defined for ceiling constructions, floor superstructures, system bases, etc. (see Appendix).

$$\text{Load capacity} = \text{load} / \text{surface area}$$

If we consider the weight of just a single section and its effect on the floor area, then we term this a **single load**.

Load capacities and single loads should always be considered separately. This can be seen clearly using the example of a vehicle:

A car weighs 2,000 kg.
The axle base is 3.5 m and the wheelbase 1.8 m.

The loads can be calculated as follows:

$$\begin{aligned} \text{load} &= \text{weight} \times 9.81 \text{ m/s}^2 = 2,000 \text{ kg} \times 9.81 \text{ m/s}^2 = 19.6 \text{ kN} \\ \text{surface area} &= \text{axle base} \times \text{wheelbase} = 3.5 \text{ m} \times 1.8 \text{ m} = 6.3 \text{ m}^2 \\ \text{Load capacity} &= 19.6 \text{ kN} / 6.3 \text{ m}^2 = 3.1 \text{ kN/m}^2 \end{aligned}$$

The weight of the car is transferred to the ground through the four tyres. The **single load** is therefore 500 kg or 4.9 kN.

When calculating and evaluating the load capacity of installation systems, only the effect of single loads should be taken into account.

2 Permissible load on installation systems

2.1 Permissible load

The permissible load of screed-flush trunking systems, screed-flush accessories, e.g. as junction and branch boxes and in service units is described in DIN VDE 0634, Parts 1 and 2: "Underfloor electrical installation".

2.2 Specifications of DIN VDE 0634 Parts 1 and 2

Regarding permissible loads, DIN VDE 0634, Part 2, Paragraph 2.1.2 specifies:

Screed-flush trunking systems and screed-flush accessories must be flush with the top edge of the accessible floor. They are subject to the effects of live loads.

2.2.1 Permissible loads for flush-mounted service units

The following test is used for **flush mounted units**, as specified by DIN VDE 0634 Part 1:

Screed-flush and variable height screed-flush service units are subjected to a load test.

The centre of the walkover areas are subjected to a vertical force of 1500 N from a testing roller for two minutes. The testing roller has a diameter of 50 mm and a width of 18–22 mm.

Both during and after the test, the air and creep paths may not be undershot. In addition, the process may not damage testing items, and active parts may not become exposed. The protection type must remain intact. The testing item may not have any clearly visible cracks. There may be no lasting deformations on the testing items five minutes after the test has been completed. Any deformations of up to 1.5 mm are allowable.

Permissible loads on screed-flush trunking systems and screed-covered ducting systems

2.2.2 Permissible loads on underfloor ducts

Screed-covered ducts and their accessories are tested according to DIN VDE 0634 Part 2.

Permissible loads on screed-covered ducts during installation

The duct sections are designed for load capacities of up to 750 N. The test is carried out using a cube with an edge length of 50 mm.

In later stages of construction, the screed-covered duct sections are subjected to live loads using static layers (floors).

The cube represents an equivalent of a person of 75 kg.

Permissible loads on screed-flush trunking systems

The accessible area of a trunking is subjected to a force of 1500 N, vertical to the surface, from a testing roller for two minutes. In multisection ducts, whose separating elements have a statically active function, the centre of the largest duct section is selected. The testing roller has a diameter of 50 mm and a width of 18 to 22 mm (according to DIN 68 131).

During the test, the items on test may not have any visible cracks or any bowing of more than 4 mm. There may be no lasting deformations on the testing items one minute after the test has been completed. Any deformations of up to 3 mm are allowable.

The testing roller supplies a force equivalent to a chair with castors. The load capacities in the standard are intentionally high, in order to cover loads from office furniture in the form of furniture feet and plinths.

2.4 Heavy load systems

DIN VDE 0634, Parts 1 and 2, do not deal with electrical installation systems for areas with higher loads.

As there are many current applications in these areas, there are also so-called heavy load systems, the design and equipment of which are suitable to meet the high load requirements.

Usually, screed-covered electrical installation systems are used.

2.4.1 Load classes for heavy load systems

Practical application have created two load classes:

- Load class 1 for static loads of up to 10 kN suitable for application in exhibition areas
- Load class 2 for static loads of up to 20 kN suitable for applications in airports and stations.

For details, load capacities and dependencies, we would draw your attention to the information sheet "Electrical installation systems for areas with high load requirements".

2.5 Testing of permissible loads

The load tests according to DIN VDE 0634 Parts 1 and 2 were aligned to the "office and administration construction" sector and the loads common to that sector. The testing roller supplies a force equivalent to an office chair with castors. However, the load capacities in the standard are intentionally high, in order to cover loads from office furniture in the form of furniture feet and plinths.

The load testing of heavy load systems is carried out using a test plate 100 x 150 mm (L x W).

These dimensions roughly correspond to the surface area of a car tyre, thus having a considerable similarity to actual conditions.

3 Conclusion

Underfloor electrical installation systems have proved their capability to support loads over many decades. They are particularly suited to use in office and administration buildings.

Appropriate installation systems must be used for applications with high load capacity requirements.

A transfer of the load capacities by simple conversion of the effective areas is generally not permitted.

The load capacity must always be regarded together with the floor structure, floor covering and the craftsmanship of the installation.

Underfloor electrical installation systems cannot accept higher loads than the surrounding floor constructions.

Appendix

Load assumptions

The following load values for ceiling constructions were taken from DIN 1055 "Actions on structures":

Category	Use	Perpendicular load capacity [kN/m ²]	Single load [kN]
A	Living accommodation	1.0–2.0	1.0
B	Offices and corridors	2.0–5.0	2.0–4.0
C	Meeting rooms	3.0–5.0	4.0–7.0
D	Sales areas	2.0–5.0	2.0–7.0
E	Workshops and rooms for large gatherings of people	5.0–7.5	4.0–10.0
F	Traffic and parking areas	3.5–5.0	20.0
G	Perpendicular load capacities with counterweight stacker	26–170	12.5–20.0

Table 1: Excerpt from 1055-3; Testing of perpendicular load capacities on a testing item 50 x 50 mm

The same applies to system bases (HB and DB). For these, so-called breaking loads are defined. Breaking loads comprise a 2x to 3x safety level, which is then related to the maximum possible single load.

Class	Breaking load [kN]	2x safety	3x safety
1	≥ 4	2 kN	1.3 kN
2	≥ 6	3 kN	2 kN
3	≥ 8	4 kN	2.7 kN
4	≥ 9	4.5 kN	3 kN
5	≥ 10	5 kN	3.3 kN
6	≥ 12	6 kN	4 kN

Table 2: Excerpt from EN 13213; Testing of breaking load capacities on a testing item 25 x 25 mm

Allocation of nominal loads and load classes for system bases

Class	Breaking load [kN]	Nominal load [kN]	Load tap	Use
1	≥ 4	2	2	Office areas without corridors
2	≥ 6	3	3	Office areas with corridors
3	≥ 8	4	4	Office areas with increased static loads
5	≥ 10	5	5	Industrial floors, with light usage, storage rooms, libraries
6	≥ 12	≥ 6	6	Industrial and workshop floors

Table 3: Excerpt from DIN EN 12825

