

Concepts

Products

Service



**All options laid out.**

FLOOR and more® dry hollow floor system



**Lindner**

Building New Solutions

# Building new solutions.

Lindner undertakes major worldwide projects in all areas of interior finishes, insulation technology, industrial services and building facades. From pre-planning through to project completion Lindner is your partner of choice.

The Company's extensive manufacturing capability enables quality to be strictly maintained whilst allowing maximum flexibility to meet individual project requirements.

Environmental considerations are fundamental to all Lindner's business principles.

Through partnerships with clients Lindner turns concepts into reality.

## Choosing Lindner you have:

**Lindner Concepts:**  
Tailored solutions specifically geared to satisfy individual project requirements

**Lindner Products:**  
Quality materials and systems to the very highest industry standards

**Lindner Service:**  
Comprehensive project management services

# FLOOR and more<sup>®</sup> dry floor system

A floor for every walk of life.



## Your benefits at a glance

- Quick installation
- Ready to use after 24 hours
- Jointless surface
- Wide choice of coverings
- Recommended by the Institute for Building Biology, Rosenheim

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# Enjoy wall-to-wall comfort.

## Lindner FLOOR and more®

Lindner is one of the world's leading and largest manufacturers for raised and hollow floor systems. We achieve best dimensional accuracy and a technical maturity level which is unique in the market on the very state-of-the-art and environmental-friendly equipment at production sites in Germany.

### System products made in Germany.

Lindner floor systems as well as FLOOR and more® floor panels from calcium sulphate are developed in house as complete systems. Every component is adjusted to each other in order to guarantee a perfect result. In our factories, we do not only process the carrier panels – from recovered paper, recycled gypsum and reprocessed water – but also the complete substructure. Over 15,000 t of steel per year are formed and afterwards galvanized at our premises for their finishing with the production of raised and hollow floor pedestals.

### Eco-friendly.

Lindner's excellent quality is not left to chance, but is assured by a sophisticated quality management system, demonstrated by our certification to ISO 9001. Samples taken during production are tested against a full range of technical parameters such as stability, breaking load, dimensional accuracy, adhesive values, etc. (over 100 test criteria in all). Our test labs are equipped with ultra-modern test equipment, and constantly test panel raw materials, adhesives, zinc layer thickness etc.

Independent institutes test all systems to the accepted standards for noise, fire safety and mechanical resistance. Tests meeting European standards and certification for almost all European countries are part of our portfolio. We also have the respective evidences for international sales areas.



Our high-quality FLOOR and more® hollow floor panels are made from recovered paper, recycled gypsum and reprocessed water.

## Everything is possible

The FLOOR and more® hollow floor system offers impressive in-built properties and state-of-the-art technology.

FLOOR and more® is formed by gluing a pedestal substructure to panels made from calcium sulphate (gypsum) – a non-combustible material with superlative structural and physical properties. Additionally, once installed, the floor system is impervious to smoke and combines superb underfoot comfort with minimal weight.

As a manufacturer, we can determine the choice of raw materials used, making it possible to adjust the mixture to the wishes of our clients as well as to their respective markets. The Institute of Building Biology in Rosenheim recommends FLOOR and more® as an environmentally friendly building material. Our gypsum panels are virtually emission-free. FLOOR and more® can be combined with many other systems, offering a great degree of flexibility. There is also a limitless choice of floor coverings.



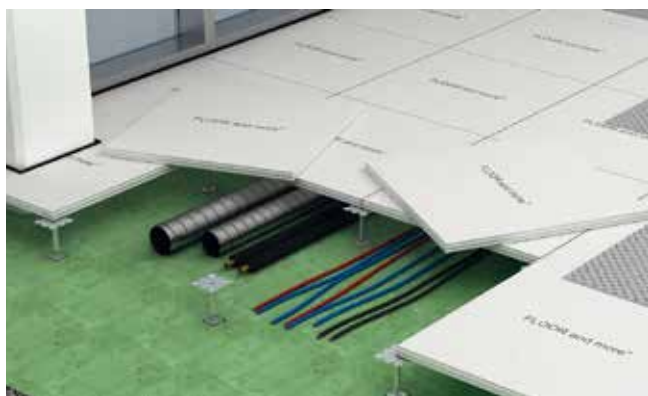
### Typical areas of use

- Atria and reception areas
- Museums
- Training and research rooms
- Office and design areas
- Industrial and workshops



and its related logo, is a trademark owned by the U.S. Green Building

# System data – FLOOR and more®



## System description

The dry hollow floor system FLOOR and more® offers stability and state-of-the-art technology. The hollow floor panels consist of fibre-reinforced calcium sulphate. The gluing of the FLOOR and more® panels is made with a special tongue and grooving at the edges of the panels which are forming a closed load bearing layer. The substructure consists of height-adjustable zinc-coated steel pedestals from our own production which form the necessary cavity for installations.

|  |  |   |
|--|--|---|
|  | <b>Technical Data</b>                                    | Panel thickness<br>24 - 44 mm<br>System weight<br>38 - 83 kg/m <sup>2</sup><br>Pedestal height<br>38 - 2,000 mm<br>Pedestal distance<br>600 x 600 mm  |
|  | <b>Load-bearing capacity</b>                             | Point load<br>2 - 20 kN<br>Safety factor<br>2   |
|  | <b>Reaction to fire performance of the carrier panel</b> | DIN 4102-1<br>A2 (non-combustible)<br>EN 13501-1<br>A1 (non-combustible)  |
|  | <b>Fire resistance performance of tested systems</b>     | DIN 4102-2<br>F30<br>EN 13501-2<br>REI30<br>REI60   |
|  | <b>Sound protection</b>                                  | ISO 140<br>Normalised flanking level difference $D_{n,f,w}$<br>42 - 59 dB<br>Weighted sound reduction index $R_w$<br>62 dB<br>Reduction of impact sound pressure level $\Delta L_w$<br>9 - 31 dB<br>Normalised flanking impact sound pressure level $L_{n,f,w}$<br>82 - 37 dB |
|  | <b>Earth quake safety</b>                                | International Building Code (IBC)<br>available in A - F   |
|  | <b>Green Building</b>                                    | The floor system can contribute positively to national and international building certifications  |

Please see the system data sheets for more detailed technical information on each system.

# System description – FLOOR and more®

## Panel FLOOR and more®

The FLOOR and more® panel is particularly impressive in terms of stability and environmental compatibility. It was especially developed as a hollow floor and is made from calcium sulphate – a composition of gypsum, high-quality cellulose fibres and water. The edges of the panels are tongue and grooved and glued together, allowing for precise panel alignment. Various panel thicknesses as well as special formats round off the FLOOR and more® product line.

## Load-bearing capacity

We have developed a special manufacturing process to provide our hollow floor panels with more demanding structural specifications, without needing to increase the panel thickness. Steel sheet can also be applied to the under side to increase load bearing capacity.

## Fire protection

FLOOR and more® offers outstanding safety: our careful choice of panel components ensures a fire resistance performance of up to 60 minutes (fire resistance performance F 60, REI 60). By gluing the panels this makes them impervious to smoke. The carrier panel is non-combustible.

## System weight

The weight of the system varies from 38 kg/m<sup>2</sup> to 83 kg/m<sup>2</sup>, depending on customer requests and load-bearing requirements.

## Installation height

For heights of 500 mm plus we recommend horizontal reinforcement with stringers.

## Hollow floor pedestals

Pedestals are made from galvanised, yellow chromatised steel and adjustable to any height. They are equipped with a precision-engineered adjusting bolt. Different designs are possible depending on height.

## Gluing of pedestals

Pedestals and panels are glued together to form a stable system. Pedestal glue is used to glue the pedestal base to the subfloor and the pedestal head to the FLOOR and more® panel. The tongue and grooved edges of the panels themselves are also glued together. Adhesives of different qualities can be used depending on the environmental requirements.

## Height fixing

A sealant varnish made from low-emission materials is used for this purpose.

## Wall connection

A permanent, pre-stressed wall connection with sealing tape works as a sound decoupling whilst also absorbing horizontal movements.

## Structural subfloor

As a rule, all structural subfloors are sealed to ensure lasting pedestal adherence. We recommend a 2-component finish for air-conducting system floors.

## Suitable floor coverings

Elastic or textile floor coverings, which can also be installed as broadloom on the building site, are highly suitable for our hollow floor system. Loose-laid tiles are also suitable. WOODline creates a particularly pleasing feel – while solid stone finishes from our STONEline range can also be used.

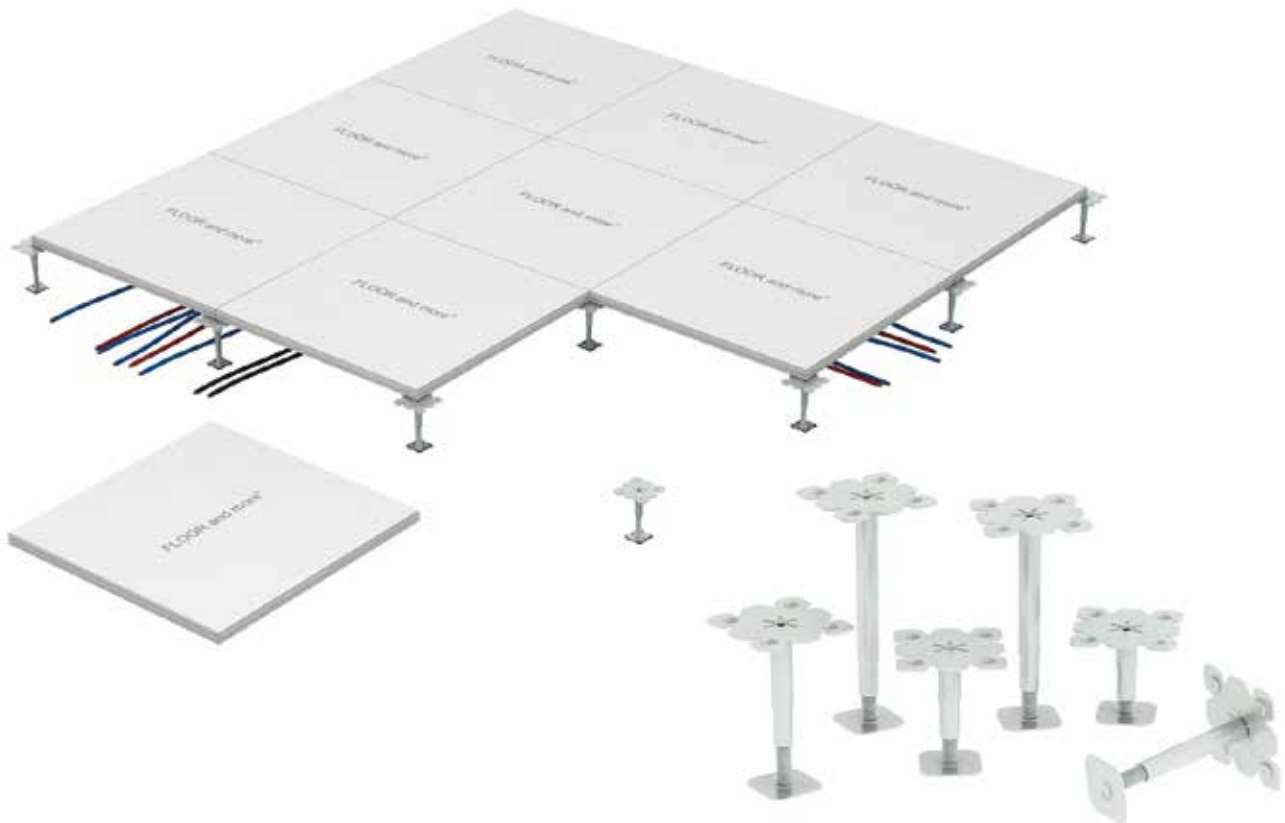


# Lindner substructures

## Pedestals

The substructure is an important component of every system floor. The pedestals create the cavity needed to accommodate the services. Lindner metal pedestals can be adjusted to almost any height, therefore compensating for any unevenness in the subfloor. From design to manufacture, including the galvanisation – we produce our pedestal range

entirely in-house. We manufacture highly accurate pedestals for hollow floors. Our many years of experience ensure high load-bearing capacity and excellent durability for all our products. Lindner systems can be combined with one another in many ways, and supplemented with different reinforcement profiles.



### Lindner pedestals from our own production

- Large adjustable range
- Corrosion resistant
- High load-bearing capacity
- Easy installation

# FLOOR and more<sup>®</sup> acoustic

The hollow floor FLOOR and more<sup>®</sup> acoustic impresses with its outstanding adjustment of the room acoustics. Perforations in the floor panels ensure the optimum usage of the air volume in the intermediate space as resonance absorber. This lowers the volume level as well as also the reverberation time in rooms. Very good sound absorption values are

achieved especially with high and low frequencies. The low frequent effect can be additionally amplified by the use of insulation materials and acoustic fleece. The FLOOR and more<sup>®</sup> acoustic equipped with an acoustic pan achieves a degree of absorption  $\alpha_w$  of 0.75 and thus creates a silent and relaxed atmosphere in atria, offices and a lot of other rooms.



## Product features

- Impressive degree of absorption  $\alpha_w$  of up to 0.75
- Various options by a selection of qualified coverings
- Different variants of the acoustic panels can be combined with each other and with other floor systems



# FLOOR and more<sup>®</sup> arena

The construction of tiered levels in cinemas and concert and lecture halls is always a challenge. We consolidated our experiences from numerous international projects into the development of FLOOR and more<sup>®</sup> arena. Solid and at the same time quick to install, comparatively lightweight but yet carrying a high load capacity, largely prefabricated but likewise extremely flexible – this floor system is a match for every challenge. Calcium sulphate

planks make all the difference; classified to fire performance A1, "non-combustible", preventing any drum effect when walking and acoustically effective. FLOOR and more<sup>®</sup> arena adjusts itself to every type of installation, whether the subfloor is level, sloping or stepped. Radial or polygonal tiering, or a version using the floor plenum for ventilation, are also available.



## Product features

- Non combustible planks from A1 material with high load-bearing capacity
- Floor plenum can be modified for ventilation purposes
- Quick installation thanks to high degree of prefabrication
- Substructure and planks from in-house production



Photo: © Jan Bitter

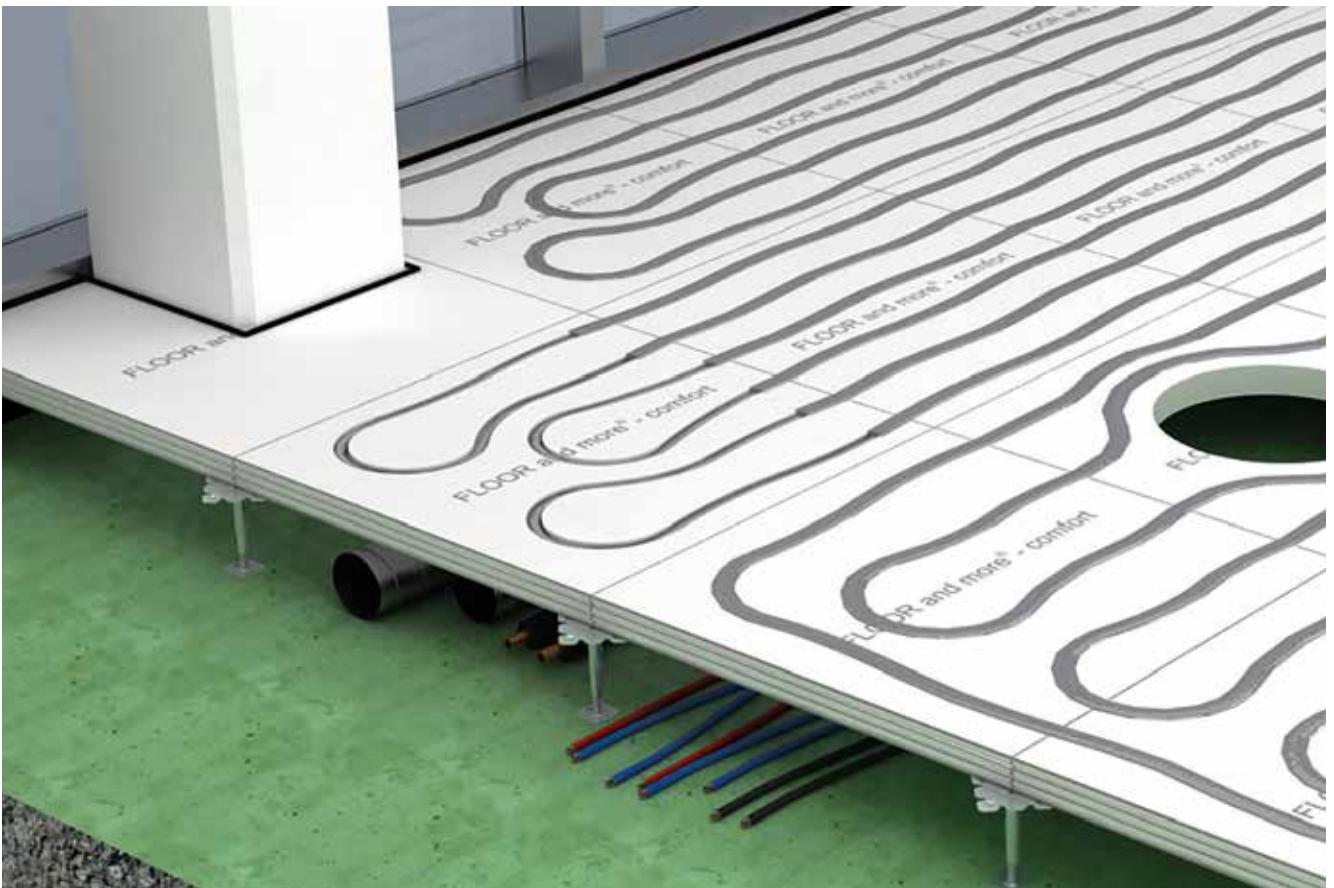
# FLOOR and more® comfort

FLOOR and more® comfort creates a pleasant environment for the occupier. Intelligent heating and cooling systems incorporated into the dry hollow floor system regulate the interior climate perfectly – both in summer and winter. The system offers integrated, high-performance under floor heating with good heat reflection.

In addition FLOOR and more® comfort generally operates with a low flow temperature, thus saving

energy – simple, efficient yet ensuring a comfortable living and working environment. Architects can also enjoy more design freedom: radiators are unnecessary, extending the planners' scope when designing the interior layout for foyers and premium quality office space.

FLOOR and more® comfort can also be installed at an impressively low floor height and is especially lightweight.



## Product features

- Heats up and cools down very quickly
- Almost any floor covering can be used
- Heating capacity 60 - 100 W/m<sup>2</sup> and cooling capacity 23 - 45 W/m<sup>2</sup>
- Eco-friendly due to low flow temperature



# FLOOR and more<sup>®</sup> hydro

Highly-frequented areas of increased humidity, for example foyers in public buildings and hotels or even wet rooms, are a challenge for standard floor systems. Until now, it was difficult to prevent long-term water penetration into the panels within a humid environment.

FLOOR and more<sup>®</sup> hydro was especially developed

as a solution for these areas. Humidity-resistant floor panels as well as the most suitable floor coverings and joint fillers are used to effectively prevent water absorption.

FLOOR and more<sup>®</sup> hydro can be supplied with a choice of coverings. The high-quality stone covering STONEline is also available for use in prestigious areas.



## Product features

- Suitable for rooms with increased humidity
- High load-bearing capacity
- Suitable for STONEline application





# FLOOR and more<sup>®</sup> power

FLOOR and more<sup>®</sup> power shoulders the weight of heavy-duty situations. The system has this special characteristic thanks to its special panel composition in combination with strengthened hollow floor pedestals. Floors are exposed to enormous stress in

foyers, manufacturing plants, museum and libraries. In these situations FLOOR and more<sup>®</sup> power displays its advantages: unbeatable load-bearing strength, highest functionality and at the same time first-class underfoot comfort.



Photo: © Xaver Lockau

## Product features

- Special panel composition
- Strengthened hollow floor pedestals
- Stringers are not required
- Safe for driving over with heavy motorized lifting apparatus



# FLOOR and more<sup>®</sup> sonic

FLOOR and more<sup>®</sup> sonic offers a sophisticated ventilation system. The floor cavity makes a convenient supply with fresh air possible. The fresh air is directly controlled by the perforations in the floor and guided draught-free into the rooms to be supplied. Perforated floor panels ensure perfect air flow.

Besides a constantly fresh air, architects and clients can also heat and cool rooms with FLOOR and more<sup>®</sup> sonic without limiting the scope for the implementation of your ideas by extensive installations. The perforations in the floor have a further advantage: They absorb sound and improve in this way the room acoustics.



## Product features

- Air flow of up to 1,500 m<sup>3</sup>/h possible at 20 Pa
- Variety of perforation designs
- Suitable for seepage ventilation coverings



# System accessories

## Electrical outlets

As all electrical installations are fed under the hollow flooring, electrical connections can be placed exactly where you want them by the installation of electrical outlets.



## Bridging profiles

For structural reasons bridging is required where pedestals cannot be installed. In such cases we offer special bridging profiles which are easy to install and yet improve dynamic and static load-bearing capacities.



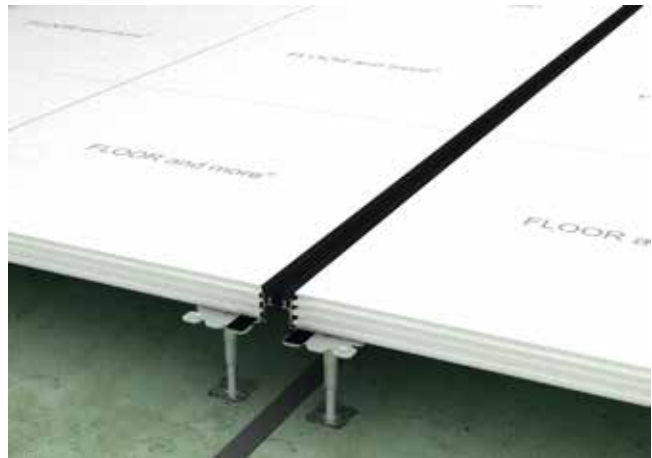
## Transitions

The combination of hollow and raised floors in one building is economically sensible. Different floor constructions are often directly linked together. We offer profiles which are designed to combine these constructions perfectly, both aesthetically and technically. Profiles are installed between the adjacent hollow and raised floor panels, act as support to the panels and also compensate potential height differences.



## Expansion joints

Expansion joint profiles, which are adapted to each application, are used structurally to absorb both horizontal deflection and vertical weighing down of the system.



## Air ventilation outlets

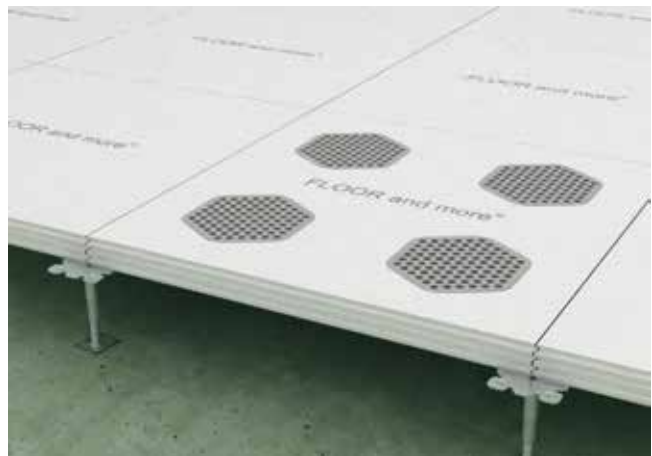
Air ventilation outlets allow the room to be air-conditioned and ventilated without creating draughts. A number of different systems are available:

### - Open system

Ventilation comes directly from the cavity, which is designed as a pressure floor, through the corresponding air ventilation outlets into the room.

### - Closed system

In a closed system, the air is fed through pipes or through cavity barriers with fixed connections to the air ventilation outlets.



## Facings

Staircases, platforms, etc. need to be finished with a front cladding (facing).

Where features such as free-standing borders are required, the top edges of the facing will be protected with a stair edging profile. Angles screwed to the subfloor and bracings installed in the upper area of the facing ensure a stable structure.

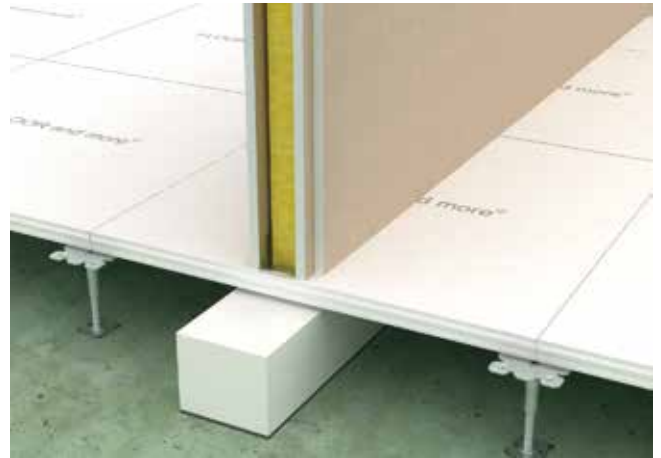


# System accessories

## Cavity barriers

Three different types of cavity barriers can be installed to meet different requirements in the hollow floor area.

- Ventilation barriers  
made from coated chipboard panels
- Fire protection barriers  
made from porous concrete (min. 115 mm)
- Soundproofing barriers  
made from porous concrete (min. 100 mm)



## Revision openings

As a matter of course, hollow floors need to guarantee easy access to services. For this purpose, FLOOR and more® can be equipped with revision openings. The removable floor panels are supported by a sturdy frame which ensures the stability of the floor construction. Edge profiles can be made to match the chosen floor covering – thus integrating the access hatch into the floor area so that it is inconspicuous.





# Load-bearing capacity

The permissible loading capacity is calculated and tested with the involvement of official bodies. The final results are substantiated by certificates of conformity to the application guideline for the standard DIN EN 13213 or by factory test certificates following national standards.

## The following key criteria are used:

- Load value
- Supporting surface of the load indenter
- Positioning of the load on the test sample
- Safety factor

The critical load for hollow floors is the point load. Floor systems are assigned a load and deflection class on the basis of their static load-bearing properties and the related deflection levels. As a rule strip loads and distributed loads are not taken into account, as they are not applicable.

## Distributed loads

Like the point load, the distributed load is a static load. In contrast to the point load, the area of the 'indenter' is 1 m<sup>2</sup>. The term distribution load is commonly used in structural engineering. It is used to determine the strength of reinforced concrete floors. For hollow floors, the specification or assessment of a distributed load is inappropriate. For practical purposes, the indenter of 1 m<sup>2</sup> spans the hollow floor grid (60 cm x 60 cm) and thus the individual panel. The panel and pedestal acts here merely as an intermediate layer, transferring the load to the concrete subfloor.



## Point loads

To determine the point load, a static load (such as a table leg) is simulated. On the basis of the permissible point load thus established, the system is generally assigned an appropriate load and deflection class. In accordance with standard practice, the load is applied with a 25 mm x 25 mm indenter.



## Dynamic loads

**To determine the permissible dynamic load (such as a forklift), the following must be taken into account:**

- Weight of the vehicle without load
- Total weight of the vehicle with load
- Maximum wheel load
- Contact surface of the tyres or rollers
- Wheelbase
- Maximum drive or tow speed
- Number, diameter, width and material of the tyres or rollers
- Maximum acceleration and deceleration during lifting
- Safety factor

A corresponding safety coefficient will be determined for the ascertained static load (permissible total weight of the vehicle) using the aforementioned factors and multiplied by the maximum permissible static load. When selecting a floor covering, one must be sure that the floor covering and adhesive are suitable for these special requirements.

# Load-bearing capacity

## Static values acc. to DIN EN 13213

The European hollow floor standard EN 13213 describes a system test process for panels and pedestals (resp. substructure) to identify the maximum load and relevant classifications. The load is transferred onto the system using a test indenter

of 25 mm x 25 mm (625 mm<sup>2</sup>). The load points shown are to be checked. The failure criteria shown below for classification of the system is the breaking load and the deflection (vertical displacement) with nominal load resp. load class.

## Load classes

| Class <sup>1)</sup> | Breaking load <sup>2)</sup> | Nominal load <sup>3)</sup> | Element class <sup>4)</sup> | Applications and usage scenarios   |
|---------------------|-----------------------------|----------------------------|-----------------------------|--|
| 1                   | ≥ 4,000 N                   | 2,000 N                    | 1                           | Offices without public access and without heavy equipment  |
| 2                   | ≥ 6,000 N                   | 3,000 N                    | 2                           | Office areas with public access  |
| 3                   | ≥ 8,000 N                   | 4,000 N                    | 3                           | Rooms with increased static loads, areas with fixed seating, design offices                        |
| 4                   | ≥ 9,000 N                   | 4,500 N                    | -                           |  |
| 5                   | ≥ 10,000 N                  | 5,000 N                    | 5                           | Exhibition areas, workshops with light use, storage rooms, libraries                               |
| 6                   | ≥ 12,000 N                  | 6,000 N                    | 6 <sup>5)</sup>             | As with class 5, but with increased load requirements, industrial and workshop floors, vault rooms |
|                     |                             | ≥ 7,000 N                  |                             | Heavy duty floors, production areas such as clean rooms  |

1) Classification of the load acc. to DIN EN 13213

2) To determine the breaking load, the load is applied to the weakest point of the panel (see illustration) using a 25 x 25 mm test indenter and is increased until the system fails

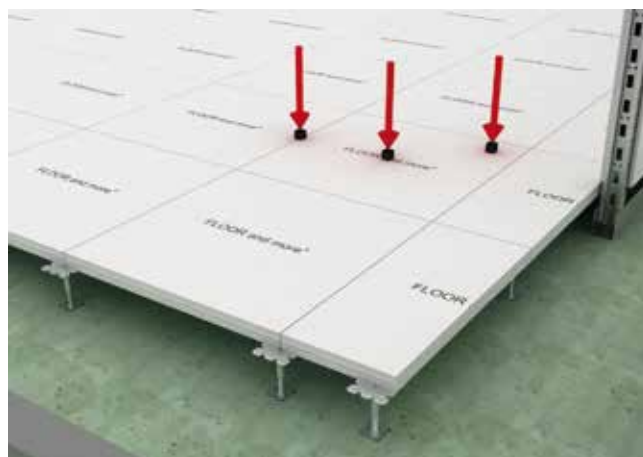
3) The nominal load or load class is determined from the breaking load divided by the safety factor  $\nu = 2$

4) Load classification in accordance with the application guideline for hollow floors

5) Higher breaking/nominal loads are required in individual cases for hollow floors with high load-bearing requirements, see FLOOR and more<sup>®</sup> power systems

## Deflection

The maximum deflection of the system with the application of the nominal load may not exceed  $l/300$  of its grid length. With the pedestal grid of 600 x 600 mm, the resulting maximum deflection is 2 mm. The admissible deflection is limited to 4 mm with higher spans.



## Static values acc. to International Standards

International Standards describe the testing of components for the classification by load classes. The installed system with panels and pedestals is tested and classified. The maximum load is applied

to the panel using a 25 mm x 25 mm (625 mm<sup>2</sup>) test indenter. The load point shown is to be tested. The failure criterion is the breaking load and a maximum panel deflection of 2 mm (l/300).

## Load classes

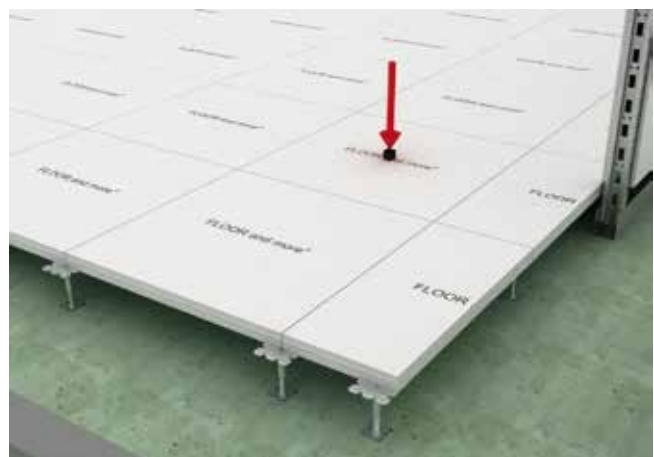
| Class <sup>1)</sup> | Breaking load <sup>2)</sup> | Nominal load <sup>3)</sup> | Deflection <sup>4)</sup> | Applications and usage scenarios  |
|---------------------|-----------------------------|----------------------------|--------------------------|---|
| 1                   | ≥ 6,000 N                   | 3,000 N                    | max. 2 mm                | Offices with a high proportion of communication equipment, telephone exchanges, engineering offices, auditoriums, training and treatment rooms            |
| 2                   | ≥ 8,000 N                   | 4,000 N                    | max. 2 mm                | Computer rooms  |
| 3                   | ≥ 10,000 N                  | 5,000 N                    | max. 2 mm                | Computer rooms with more demanding requirements, print rooms, industrial floors with light traffic, storage rooms, workshops with light use and libraries |
| 4                   | ≥ 10,000 N                  | > 5,000 N                  | max. 2 mm                | Floors with forklift traffic, industrial and workshop floors, vault rooms   |

1) Classification of load

2) To determine the breaking load, the load is applied with a 25 x 25 mm test indenter to the area in the second grid field (see illustration) and is increased until the supporting layer fails.

3) The nominal load is determined from the breaking load divided by the safety factor  $\nu = \min. 2$

4) Where the panel is loaded with the nominal load, the maximum permissible deflection is l/300.



# Fire protection

More than 500 fire victims and countless casualties in Germany each year speak for themselves: The safety of the occupants of a building in the case of a fire has to have highest priority!

At the same time buildings all over the world are always getting bigger and more complex in their use. In view of these developments, it is vital that the constructional fire protection is considered with each project right from the beginning and lies within the hands of competent planners, manufacturers and installers.

In the case of emergency the development of a fire can be prevented or at least safe escape routes respectively a good accessibility for rescue forces can be secured by a carefully adjusted building concept. The effective limitation of the possible damage for the building owner is thereby a welcome side effect.

System floors offer the possibility to place building services and installations in the floor cavity. Requirements to the fire safety are imposed for rooms in need for protection as these installations are bringing calorific potential into the cavity of the system floor.

The following protection objectives are defined in Germany which can of course be viewed as relevant requirements for the improvement of the safety level of buildings worldwide:

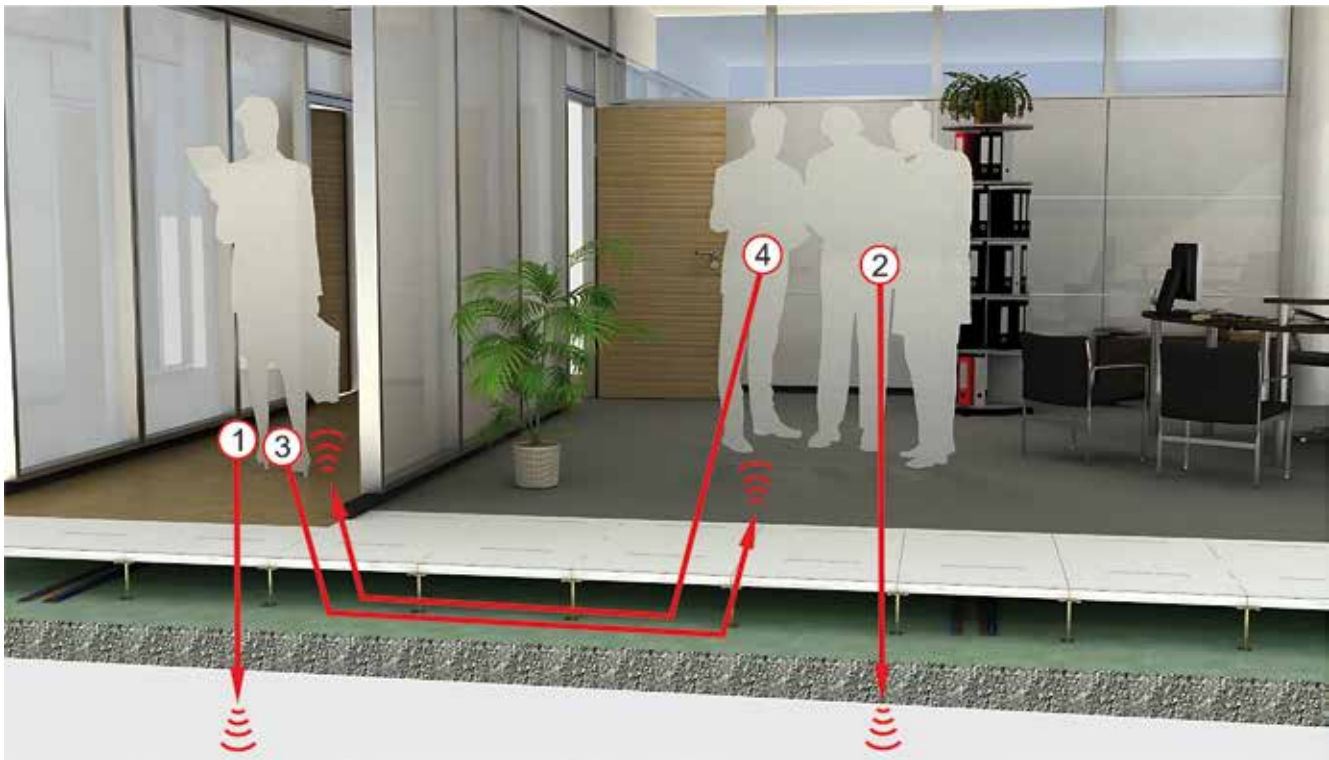
- Prophylaxis against the development of fire and smoke
- Prevention of the spreading of fire and smoke
- Guarantee of sufficient rescuing and firefighting operations.

Besides the reaction to fire performance A1 "non-combustible", system floors in escape routes with a cavity of more than 200 mm, respectively in other rooms with more than 500 mm, have therefore to prove also a fire resistance performance in a fire test according to DIN 4102-2. Thereby they have to resist temperatures of up to 850 °C for at least 30 minutes in order to guarantee the escape from the building in the case of an emergency.



Lindner FLOOR and more® is suited for the use in these areas due to its reaction to fire performance A1 according to EN 13501-1. The system has the respective F 30-AB / REI 30 classifications according to DIN 4102-4 respectively EN 13501-2.

# Sound protection



## 1 Reduction of impact sound pressure level $\Delta L_w$ tested to DIN EN ISO 140-8

Laboratory test measurement is carried out vertically, i.e. from floor to floor with a standard ceiling, allowing comparison between different systems. Higher values are favourable.

## 2 Weighted sound reduction index $R_w$ tested to DIN EN ISO 140-3

Laboratory test measurement is carried out vertically, i.e. from floor to floor, with a standard ceiling, allowing comparison between different systems. Higher values are favourable.

## 3 Normalised flanking impact sound pressure level $L_{n,f,w}$ tested to DIN EN ISO 10848-2

Laboratory test measurement is carried out horizontally in combination with a highly sound-proofing partition which is suspended from the ceiling and touches the surface of the system floor. Lower values are favourable.

## 4 Normalised flanking level difference $D_{n,f,w}$ tested to DIN EN ISO 10848-2

Laboratory test measurement is carried out horizontally in combination with a highly sound-proofing partition which is suspended from the ceiling and touches the surface of the system floor. Higher values are favourable.

Consider the correction degree according to VDI 3762 to calculate the values on the construction site. Combinations of raised and hollow floors are to be assessed individually. The corrective allowance should be specified by the planner.

# Static electricity

## Preliminary remarks

Static electricity as a natural phenomenon is familiar to the public, for example when getting an electric shock from door handles after walking across carpets.

These electrical discharges are generally of no danger to the people themselves. People may however be startled and, as a result, make a mistake.

In addition to this, however, there are consequences of static electricity that must be prevented. These range from the destruction of electronic components to the explosion of complete factories.

## Charge measurements

Charge measurements with the walking test,

DIN 54345 / Part 2

- Measurements of the tendency to electrostatic charge during the walking test

Duration of the walking test:

The charging voltage is measured when the person stands on the floor covering with both feet.

Floor coverings are considered to be antistatic if the charge voltage does not rise above 2,000 V (definition acc. to data sheet EDV 1, Issue 7/84 from the TFI Aachen for carpet flooring).

1 minute (shuffling gait) at 23 °C and at 25 % relative air humidity.

A special rubber provided by the National Materials Testing Institute (BAM) is used for the sole material of the shoes. This material is slightly conductive and supplies a resistance of around  $10^9 \Omega$  between the person and a conductive floor.



# Naturally sustainable

A responsible approach to humans and nature is a matter of course for us as a manufacturer of long lasting floor systems in premium quality for more than 25 years. We are continuously optimising our wide range of floor systems with the objective to further reduce their impact on the environment over their entire life cycle. Every production step in our manufacturing base in Dettelbach is subject to a thorough control of the ambitious energy, material and quality requirements – from the raw material to the ready-to-use system – thanks to its unique production intensity of the FLOOR and more® hollow floors. This ensures that our clients do not only get a sophisticated product but that they can also rely on the ecological suitability by for example the use of components with low emissions. As a direct result of these effective measures the harmlessness to the health has been verified with test chamber measurements.

The results and the constant findings of a life cycle assessment of the base in Dettelbach are part of the environmental declaration according to ISO 14021 which is available for the procedure of furnishing proof of the environmental performance of Lindner FLOOR and more®.



Lindner is a founding member of the German Sustainable Building Council (DGNB) and member of the US Green Building Council. We are actively involved in building up awareness for the principles of sustainable construction and the development of relevant standards.

## Sustainable construction with Lindner system floors:

- Extremely durable products with best functional characteristics and high economic efficiency
- End-to-end procedure of furnishing proof of the ecological material characteristics by environmental product declarations
- Consultancy service with all current building certifications, as for example according to DGNB, LEED, BREEAM

## Simply healthier: FLOOR and more® system floors – naturally recycled.

- Exclusively healthy and environmentally compatible materials
- Solvent- and VOC-free (tested according to EU regulations / ASTM standard)
- Almost emission-free and building biologically neutral
- Calcium sulphate panel made from more than 99 % recycled material
- Environmentally friendly raw material extraction from secondary products of different manufacturing methods (FGD gypsum)
- CO2 neutral systems (panel and pedestal) available; carbon footprint verifiable thanks to a comprehensive life cycle assessment of the manufacturing bases in Dettelbach and Arnstorf

# Floor coverings

## Standard coverings

A range of floor coverings individualise your FLOOR and more®. In general, all standard floor coverings are available, such as rubber, PVC or carpet; in addition Lindner also offers WOODline and STONEline.

All surfaces, as well as parquet and stone coverings, can be factory-bonded to the floor panels. The monolithic surface of FLOOR and more® means that any size of covering is possible. Broadloom coverings which are easy to install can be used to minimise costs.



## Possible coverings

- Elastic coverings
- Textile coverings
- WOODline
- STONEline
- Loose-laid tiles



## WOODline

The floor has always been an essential part of a highly specified room. Whether in a conference room or in the modern office, parquet floors make you feel good. Lindner parquet floors are manufactured from solid wood to the highest quality standards and are particularly durable and comfortable to walk on.

The combination of a range of woods, designs and finishes means that all ideas are possible.

The installation of a FLOOR and more® WOODline is easy and efficient: the parquet is already factory-applied and just has to be sanded and sealed on site.



As with all natural products, wood differs in colour and structure. Print colours cannot reproduce the colour of the parquet exactly, therefore small differences might occur.

The wooden surfaces are offered oiled or varnished.

# Floor coverings

## Types of wood

Oak, steamed oak, bamboo, steamed bamboo, steamed beech, light beech, olive ash, ash, maple etc. – these wood types are only a small selection from our range. Other types of wood are available on request.

All selected suppliers for Lindner WOODline floor coverings guarantee highest quality and have a certification according to the high ecological requirements of the FSC / PEFC.



Oak



Smoked oak



Bamboo



Steamed bamboo



Steamed beech



Light beech



Olive ash



Ash



Maple



Cherry



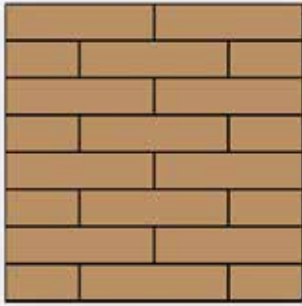
Walnut



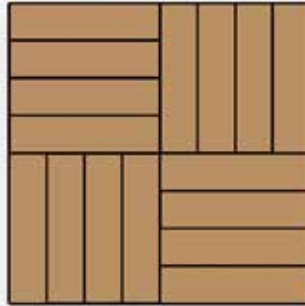
Teak

## Types of designs

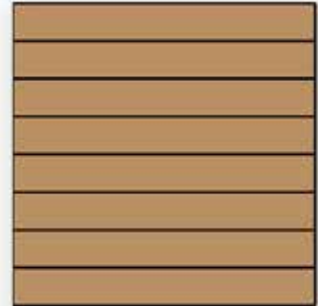
3-strip



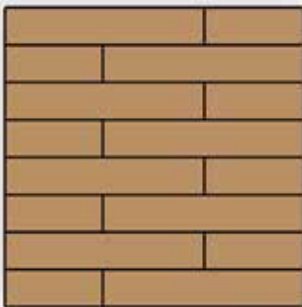
Cube, fourfold



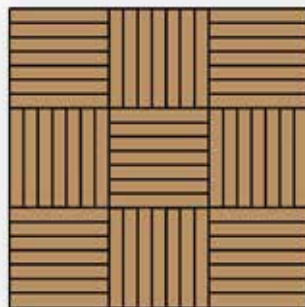
Large baton



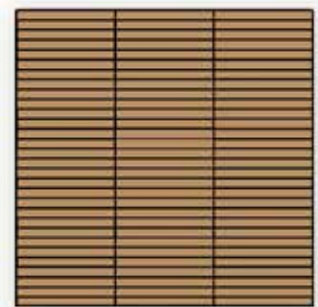
2-strip



Mosaic



Industrial parquet



**Surface**

Pre-sanded wooden surface ready for varnishes and oils

**Covering**

High-quality wood panels in different designs and woods

**Carrier panel**

Calcium sulphate panel with tongue and grooved edges

**Barrier**

Counteracting foil and humidity barrier

**Advantages of varnished finishes:**

- Extremely hard surface
- Highly wear resistant
- Low maintenance
- Resistant against bacteria and microorganisms
- Adjustable gloss level

**Advantages of oiled finishes:**

- Low maintenance
- Damage through use is easy to resolve
- Ecologically friendly
- Maintains natural surface structure

# Floor coverings

## STONEline

STONEline offers a range of natural and artificial stone and ceramic tiles, factory bonded to our calcium sulphate panels. Countless types of stones from a wide range of countries are available, as well as a great variety of colours.

New manufacturing techniques mean that the combined “sandwich” of stone and calcium sulphate panel can be processed as a single unit. This innovative production technology allows us to provide you with all-in-one solutions.

During manufacture of FLOOR and more® panels with stone, the joints are made to fit 100% accurately. The precisely fitting panels ensure a uniform joint width. The use of a colour-coordinated joint filler completes the aesthetic effect.



## Types of stone

A variety of stone surfaces is available to suit the design, use and load-bearing requirements of every interior: hard-wearing granite for extreme, long-term usage; highly valued, high-quality marble for high-class interiors, a wealth of artificial stones and ceramic coverings offering a range of surface options to suit modern design requirements.

### Ceramic and artificial stone: versatile and exquisite

A comprehensive, carefully-graded product range enables us to satisfy a wide variety of requirements in terms of function and aesthetics. Countless combinations of colours, sizes and patterns make it possible to fulfil almost any individual design.



Micron 60GL



Micron 60DG



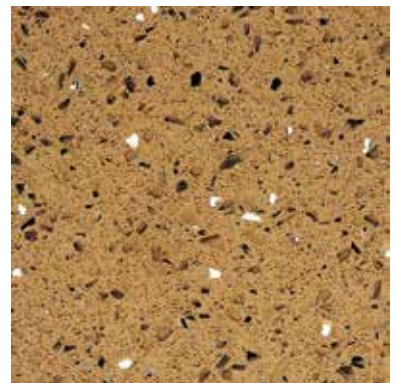
Micron 60N



35-50-05



10-10-05



33-10-09

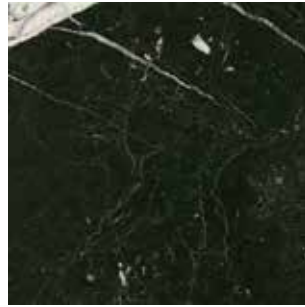
# Floor coverings

## Natural stone for the highest standards

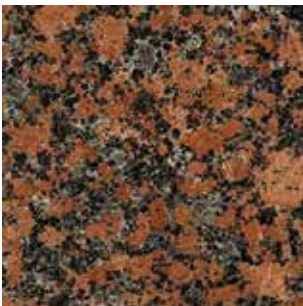
By using a variety of different stones, one can create individual highlights and give each interior its own particular style. The following types of stones are a small selection from our range.



Bianco Sardo Perla



Negro Marquina



Carmen Red



Assoluto Zimbabwe



Onice Cappucino



Impala



Silver Cloud Imperial



Imperial White

As with all natural products, stone varies slightly in colour and structure. Printer inks cannot match the colour tones of stone perfectly: minor differences in colour are therefore possible.

Other stone coverings are available on request.



**Surface**

Factory-applied stone in a wide variety of types

**Joint**

Factory-bonded stone on FLOOR and more® panels ensure a precise joint alignment which is sealed with joint filler once dry.

**Carrier layer**

Calcium sulphate panel with tongue and grooved edges

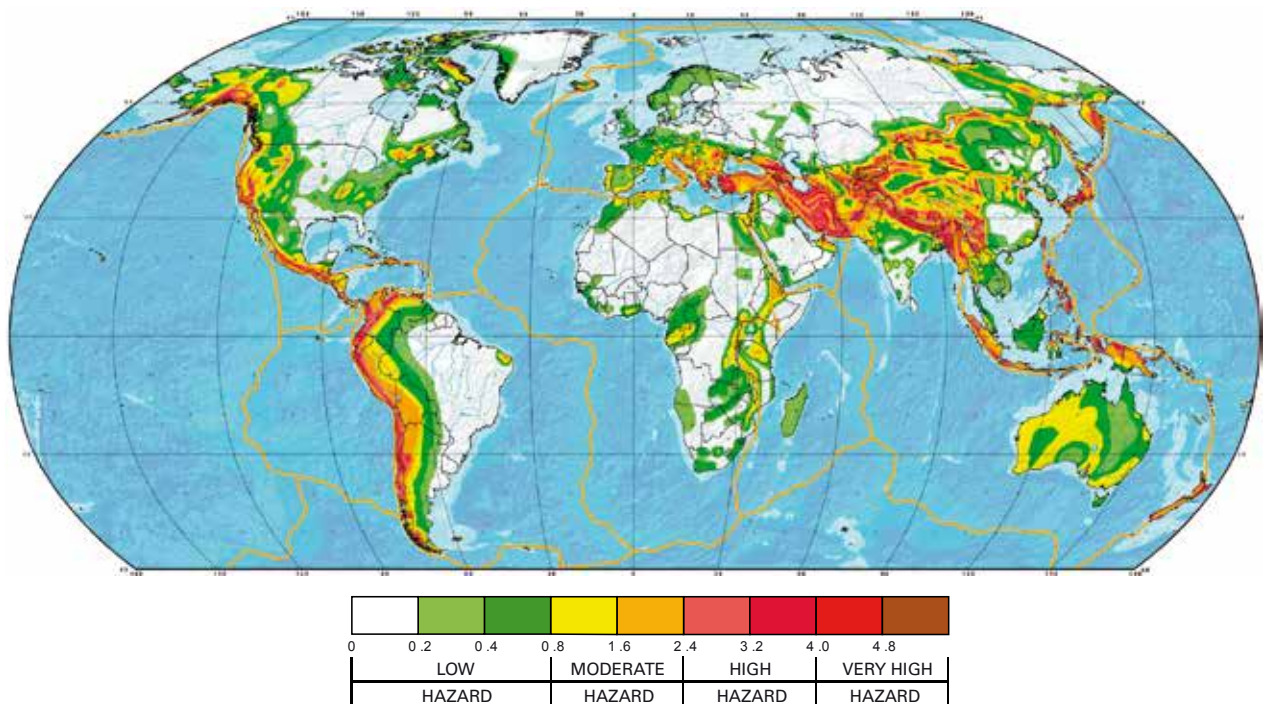
## Surface finishing

- Polished surfaces will bring out the full natural stone structure and colour
- Finely-burnished surfaces are classified to the slip resistance level R9
- With layered stones (e.g. Juparanà Colombo), the cutting of untreated blocks, either "with the grain" or "against the grain", and the choice of a suitable surface finish can create a variety of different appearances

## Advantages of STONeline

- Stability, low maintenance and durability
- Quick and economic installation due to factory-applied covering
- Natural stone from selected international stone reserves
- Application and formatting to one tenth of a millimetre

# Seismic safety



Seismic hazard map – zones worldwide

Giardini, D., Grünthal, G., Shedlock, K. M. and Zhang, P.: The GSHAP Global Seismic Hazard Map. In: Lee, W., Kanamori, H., Jennings, P. and Kisslinger, C. (eds.): International Handbook of Earthquake & Engineering Seismology, International Geophysics Series 81 B, Academic Press, Amsterdam, 1233-1239, 2003.

Earthquakes are in most cases the result of seismic activities due to continental drifts in the Earth's crust. There is no certainty in the particularly active areas if and when an earthquake happens and as far as humans are concerned by the oscillations. This permanently dangerous situation makes especially in the construction sector new measures necessary in order to further fulfill global safety requirements. Lindner system floors are approved for these disaster areas.

The severity of a quake is classified in magnitude scales – of which the most famous surely is the Richter scale. The geographic division of the concerned zones is made by earthquake zones or hazard maps. These show that, although the highest occurrences are in Asia and on the American continent, some zones in Europe respectively Germany are also seismically very active. Consequently there are regulations in the construction standard Eurocode 8: DIN EN 1998-1:2010-12 for the seismic safe design in construction. The requirements of the Eurocode 8 for seismic safety are also valid for buildings which are classified in building class 1 and need to be maintained as part of the basic supply in the case of emergency, like for example hospitals, fire houses and power plants, also if those are not located directly in the concerned zones.

The risk of damage to humans and buildings by earthquakes can be reduced significantly by specific prevention measures like allowing the structural compensation of frequencies and additionally fixing other building parts. In interiors, this is made by fall protections, expansion joints and horizontal reinforcements.

- Thereby the following objectives have priority:
- Protection of humans from the collapse of the building respectively from objects falling down
  - Limitation of damages of buildings respectively guarantee of the function of certain sections
  - Maintenance of the basic supply
  - Restriction of eventual secondary damages, for example from the bursting of fire

The suitability of Lindner system floors for the categories A – F according to IBC (International Building Code) – from low seismic design requirements in the case of light frequencies to very high requirements with acute danger of life for humans in the building – was verified in collaboration with the Institute of Earthquake Engineering and Engineering Seismology in Skopje.



# Standards and regulations

## Association of System Floors (Bundesverband Systemböden e.V.)

The coming together of European countries and the creation of standards and laws to regulate this free market has resulted in medium-sized companies forming syndicates, so that they can increase their influence with public institutes and standardisation opposite their European counterparts.

This resulted in the Association of System Floors, founded on 1st January 1995 to represent the interests of medium-sized companies, such as the "Fachgemeinschaft Doppelboden" (Trade Community Raised Floors) or the "Fachverband Hohlraumböden" (Trade Association of Hollow Floors).

In addition to this synergy between associations, the Association of System Floors will also continue to support the European standardisation for hollow floors in the CEN. This standardisation is intended to establish top-quality technical offers for hollow floor products.

Please refer to the website of the "Bundesverband Systemböden e.V." ([www.systemboden.de](http://www.systemboden.de)) for up-to-date information, particularly BVS data sheets on system floor specifications, the overview on standard certified system floors and the German system floor ABP (General Constructional Supervisory Test Certificate) central register.

Lindner AG is a member of the Association of System Floors.

## DIN EN 13213 Hollow Floors

System floors, particularly hollow floors, are used in every modern administrative and office building and as such are an everyday product for planners and architects.

System floors also fulfil many safety tasks. The planner has to deal with many building regulations, technical requirements and products.

The DIN EN 13213 standard has introduced standardised European testing procedures and load classes for system floors based on the Construction Product Directive. The corresponding application guidelines are based on European standards, whilst taking into account the German Building Regulations Act and the generally recognised regulations on the technology in nationally applicable requirements and regulations. At the same time, they also regulate procedures for certifying standards compliance.

The full set of DIN standards can be requested from Beuth Verlag GmbH, Burggrafenstraße 6, 10787 Berlin, Tel. (030) 26 01 – 22 60, [www2.beuth.de](http://www2.beuth.de).



## Application guideline for DIN EN 13213 Hollow Floors

In the application guideline for use, as part of the DIN EN 13213, essential requirements and features are specified regarding the suitability of a hollow floor for use and traffic, setting a safety standard for the construction process.

System floors are being developed continually in both a technical and scientific sense. As a result, the application guideline needs to be adjusted regularly to the latest technology.

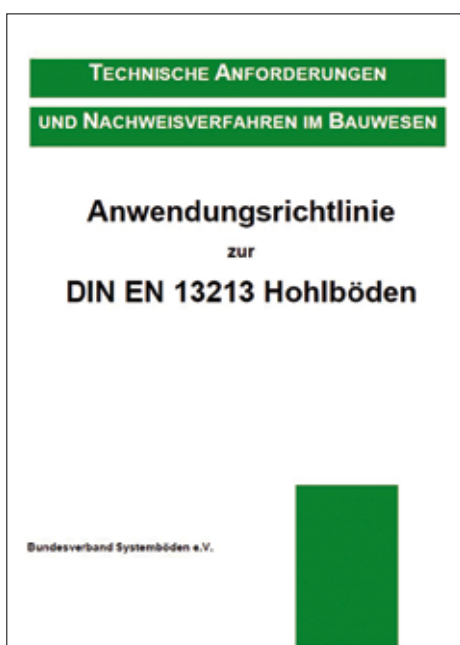
Only system floors that are produced in compliance with the standards, and which comply with the requirements of the application guideline in terms of construction, stability, materials, workmanship and life of product conformity are awarded the certificate for raised and hollow floors.

Monitoring of the safety standards is carried out by continual in-house monitoring and by regular external testing by neutral testing institutes and bodies in accordance with the application guideline.

Monitoring of safety standards guarantees adherence to the criteria required for suitability for use and traffic and so represents a reliable marker when choosing a floor system.

Installation of a certified hollow floor is a guarantee for the users and owners that it complies with the latest technology in terms of safety, liability and industrial workplace regulations.

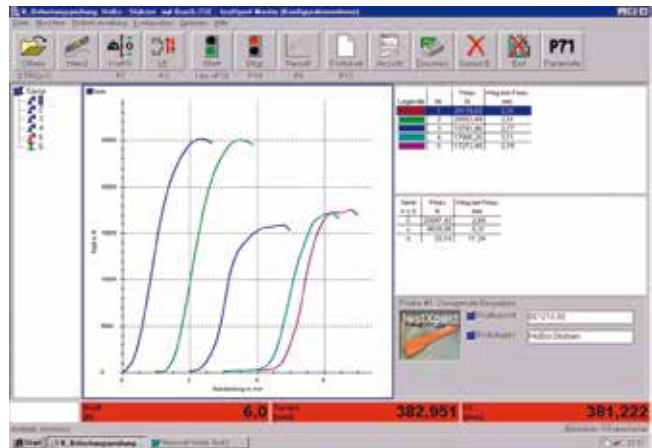
The guidelines for use are continuously added to and developed, to keep up to date with technical progress. The current version can be requested from the Association for System Floors.



## Workshop testing

As with all other rules and regulations, suitable test criteria for workshops (workshop test certificates) are specified for practical application, ensuring the smooth function of hollow floors with a special requirement profile.

The type and validity of the tests were put together by the LGA (State Trade Agency) in Nuremberg.



## We can do it all for you.

### Lindner Concepts:

- Airports and Railways
- Clean Rooms and Operating Theatres
- Cruise Liner and Ship Fit-out
- General Contracting
- Hotels and Resorts
- Insulation and Industrial Service
- Interior Fit-out and Furnishings
- Special-Purpose Constructions and Stadiums
- Studios and Concert Halls

### Lindner Products:

- Ceiling Systems
- Doors
- Dry Lining Systems
- Facades
- Floor Systems
- Heating and Cooling Technologies
- Lights and Lighting Systems
- Partition Systems
- Roofing Systems
- Steel & Glass

### Lindner Service:

- Clearance of Harmful Substances
- Construction Management and Project Development
- Deconstruction and Interior Demolition
- General Planning
- Global Product Supplies
- Green Building
- Industrial Scaffolding
- Installation and Building Services
- Research and Development

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