



# Raised Floors



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**Raised floor manufacturing involves the combination of many very different elements to create the end product, the 'raised floor board'.**

Combining these elements requires different adhesives to cater for the different adhesive properties of the individual materials and to meet the requirements of everyday use of the floors. There is a wide range of adhesives available – dispersion glues, two-component systems, reactive and thermoplastic hotmelts – and different process technologies are used to apply them. Material properties and the technical processing options are therefore key factors in selecting the best adhesive for the purpose.

## 1. Materials, properties, special features

### 1.1 Carrier material

The carrier material forms the core of the board. It must bear the static loads and exhibit important properties such as:

- bending strength
- dimensional stability
- impact sound insulation
- water or humidity resistance
- electrical conductivity
- flame resistance

#### Chipboard

##### Properties

- 3-layer structure (required for stability)
- relatively lightweight

##### Adhesion

- possible with all adhesive systems – low-price solution

##### Other factors

- open edges must be sealed with edging materials
- underside must be protected against humidity

#### Cement-bound chipboard

##### Properties

- heavy duty (impact sound insulation)
- water resistant
- flame resistant (B1)

##### Adhesion

- possible with all adhesive systems

##### Other factors

- material reacts alkaline, which must be taken into consideration when using dispersion glues

#### Reinforced concrete slabs

##### Properties

- very bend resistant
- non-flammable (A1)

##### Adhesion

- suitable for two-component systems and dispersions

##### Other factors

- material reacts alkaline, which must be taken into consideration when using dispersion glues

#### Gypsum fibre board

##### Properties

- bend resistant
- non-flammable (A1)

##### Adhesion

- possible with all adhesive systems

##### Other factors

- edges must be sealed with edging materials
- boards should be primed to ensure bonding stability

Materials,  
properties,  
special features

### **Metal trays with inorganic filling (anhydrites)**

#### **Properties**

- very similar to concrete
- non-flammable (A1)

#### **Adhesion**

- possible with dispersion and reaction glues

#### **Other factors**

- no edge banding necessary
- surfaces must be polished

### **Cast aluminium boards**

#### **Properties**

- very bend resistant
- very dimensionally stable

#### **Adhesion**

- two-component systems
- reactive hotmelts

#### **Other factors**

- no edge banding necessary

### **Welded steel plate constructions**

#### **Properties**

- very bend resistant

#### **Adhesion**

- two-component systems
- reactive PUR hotmelts

#### **Other factors**

- droning noise when walked upon

N.B.: Surface can sometimes be uneven due to welding points (especially on non-flexible finishes!); no edge banding necessary

## **1.2 Floor finishes**

Besides having a decorative function, floor finishes must also fulfil functional requirements such as electrical conductivity. As a rule, the bonded areas should be shampooable (water contact) and wheelchair resistant.

### **Textile finishes – needle-felt and carpets with/without latex – and synthetic backings:**

All glues are suitable. Different rough-textured backing structure and/or absorbency must be considered. Adhesion tests on synthetic backings are strongly recommended.

### **Flexible surfaces made of PVC, linoleum, elastomers:**

All glues are suitable. Monitor closely for possible plasticizer migration. Adhesion tests are recommended.

### **Laminate surfaces made of reinforced plastics**

Due to the high reaction forces, dispersion glues (on chipboard) are preferable; two-component systems are suitable only to a limited extent. The materials must be pressed.

### **Stones, stoneware, tiles**

Two-component systems are preferred; dispersion glues are suitable only to a limited extent.

Materials,  
properties,  
special features

**Wood flooring, parquetry:**

Two-component systems and dispersion glues; if necessary, pressing can be performed using stack pressure.

**1.3 Coating of the board underside**

As a rule, this is only done on chipboard and cement-bound chipboard – very occasionally also on concrete slabs – for reasons of dissipating electrostatic charge, improving the bending strength, and preventing water absorption.

**Aluminium foil:**

Dispersion glues for laminating processes.

**Steel plates:**

Two-component and dispersion glues if bending strength needs to be enhanced. Wet method dispersion processing.

**1.4 Edge banding**

This workstep is usually required to cover the open chipboard edge. Edge banding is usually done before the floor finish is applied. In cases where special edging material is used, this serves to dissipate electrostatic charge.

**Laminate edges, polyester edges, resined paper edges:**

Hotmelt on edging machines.

**PVC edges (0.4 mm foil and extruder edges):**

Hotmelts on edge banding machines; the edge strips must be primed.

**1.5 Pedestals**

Usually made of cast aluminium or welded steel. One and two-component systems can both be used for glueing.

The height is often levelled using threaded spindles; once the height has been aligned, the lock nut is glued to prevent the screw thread from shifting. Furthermore, the adhesive foams slightly, thus filling the void between the upper pipe and the shaft and preventing the pedestal from swaying.

**1.6 Foundation sealing**

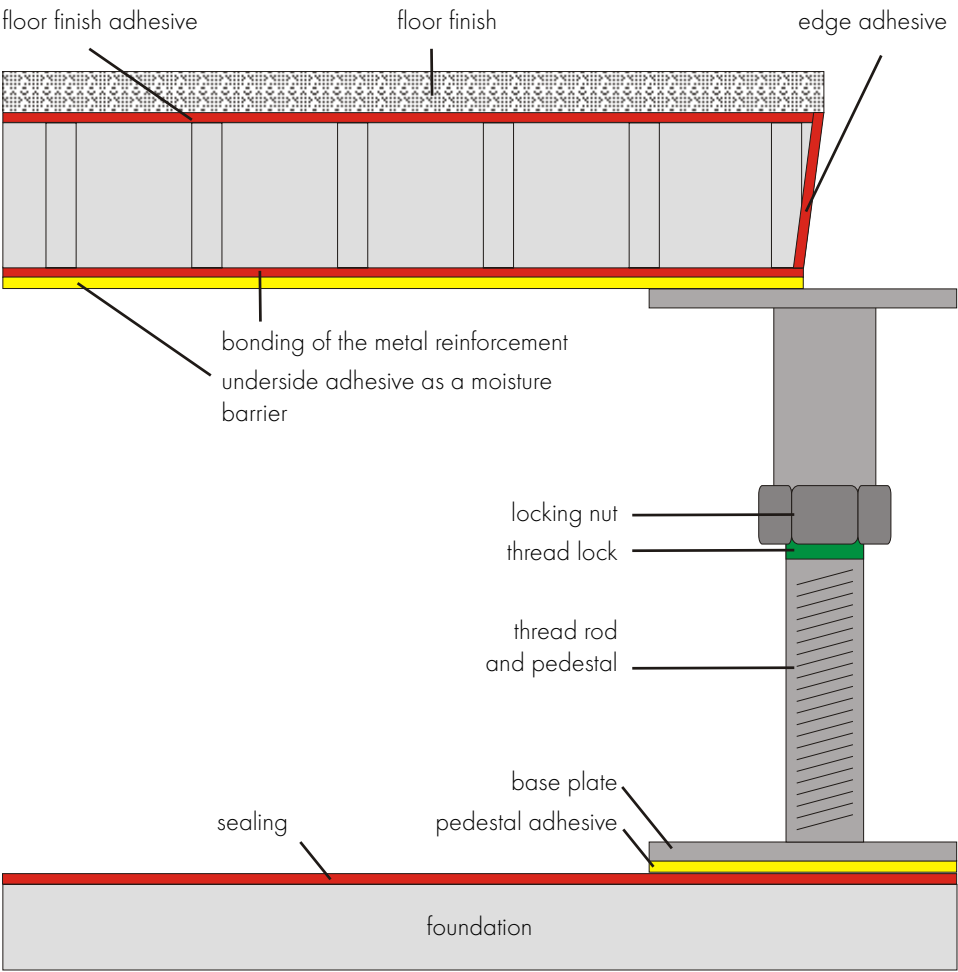
Sealing should be applied to improve the concrete foundation and to bind dust particles. This also creates the best conditions for pedestal adhesion.

The seal is applied in a thin layer and waterproofs the concrete surface. It does not compensate any floor unevenness or act as a hardener against mechanical impact.

**2. Schematic**




**Raised floor**

**Schematic**



### 3. Adhesives and applications

## Adhesives and applications

KLEIBERIT Products	Adhesive base	Surface adhesion		Edge primer	Edge banding			Thread lock	Support adhesive	Floor sealant
		(non-conductive)	(conductive)		(non-conductive)	(conductive, PVC, polyester, resined paper edges)	(non-conductive, gypsum fibre board)			
FE 403.5 white 	Dispersion glue	●								
FE 404.6 black	Dispersion glue		●							
FE 404.8 grey 	Dispersion glue		●							
FE 405.0 white	Dispersion	●								
FE 405.5 	Dispersion		●							
FE 405.6	Dispersion		●							
596.1/.2	2C PUR	●								
596.6/.7	2C PUR	●								
597.3/.4	2C PUR		●							
728.7	PSA						●			
771.2	EVA copolymers					●				
777.0 24	EVA copolymers				●					
779.7	EVA copolymers				●					
788.3	EVA copolymers				●		●			
707.6	PUR HM				●					
555.1	1C PUR			●						
837.0	Solvent			●						
504.0	1C PUR							●		
539.5	2C PUR								●	
566.0/.3/.4/.5	1C PUR								●	
697.0	Acrylate dispersion									●

#### Conductivity:

Ensuring electrical conductivity to dissipate electric charge from the floor finish is becoming increasingly relevant in raised floor manufacturing. It protects the raised floor surface against electric charge build-up, which is a regular requirement particularly for computer rooms and laboratories. There are three common systems for electric discharging:

#### Contact resistance of the entire board:

Dissipation of electric charge occurs across the entire board to the pedestal, therefore leading to grounding. Electrical contact resistance has to be given on every layer of the raised floor, including all the glue joints.

#### Dissipation across the glue joint and/or the edge:

The electric charge is not dissipated diagonally across the board, but across the floor finish and the conductive glue joint of any floor finish adhesives, up to the conductive edge adhesive. Depending on the board structure and conductivity of the edge glue joint, using a conductive edge also leads to dissipation towards the pedestal and subsequent grounding.



#### **Metal tray structures:**

In the USA and Britain, 'all round' metal trays are commonly used when chipboard is the carrier material. In such cases, only a guarantee for electrical conductivity across the floor finish and the glue joint between the finish and the metal tray is required.

## Application technologies and processing guidelines

### **4. Application technologies and processing guidelines**

#### **4.1 Surface bonding with dispersion glues**

KLEIBERIT FE 403, FE 404 and FE 405 dispersion glues can only be used on absorbent carrier materials. The adhesive is applied on one surface only, usually the carrier board, and generally with a roller application machine. In practice, **wet bonding** is the conventional method used; therefore only this method is described below.

##### **4.1.1 Wet bonding of flexible finishes, needle felt and carpet flooring (FE 403, FE 404)**

Depending on the finish, one-sided application onto the carrier board requires the following quantities:

- Flexible finish: approx. 150-250 g/m<sup>2</sup>, depending on the backing and board surface
- Needle felt finish: approx. 400-600 g/m<sup>2</sup>, depending on the structure
- Carpet flooring: approx. 400-600 g/m<sup>2</sup>, depending on the backing

The finishes are generally applied manually on the still wet glue film (open times must be considered). The product then passes through a roller press before being stacked for at least 24 hours, preferably 72 hours. This is very important as the bonding process takes place during this time. The stack weight ensures that applied finishes do not peel away from the sides of the board during the drying process.

Diagonally cut board edges must be stacked coated side to coated side, or back to back.

##### **4.1.2 Wet bonding of metal sheets (FE 405, FE 405.5)**

Dispersions are used for glueing metal sheets (zinc-plated, V2A) to chipboard undersides in order to enhance the bending strength. The process is the same as for surface adhesion with one-sided glueing of the carrier boards. Depending on the chipboard properties, 75 g/m<sup>2</sup> or more are to be applied. The product then needs to be stacked (under pressure) for 24 hours, preferably 72 hours, before further processing.

##### **4.1.3 Wet bonding of aluminium foils**

Dispersion glues are also used for laminating aluminium foils. The foil is fed either sheet-wise or continuously from a roll; in the latter case it is cut after passing through the roller press, which can be equipped with heated rollers to accelerate the setting process. The product must then be stacked for several hours before further processing.

##### **4.1.4 Wet bonding of wood finishes**

The same processing features and properties as mentioned above apply to processing PVAc glues, with the difference that the roller press and stacking processes are replaced by only one pressing stage using suitable multiple presses or block presses.

## 4.2 Surface bonding with reactive adhesives

PUR adhesives are applied to one side only, usually on the carrier board. The setting process depends on the sequence of the chemical reaction that occurs when components A and B of commonly used two-component systems are mixed. When mixing manually, the mixing ratio and the pot life have to be carefully monitored; when using mixing and dosing systems, the mixing ratio will remain stable as new mixture is constantly added to the application machine.

To achieve the best wetting of both surfaces to be bonded, the boards should pass through a roller press and then be stacked for at least 16 hours, for instance overnight.

### PUR adhesive properties

- anhydrous and solvent-free
- excellent adhesion to many materials
- high stability
- water resistant

PUR adhesives are therefore suitable for almost all kinds of bonding purposes for raised floors, particularly for bonding non-absorbent materials to each other.

## 4.3 Surface bonding with reactive hotmelts

Reactive hotmelts offer an interesting alternative (processing-wise) to standard wet bonding adhesive systems for bonding the different finishes. One major advantage is higher throughput volumes (no drying, no intermediate stacking). Roller application to the carrier board or the finish is recommended in such cases.

Finish/backing	Application qty [g/m <sup>2</sup> ]
Carpets	approx. 200-300
Flexible finishes	approx. 100-200

Both parts have to be joined immediately after application; later corrections are not possible. In the event that immediate joining is not possible, IR reactivation will be necessary. The roller press pass also has to occur immediately.

This adhesive system requires a very high throughput speed to ensure that the open time of the adhesive, which can vary depending on the application amount and system, is not exceeded.

### Edge banding on raised floor boards

This workstep is used when chipboard is used as the carrier material. In practice, the proven system is hotmelts combined with appropriate edge materials. The procedure depends on the edge banding machine used.

### Pedestal bonding

The pedestals are generally bonded manually with two- and one-component adhesives. It is worth mentioning that the use of proven two-component PUR systems is increasingly being replaced with PUR-based one-component systems.

Two-component adhesives are used in clean rooms, where the use of products containing

plasticisers is not permitted.

The one-component pedestal adhesive KLEIBERIT 566 is usually applied with a compressed air or hand dispenser, available in either a 600 ml tube bag or 310 ml cartridge. The adhesive should be applied in a wavy line across the pedestal base; for optimal distribution (wetting), twist the pedestal when firming down.

### **Sealing the foundation**

The foundation concrete or floor screed must be at least 30 days old, and completely cross-linked and dry. The floor must be swept or vacuum-cleaned immediately before applying the sealant (waterproofing), to ensure it is dust-free.

KLEIBERIT 697 sealant, a solvent-free acrylate dispersion, is spread out and brushed into the concrete or the floor screed using a sealing brush. Around 100-150 g/m<sup>2</sup> will be needed, depending on the condition of the floor.

Sealing only serves to waterproof the concrete surface – no varnish layer should ensue – and to bind dust. It is not designed to compensate any floor unevenness or improve any mechanical properties of the concrete surface.

## Application technologies and processing guidelines



## **KLEIBERIT® Adhesives worldwide**

### **KLEIBERIT Adhesives (Head Office)**

KLEBCHEMIE M. G. Becker GmbH & Co. KG  
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### **KLEIBERIT Adhesives UK**

Coalville, Leicestershire, UK

### **KLEIBERIT Chimie S.a.r.l.**

Reichstett, France

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Waxhaw, North Carolina, USA

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### **KLEIBERIT AUSTRALIA Pty Ltd.**

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