K-Sentials

F20-IC.de

Technical Brochure 2020-10

Knauf Floor Systems on the Basis of K-Sentials Flowing Screed Compounds

Construction and Application Technology

Note on English translation / Hinweise zur englischen Fassung

This is a translation of the Technical Brochure valid in Germany.
All stated details and properties are in compliance with the regulations of the German standards and building regulations. They are only applicable for the specified products, system components, application rules, and construction details in connection with the specifications of the respective certificates and approvals.
Knauf Gips KG denies any liability for applications outside of Germany as this requires changes acc. to the respective national standards and building regulations.

Dies ist eine Übersetzung des in Deutschland gültigen Technische Broschüres. Alle angegebenen Werte und Eigenschaften entsprechen den in Deutschland gültigen Normen und bauaufsichtlichen Regelungen. Sie gelten nur bei Verwendung der angegebenen Produkte, Systemkomponenten, Anwendungsregeln und Konstruktionsdetails in Verbindung mit den Vorgaben der bauaufsichtlichen Nachweise.
Die Knauf Gips KG lehnt jegliche Haftung für Einsatz und Anwendung außerhalb Deutschlands ab, da in diesem Fall eine Anpassung an nationale Normen und bauaufsichtliche Regelungen notwendig ist.

Contents

Introduction

The reference guide

The floor, as one of the most heavily stressed constructional components, requires careful planning and application. Difficult problem areas in flooring design can be permanently solved when state-of-the-art and innovative systems are used.

Flowing screeds are one of the most important components in this respect. The special binding agent properties offer you almost shrinkage-free particularly high strength screeds. These are the decisive factors for a long and trouble-free service life. Based on these properties, the resulting flowing screeds can be used on raised access floors and as floating screeds with reduced screed thicknesses acc. to DIN 18560-2. They do not curl at the edges and retain their excellent flatness and evenness.

Produced for the manufacture of flowing screeds, Knauf delivers and supplies top quality flowing screed compounds (K-Sentials) based on alpha-hemihydrate, natural anhydrite and thermal anhydrite. They comply with the requirements of EN 13454 and bear the CE-mark. You can use them to manufacture the desired screed mixture for use in screed mortars compliant to EN 13813.

K-Sentials flowing screed compounds use different mixing techniques to suit the product involved.

- Mobile mixer
  Mix systems for flexible deployment on the building site
- Truck mixer and factory-mixed dry mortar
  Highest expectations for use in truck mixers as a factory-mixed mortar
- Silo technology (unicameral and bicameral silo)
  Suitable for the use of dry aggregates for the manufacture of factory-mixed dry mortar as bulk material (unicameral silo) or as bagged material. As a bicameral silo it facilitates the use of wet aggregates.

The sustainable production protects the environment and conserves precious resources.

Important content

This technical brochure provides valuable information on the planning and application of flowing screeds.

The complete system for flooring

Flowing screeds on a calcium suplhate basis ($CaS0_4$ basis) consist of anhydrite, special gypsums, superplasticizing admixtures and aggregates, such as particulate natural anhydrite, limestone or silica sand.

K-Sentials flowing screed compounds for the manufacture of flowing screeds are subject to continuous and ongoing control in the factory as well as in the central laboratory of Knauf Gips KG to ensure their consistent high quality. The certified quality management system stipulates that company-internal quality control procedures and processes are continuously monitored by independent and recognized test institutes.

Flowing screeds on the basis of K-Sentials flowing screed compounds can easily fulfil more complex demands placed on flooring, whereby the constructional design of the screed as a bonded screed, screed on a separating layer, screed on insulating layers and heating floor screed ensures that the properties can be specifically targeted to the application.

The properties of these flowing screed are designed for use in residential buildings, public buildings and commercial buildings (trade and light industry).

Flowing screeds on the basis of K-Sentials flowing screed compounds are not suitable for

- Commercial or public wet areas (large-scale kitchens, public and private swimming pools and shower rooms)
- Outdoor application

Flowing screeds on the basis of K-Sentials flowing screed compounds feature good characteristics such as

- Flexural and compressive strengths, dimensionally stable during usage
- Ecologically highly recommended
- Suitable for common coverings and epoxy resin coatings
- High thermal conductivity (for heated floor screeds)
- Non-combustible

Technological properties include:

- High pouring capacities with suitable machinery systems with low levels of physical effort
- Rapid, volume proven hardening (joint free or minimal joint requirement application)
- Surface ready to use (even, free from deposits and sinter layers)
- Quickly available for foot traffic (short technological pauses)

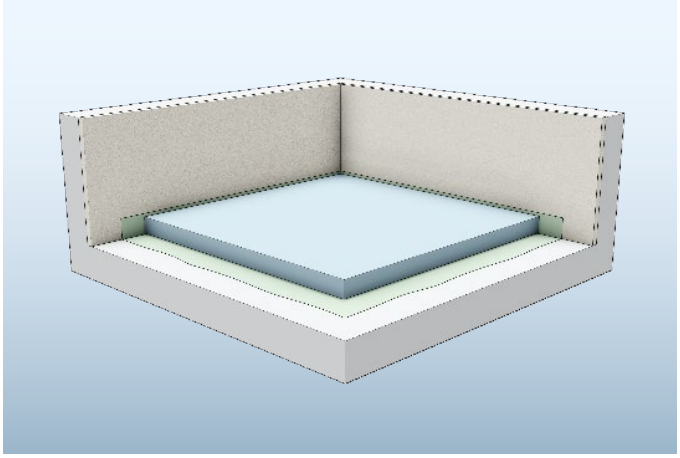
Overview of Screed Construction Types

Dependent on the constructional and building physical requirements as well as the corresponding application conditions, flowing screed can be applied as:

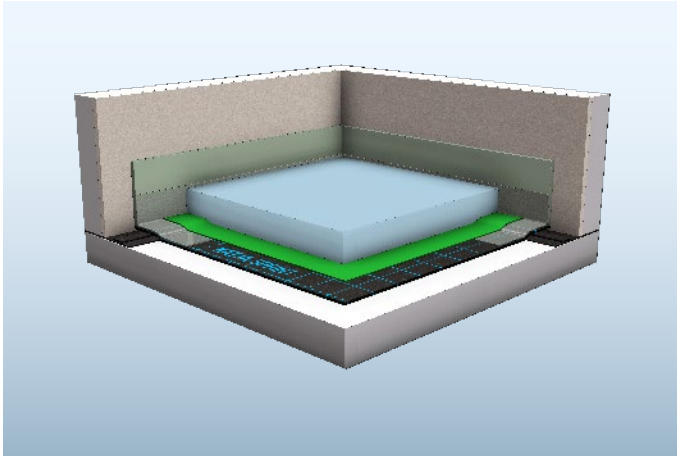
- Bonded screed
- Screed laid on a separating layer
- Screed on an insulating layer / heating floor screed
- Hollow raised access floors

Flowing screeds on the basis of K-Sentials flowing screed compound can be applied in different variants. They are illustrated on this page.

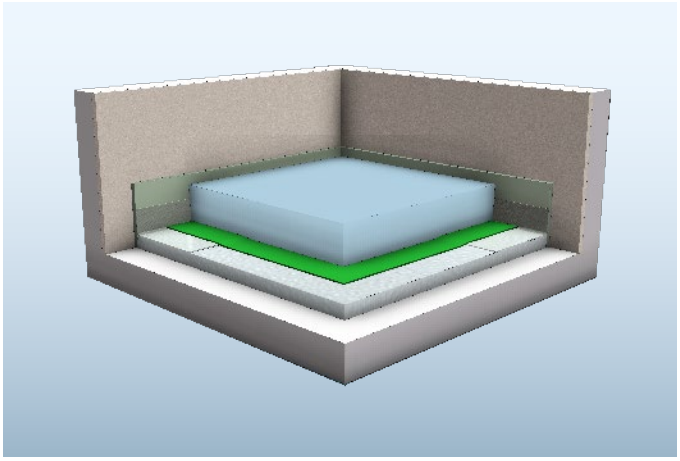
Bonded screed



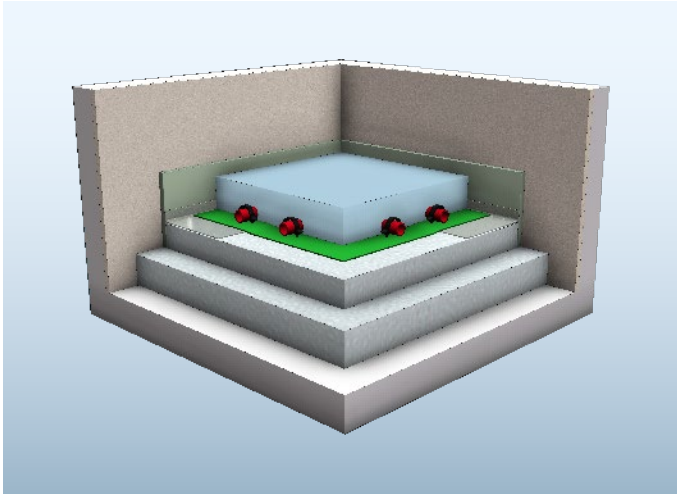
Screed laid on a separating layer



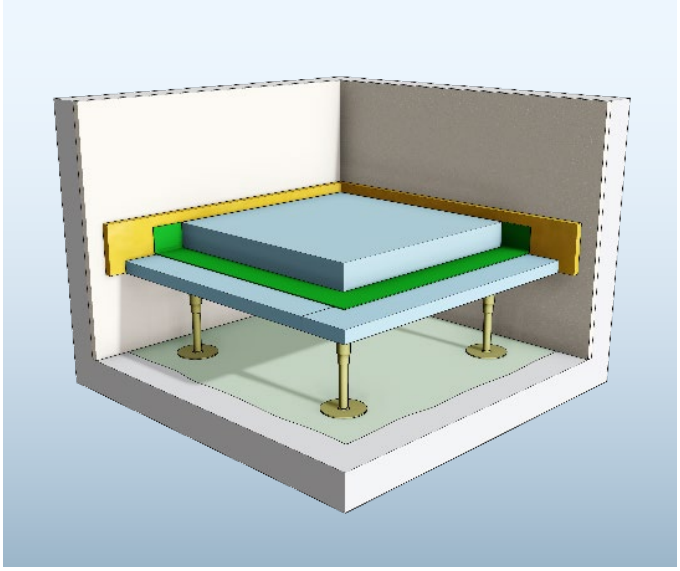
Screed on an insulating layer



Heating floor screed



Hollow raised access floors



Building physics

Fire exposure from above

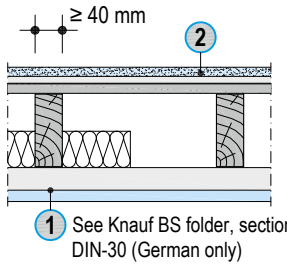
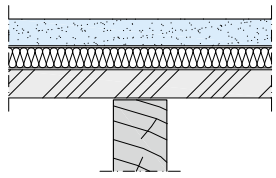
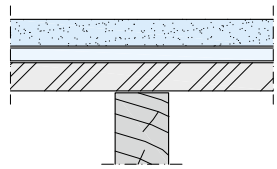
Should fire resistance requirements with fire exposure from above exist for ceilings they can be implemented with flowing screeds.
Depending on the requirements and layer thickness of the screed, an additional layer underneath the screed may be necessary.

► Good to know
The structurally necessary screed thicknesses must be considered. The stated values are minimum values and not rated thicknesses. Flowing screeds with a share of organic material less than 1 % are non-combustible and feature reaction to fire A1 acc. to EN 13501-1.

Fire resistance acc. to DIN 4102-4

The necessary screed thicknesses for the required fire atings as well as the required substrate, if applicable, are shown in Table 1.

Table 1: Flowing screed floor construction design acc. to DIN 4102-4

 **DIN construction Fire resistance: From below and from above** 1 + 2	Fire resistance class	2 Floor construction			
		Screed		Construction underneath screed required for fire resistance	
				or	
				Mineral wool insulation layer S Density ≥ 30 kg/m³	Gypsum boards
		Flowing screed	Minimum thickness[1] mm	Minimum thickness mm	Minimum thickness mm
	F30	•	20	15	9.5
or 	F60	•	20	15	9.5

1) Greater screed thicknesses may be required for structural reasons.

General notes on fire resistance

The maximum permissible load per unit area with demands on the fire resistance is 2 kN/m².

The sequence of the layers as listed in the table as required for fire protection is mandatory.

Layers required for fire protection must be laid tightly jointed.

Fire resistance permissible intermediate layers

The constructionally necessary separating layer between the screed and the insulation layer, is permissible as a ≥ 0.12 mm thick Knauf Schrenzlage synthetic coated kraft paper or ≥ 0.15 mm thick PE foil fire resistance layer.

Insulation layers

S Mineral wool insulation layer acc. to EN 13162
non-combustible
melting point ≥ 1000 °C acc. to DIN 4102-17
(insulating material, e.g. from Knauf Insulation)

Perimeter application

Edge insulation strips: Thickness ≥ 12mm, building material class A, melting point ≥ 1000 °C (e.g. Knauf mineral wool edge insulation strips or equivalent).

Layers above the base substrate

Standard floor coverings can be applied on screed constructions.

Requirements and terms

New demands have been posed for sound insulation with the publication of the German DIN 4109:2018-01 standard. The validity of the DIN 4109:2018-01 is limited to German states who have enacted the Model Administrative Provisions – Technical Building Rules (MVV TB) into their state legislation. It is expected that the remaining German states will enact the legislation soon. Until the MVV-TB has been enacted into the respective state building codes for these Federal states, the DIN 4109:1989 will continue to apply.

In the following, the specifications from the DIN 4109:2018-01 are used. As it is only possible to offer a brief overview here, we will refer you to our technical brochures for further information.

- Sound insulation with Knauf, requirements on the constructional components, SS02.de
- Sound insulation with Knauf, calculations and input data for calculation, SS03.de

Airborne sound insulation

Figure 1: Airborne sound measurement

The sound insulation proof for the airborne sound insulation acc. to DIN 4109:2018-01 applies different calculation models to suit the construction method

- Solid construction
- Building with double leaf party wall (building party wall)
- Timber, lightweight and drywall constructions
- Structural framing and combined construction methods

Thirteen different transmission paths must be taken into consideration. It is not possible to illustrate that more clearly here due to the complexity of the proof.

Impact sound insulation

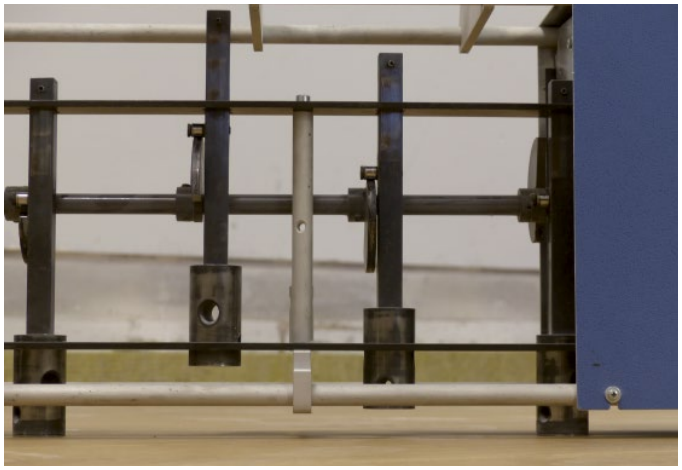


Figure 2: Test of the impact sound insulation of solid ceilings

Terms

$L_{n,eq,0,w}$ Equivalent weighted normalized impact sound level of a basic ceiling in dB

$L_{n,w}$ Weighted normalized impact sound pressure level in dB without flanking transmission

$L'_{n,w}$ Weighted normalized impact sound level in dB incl. flanking transmission
$L'_{n,w} = L_{n,eq,0,w} - \Delta L_w + K$

req. $L'_{n,w}$ Required weighted normalized impact sound level in dB
req. $L'_{n,w} \geq L'_{n,w} + 3$ dB

ΔL_w Weighted impact sound improvement index of the ceiling covering in dB

K The correction factor for the footfall sound transmission via the flanking constructional components in dB

R'_w Weighted apparent sound reduction index in dB

req. R'_w Required weighted apparent sound reduction index in dB

Solid ceilings

The weighted normalized impact sound level on buildings $L'_{n,w}$ with solid ceilings can be calculated as a solid basic wall from the equivalent weighted normalized impact sound level $L_{n,eq,0,w}$ of the basic ceiling and the weighted impact sound improvement index ΔL_w through a ceiling covering (floating screed).

Rooms located over each other are calculated using the following formula:

$L'_{n,w} = L_{n,eq,0,w} - \Delta L_w + K$

$L_{n,eq,0,w}$ results from the mass per unit area m´ in kg/m² of the solid ceiling and

$L_{n,eq,0,w} = 164 - 35 \lg(m')$

is the formula to calculate it.

The weighted impact sound reduction ΔL_w can be calculated with the formula

$\Delta L_w = 13 \lg(m') - 14.2 \lg(s') + 20.8$

where s' dynamic stiffness of the impact noise layer in MN/m³ (see Table 2 on page 11) determined by calculation or testing of the observed floor construction on a ceiling test stand.

The correction factor K takes the influence of the flanking transmission into consideration on whether the rooms are located above or below one another, and whether a suspended ceiling is or is not available.

The calculated proof that the impact sound level is observed results from the consideration of a safety factor (forecast uncertainty) of 3 dB

$L'_{n,w} + 3$ dB ≤ req. $L'_{n,w}$

Wood joist ceilings

Separate consideration of ceiling and ceiling covering as is the case with solid ceilings acc. to DIN 4109 is not possible. The weighted normalized impact sound pressure level in the installed state is determined from
$L'_{n,w} = L_{n,w} + K_1 + K_2 + u_{prog}$

$L_{n,w}$ results from the tables in DIN 4109-33, 4.3 or from measurements. K_1 and K_2 are correction factors, which consider the influence of flanking transmission and u_{prog} is a safety factor of 3 dB.

With the wood joist ceiling there is also a calculated proof that the impact sound level is observed with:

$L'_{n,w} + 3$ dB ≤ req. $L'_{n,w}$

Note	For further information, see “Schallschutz und Raumakustik mit Knauf” *Sound insulation and room acoustics with Knauf (partly German only).*

Insulation materials

The thickness designation is stated as the thickness on delivery t_L which applies as the rated value for the thickness.
The compressibility ($c = t_L - t_B$) s determined in the laboratory under a defined load and is not comparable with the compression of the insulating material under load in practical application. t_B is the thickness under a load of 2 kPa after removal of an additional load of 48 kPa.
With the compressibility c, the product is assigned to the application types sh/sm/sg acc. to DIN 4108-10 (see page 18).

Table 2: Suitable insulation materials (impact sound protection) for floating screeds, e.g. Knauf Insulation and EPS in general (selected)

Stiffness group s' MN/m³	**Material**	**Name**	**Insulation thickness and compressibility (t_L - c)** mm
70	Mineral wool	Knauf Insulation Trittschall-Dämmplatte TP-GP[1)]	12 – 1
50	Mineral wool	Knauf Insulation Trittschall-Dämmplatte TP-GP[1)]	20 – 1
40	Mineral wool	Knauf Insulation Trittschall-Dämmplatte TPE[1)]	12 – 2
30	Mineral wool	Knauf Insulation Trittschall-Dämmplatte TP[1)]	13 – 3
		Knauf Insulation Trittschall-Dämmplatte TPE[1)]	20 – 2; 25 – 2
	EPS	Trittschalldämmplatte 045 DES sm	15 – 2
		Trittschalldämmplatte 040 DES sg	20 – 2
25	Mineral wool	Knauf Insulation Trittschall-Dämmplatte TP[1)]	15 – 5
		Knauf Insulation Trittschall-Dämmplatte TPS[1)]	20 – 3
		Knauf Insulation Trittschall-Dämmplatte TPE[1)]	30 – 2
20	Mineral wool	Knauf Insulation Trittschall-Dämmplatte TP[1)]	20 – 5
		Knauf Insulation Trittschall-Dämmplatte TPS[1)]	30 – 3; 35 – 3; 40 – 3
		Knauf Insulation Trittschall-Dämmplatte TPE[1)]	40 – 2
	EPS	Trittschalldämmplatte 045 DES sm	20 – 2
		Trittschalldämmplatte 040 DES sg	30 – 2
15	Mineral wool	Knauf Insulation Trittschall-Dämmplatte TP[1)]	25 – 5; 30 – 5; 35 – 5
		Knauf Insulation Trittschall-Dämmplatte TPS[1)]	50 – 3
	EPS	Trittschalldämmplatte 045 DES sm	30 – 3
		Trittschalldämmplatte 040 DES sg	50 – 2
10	Mineral wool	Knauf Insulation Trittschall-Dämmplatte TP[1)]	40 – 5; 45 – 5; 50 – 5
	EPS	Trittschalldämmplatte 045 DES sm	40 – 3
16	Mineral wool	Knauf Insulation Trittschall-Dämmplatte TPT01	15 – 5
12	Mineral wool	Knauf Insulation Trittschall-Dämmplatte TPT03	20 – 3
10	Mineral wool	Knauf Insulation Trittschall-Dämmplatte TPT01	20 – 5; 25 – 5
9	Mineral wool	Knauf Insulation Trittschall-Dämmplatte TPT03	30 – 3
8	Mineral wool	Knauf Insulation Trittschall-Dämmplatte TPT01	30 – 5
7	Mineral wool	Knauf Insulation Trittschall-Dämmplatte TPT01	35 – 5; 40 – 5

1) Knauf Insulation GmbH

Requirements for airborne and impact sound insulation

Table 3: Requirements for airborne and impact sound insulation of ceiling constructions to DIN 4109:2018-01, Tab. 2 (extract)

Requirement	Weighted apparent sound reduction index R'_w in dB	Weighted normalized impact sound level incl. flanking transmission $L'_{n,w}$ in dB
Apartment buildings, office buildings and mixed-use buildings		
Ceilings under generally usable floors beneath attics	≥ 53	≤ 52
Apartment separation ceilings (incl. stairways)	≥ 54	≤ 50[1) 2)]
Floors above cellars, halls	≥ 52	≤ 50
Ceilings below/above playrooms or similar common rooms	≥ 55	≤ 46
Ceilings under hallways	–	≤ 50
Ceilings under bathrooms and WCs with/without floor drains	≥ 54	≤ 53
Hotels and overnight accommodation		
Ceilings, including ceilings under corridors	≥ 54	≤ 50
Ceilings below/above common rooms	≥ 55	≤ 46
Ceilings under bathrooms and WCs with/without floor drains	≥ 54	≤ 53
Hospitals and sanatoria		
Ceilings, including ceilings under corridors	≥ 54	≤ 53
Ceilings below/above common rooms	≥ 55	≤ 46
Ceilings under bathrooms and WCs with/without floor drains	≥ 54	≤ 53
Schools and buildings with comparable usage		
Floors between classrooms or similar rooms	≥ 55	≤ 53
Ceilings between classrooms and “noisy rooms”	≥ 55	≤ 46

1) In case of changes to an existing structure where construction was completed before 1 July 2016, the requirement is $L'_{n,w} \leq 53$ dB.

2) In new construction of buildings with ceiling constructions, the DIN 4109-33:2016-07, Sound insulation in buildings - part 33: Data for the calculated proof of the sound insulation (component catalogue) that can be attributed to timber construction, lightweight construction or drywalling, the requirement for $L'_{n,w} \leq 53$ dB

NOTE At the current time it is not possible to certify a required value $L'_{n,w} \leq 50$ dB for all common ceiling constructions. Until suitable solutions are available as part of a planned revision of DIN 4109-33, the requirement stated in footnote 2) applies.

Table 4: Recommended sound insulation values of the class of sound insulation between rooms (SSt) in apartment houses acc. to VDI 4100:2012

Sound insulation criteria		Characteristic acoustical parameter	SSt I	SSt II	SSt III
Airborne noise protection	–	$D_{nT,w}$ in dB	≥ 56	≥ 59	≥ 64
Airborne noise protection	Staircase partition wall with a door	$D_{nT,w}$ in dB	≥ 45	≥ 50	≥ 55
Impact sound insulation	Vertical, horizontal or diagonal	$L'_{nT,w}$ in dB	≤ 51	≤ 44	≤ 37

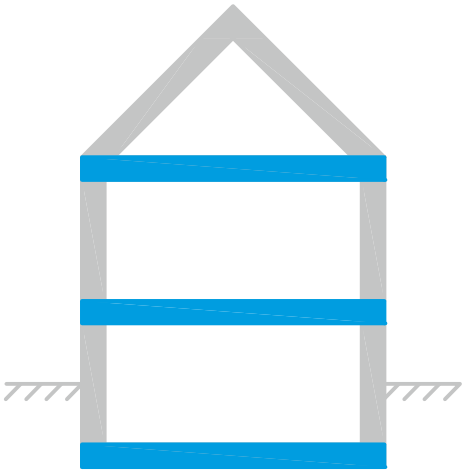
Table 5: Recommended sound insulation between rooms (SSt) for dwellings in one-family terrace houses and one-family semi-detached houses acc. to VDI 4100:2012

Sound insulation criteria		Characteristic acoustical parameter	SSt I	SSt II	SSt III
Airborne noise protection	–	$D_{nT,w}$ in dB	≥ 65	≥ 69	≥ 73
Impact sound insulation	Horizontal or diagonal	$L'_{nT,w}$ in dB	≤ 46	≤ 39	≤ 32

$D_{nT,w}$ = weighted standardized level difference acc. to VDI 4100:2012

$L'_{nT,w}$ = weighted standardized impact sound pressure level acc. to VDI 4100:2012

Requirements of the German Energy Saving Ordinance (EnEV)



The amended German Energy Saving Ordinance (EnEV 2014) applies since 01 May 2014 and supersedes the previous EnEV from 01.10.2009.

According to the Energy Saving Ordinance, all new buildings must determine the annual primary energy requirement and consequently the heat loss, which may not exceed a determined threshold. Thus, the planner is responsible for rating of the thermal insulation.

Since 1 January 2016, the stipulations of the German Energy Saving Ordinance (EnEV 2014) have become more stringent for residential and non-residential buildings. It is often referred to as the *EnEV 2016*. The maximum permissible annual primary energy requirement for new buildings has been reduced by 25 %. At the same time, the requirements for the energy-related quality of the building envelope have become more stringent, as the modified proofing method is intended to reduce the transmission heat losses by about 20 %.

For existing buildings, the rating of the heat insulation can be undertaken on the constructional component. If the floor structures on the heated side are rebuilt during modernisation, the floor structure must exhibit a heat transfer coefficient of $U \leq 0.50$ W/(m^2·K) (previously k-value) when the new and old building component layers are considered.

With some modernisation measures, the heat transfer coefficient can not be achieved, as the lack of constructional height prevents application of the necessary insulation layer thickness. The requirements acc. to EnEV are considered to be fulfilled when the maximum possible insulation layer thickness is installed and the insulation material) has a thermal conductivity of $\lambda_R \leq 0.035$ W/(m·K).
Calculation of the U value is described in the following.

Table 6: Highest values of the heat transfer coefficient with modernization measures

Constructional component	**Highest values of the heat transfer coefficient U_{max}**	
	Residential buildings and zones of non-residential buildings with interior temperatures ≥ 19 °C	Zones of non-residential buildings with interior temperatures from 12 to < 19 °C
Ceilings that border unheated attic spaces	0.24 W/(m^2·K)	0.35 W/(m^2·K)
Ceilings that border unheated rooms or the soil	0.30 W/(m^2·K)	No requirement
Floor structures	0.50 W/(m^2·K)	No requirement
Ceilings that border rooms below against outdoor air	0.24 W/(m^2·K)	0.35 W/(m^2·K)

Rating of thermal insulation

Calculation procedure

The thermal transmission coefficient U acc. to EN ISO 6946 is determined using the formula

R_{si} Thermal transfer resistance internal

R_{se} Thermal resistance external (W/(m²·K))

d Component layer thickness (m)

λ_R Calculation value of the thermal conductivity (W/m·K)

$$U = \frac{1}{R_{si} + \frac{d_1}{\lambda_{R1}} + \frac{d_2}{\lambda_{R2}} + \frac{d_3}{\lambda_{R3}} + \ldots + R_{se}}$$

The calculation value for the thermal conductivity of the materials used and the thermal transfer resistances 1/ R_s should be taken from the DIN 4108-4 and the manufacturers specifications.

With a combination of impact sound insulation boards and thermal insulation boards, the impact sound insulation boards can of course be included in the heat insulation calculation. The thickness of the impact sound insulation board (d_L) in the unloaded state is to be used as a calculation variable.

Example calculation - ceiling above unheated cellar

Determination of the necessary insulation material thickness to achieve the required heat transfer coefficient (U value) to EnEV 2014 for a ceiling above an unheated cellar in the course of a modernisation by renovation of the floor structure:

- U value of the planned ceiling structure without insulation layer calculated from existing $R = \frac{1}{U}$
  U = 2.13 W/(m²·K)
- Required U value is ≤ 0.50 W/(4-side tapered edge (m²·K), resulting in the inverse value the thermal transmission resistance R

  $$\text{req } R = \frac{1}{U} = \frac{1}{0.50} = 2.00 \ \frac{m^2 \cdot K}{W}$$
- Required thermal resistance R_D of the insulation layer for improvement of the required thermal transmission resistance

  $$\text{req } R = \text{req } R - \text{prev } R = 2.00 - 0.47 = 1.53 \ \frac{m^2 \cdot K}{W}$$
- Required insulation thickness req. d_D (WLG 035)
  $\text{req } d_D = \lambda_{RD} \cdot \text{req } R_D = 0.035 \cdot 1.53 = 0.054$ m

Table 7: Calculation of the existing thermal resistance (example)

Floor and ceiling construction (from above and from below) **Material**	**Layer thickness** **d_n in m**	**Thermal conductivity** **λ_R in W/(m·K)**	**Thermal resistance** $R_n = \left(\frac{d_n}{\lambda_{R,n}}\right)$ in $\frac{m^2 \cdot K}{W}$
Thermal transfer interior R_{si}	–	–	0.17
PVC covering	0.003	0.25	0.01
Flowing screed	0.035	1.4	0.03
Insulation layer	(sought)	0.035	(sought)
Reinforced concrete	0.14	2.30	0.06
Knauf gypsum plaster	0.015	0.35	0.04
Thermal transfer interior R_{si}	–	–	0.17
Thermal transmission resistance previously	$R = \frac{1}{U}$		**0.48**

► **Calculation check**

Selected insulation material EPS DES 035, WLG 035, thickness d_D 0.06 m with

$$\frac{d_D}{\lambda} = \frac{0{,}06}{0{,}035} = 1{,}71 \ \frac{m^2 \cdot K}{W}$$

existing U value of the ceiling with insulation material

$$\frac{1}{U} = 0{,}48 + 1{,}71 = 2{,}19 \ \frac{m^2 \cdot K}{W}$$

$$U = 0{,}46 \ \frac{W}{m^2 \cdot K} = < 0{,}50 \ \frac{W}{m^2 \cdot K}$$

Screed systems

Flowing screed system bonded screed

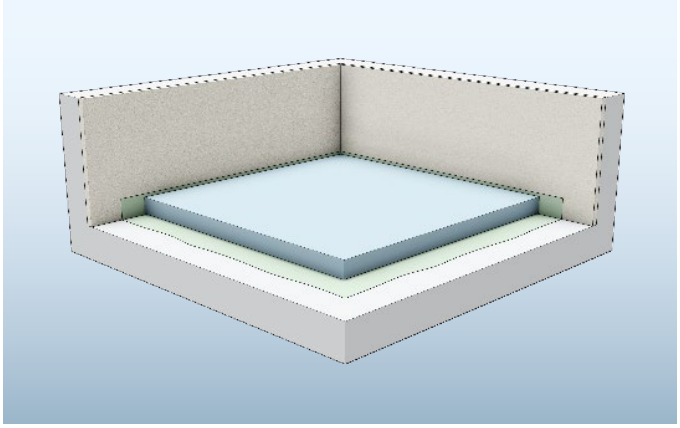


Figure 3: Floor construction bonded screed

Construction and application

A bonded screed is a screed that is bonded to the supporting substrate. Bonded screeds must be fully frictionally bonded to the respective substrates. All forces that result from deformation, shrinkage processes, shear stresses due to live loads, are assumed by the overall system (bonded system) of substrate/screed.

Thus bonded screeds can be loaded even at thin layer thicknesses e.g. with transport loads (lift truck, forklift, truck or similar) providing that the foundation permits it. The surface of the screed must be protected by a covering against a compressive load that is too high as well as abrasion, e.g. by polyamide wheels of lift trucks.

Bonded screeds when correctly applied (a good bond is essential) are particularly suitable for high loads (live loads). The screed thickness is not a criterion for the ability of the bonded screed to sustain a load.

According to the recommendation in DIN 18560-3, the screed thickness should not be less than three times the largest aggregate grain and not exceed 50 mm for single-layer screed.

Substrate quality/preparation

- Substrates must be dry, this also applies for any fine smoothing equalization layers of concrete that have been applied. They must fulfil the demands of the DIN 18560-3.
- Substrates must be clean and loose layers must be removed (adequate strength, textured surface, free of grease, free of cracks), depending on the state and loading of the surface, keying or surface shot blasting may be required.
- Apply one or two coats of Knauf Estrichgrund (screed primer) (diluted 1:1 with water) or prime with one or two coats of Knauf Schnellgrund (undiluted) depending on the absorbency of the substrate. Avoid the formation of pools.
- On sealed substrates (tiles, Terazzo), for example, apply Knauf Spezialhaftgrund bonding primer or Knauf FE-Imprägnierung epoxy resin with interspersed silica sand.
- Prime the contact surfaces between the wall and screed (to avoid transfer of moisture to the wall).

Figure 4: Apply Knauf Estrichgrund screed primer

Sealing

For constructional components coming in contact with the soil, a minimum ground moisture acc. to DIN 18533-1 must be assumed. If necessary, sealing measures required must be provided by the planers.

Bonded screeds cannot be applied with conventional seals, as the respective sealing membranes and sealing foils do not facilitate a bond.

If a seal is required, a seal can be applied with the assistance of the Knauf FE Sealing Shield, which simultaneously represents a fully adequate bonding bridge between the screed and concrete substrate.

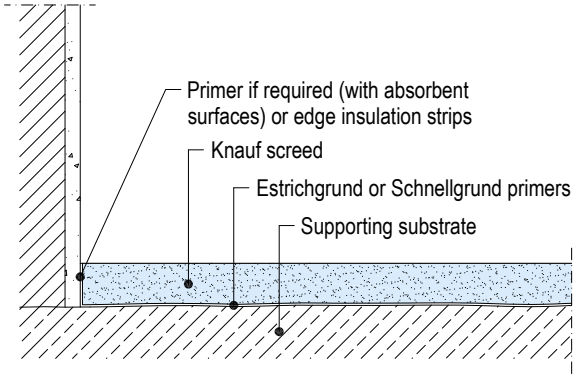
Joints

- Joints in the substrate (structural joints) must be applied to the screed and covering also.
- Otherwise, the screed slab can be applied without joints.

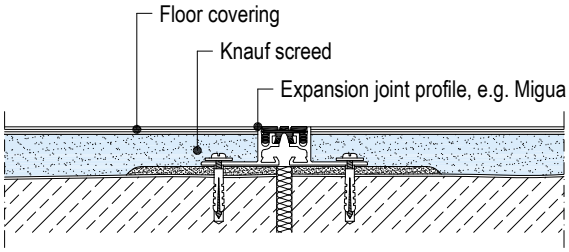
Details

Scale 1:5

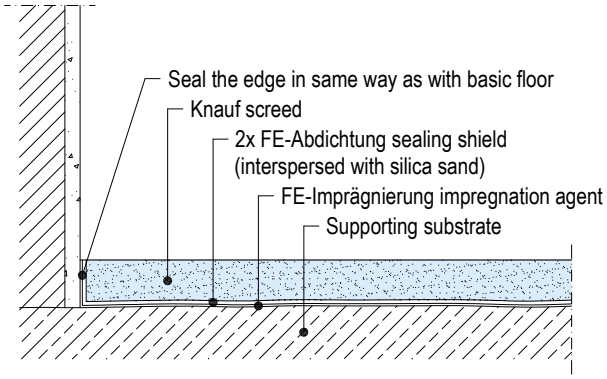
F211.de-V101 Edge design



F211.de-V102 Joint application



F211.de-V103 Bonded seal with soil contacting areas



Flowing screed systems on separating layer

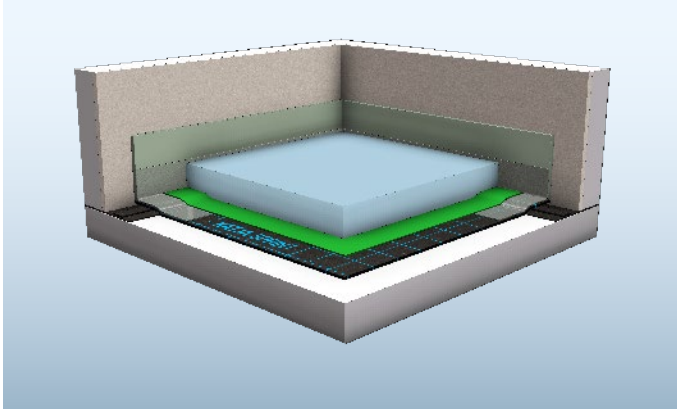


Figure 5: Floor construction screed on a separating layer

Construction and application

Screeds on a separating layer are separated from the supporting substrate by thin intermediate layers (Knauf Schrenzlage synthetic coated kraft paper or similar). No friction bond results between the screed and the substrate. Screed and substrate can move independently of one another.
There are movement joints arranged between the screed and the rising constructional components, such as elastic strips on walls, columns, pipes, etc., to prevent constraint forces.

As vertical loads are transferred directly to the substrate, and the screed is only loaded by pressure, a relatively thin layer can be applied.

On larger surfaces and higher static loads, tensile stresses can however occur at a temperature change, requiring screed thicknesses that are greater than those listed in Table 8 on page 19. The screed thickness shall also be selected at a higher thickness with transport loads. With lifting truck loads, the nominal screed thickness should be at least 40 mm and with forklift loads at least 50 mm.

Screed on a separating layer is suitable

- When the substrate is imperfect (e.g. crumbling surface, oily), or special sealing measures are required.
- On wooden planking
- With high loads if a bonded screed is not possible (e.g. surface strength of the substrate too low).

Substrate preparation/separating layer

- Clean the substrate mechanically (mortar remnants, loose parts that can destroy the Knauf Schrenzlage synthetic coated kraft paper).
- Sealing of holes, cracks, or similar and any existing bonded equalization layer with uneven surfaces, in order to obtain a uniform screed surface thickness.
- Attachment of Knauf edge insulation strips, $t \geq 8$ mm.
- Use Knauf Schrenzlage with at least 8 cm layer overlap as a separating layer, and do not use PE foil (formation of wrinkles) or bitumen felt (swelling due to water absorption through the screed).
- A Knauf Schrenzlage synthetic coated kraft paper is also required as a separating layer with screed application on a moisture barrier.

Sealing

Knauf Katja Sprint sealing membrane used as sealing against ground moisture acc. to DIN 18533-1.

Screed slab

- Nominal thickness at least 30 mm (minimum F4)
- Structural joints must be implemented with the same width in the screed. Otherwise, the screed slab can be applied without joints.

Figure 6: Separating layer

On wood joist ceilings

In order to avoid accumulation of moisture in the ceiling, no vapour barrier or foil should be applied on the wood joist ceiling. Knauf Schrenzlage can be used as a separating layer. If a vapour barrier is necessary, for example, because high levels of moisture can be found in the lower area, it should be applied underneath the wood joist ceiling.

Areas of application for screed on an separating layer

Table 8: Nominal screed thickness for screed on an separating layer

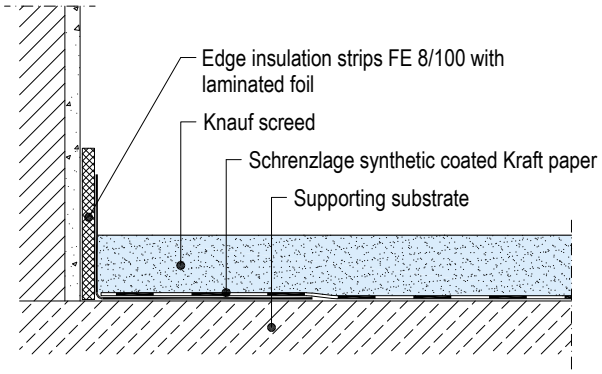
Load capacities acc. to DIN 18560-4		Nominal screed thickness in mm for calcium sulphate flowing screeds CAF acc. to DIN 18560-4		
Area load kN/m²	Point load kN	Flexural strength class to DIN 18560 F4	F5	F7
2	1	35	30	30
3	2	45	40	35
4	3	50	45	40
5	4	60	50	45

Note At dynamic loading, larger screed thicknesses can be necessary in dependence on the total load imposed by forklifts.

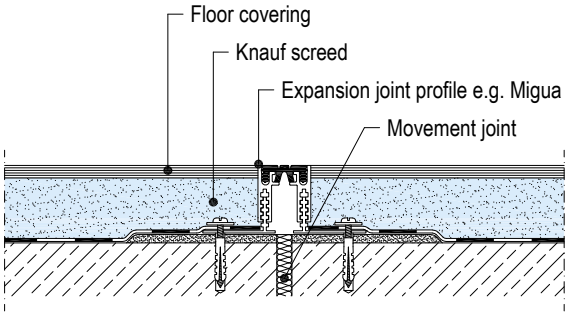
Details

Scale 1:5

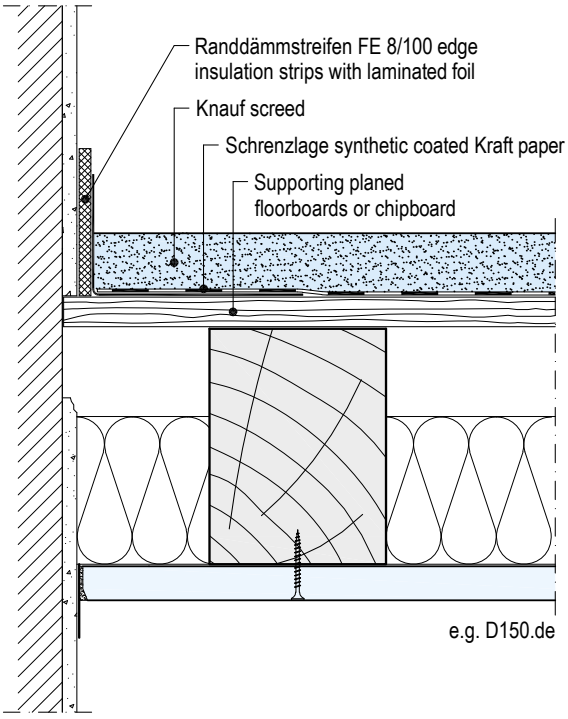
F221.de-V101 Perimeter application on a solid ceiling



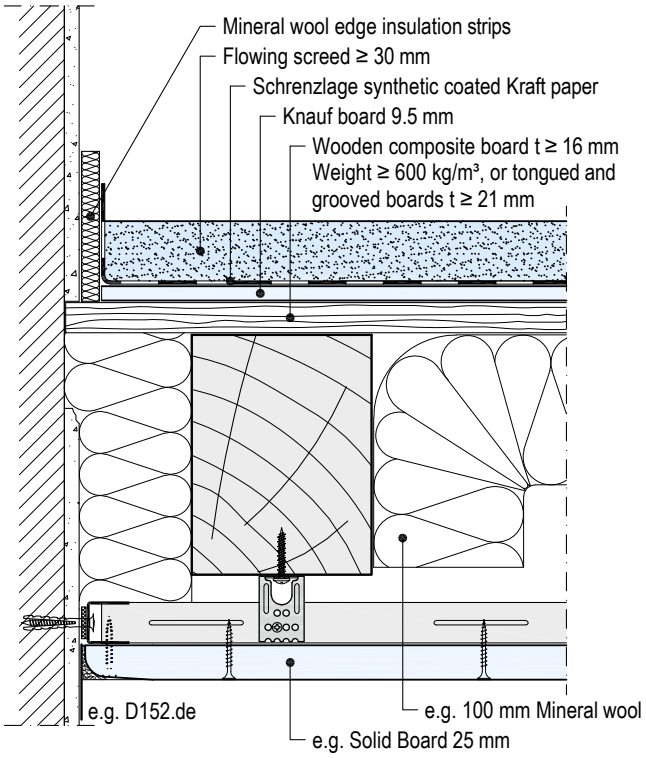
F221.de-V102 Joint application on solid ceiling



F221.de-V103 Perimeter application on a wood joist ceiling



F221.de-V104 On a wood joist ceiling



Flowing screed systems on insulation layer

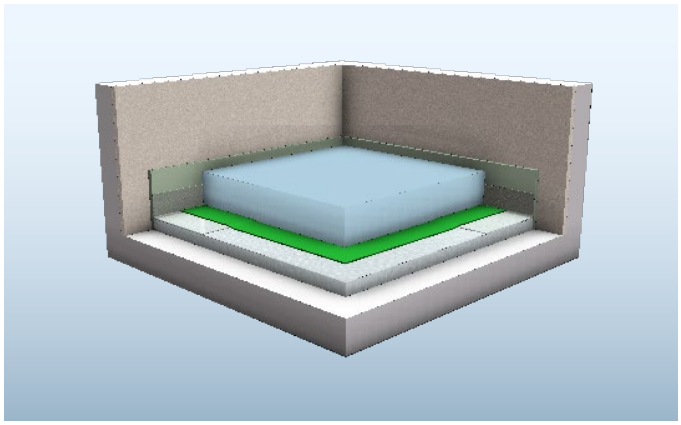


Figure 7: Floor construction screed on insulation layer

Construction and application

Screeds on the insulating layer are separated from the supporting substrate by an insulating layer (thermal and sound insulating materials). The rigid load distributing screed layer forms an anti-vibration system together with the elastic insulating layer (improving the impact sound insulation, airborne sound insulation, thermal insulation, see page 10 ff). There is no direct connection to the flanking constructional components.

Substrate preparation

- Clean the substrate mechanically (mortar remnants, loose constituents).
- The screed must have a uniform thickness acc. to DIN 18560.
- Levelling of unevenness using light levelling mortar (Knauf EPO-Leicht, Knauf S 400 Sprint)) or Dry bulk leveller PA or alternatively Knauf heavy-duty acoustic infill; possible is a combination of levelling/polystyrene insulation boards to eliminate sloping surfaces, to produce screed layers of uniform thickness (cover the bulk leveller with gypsum boards to distribute the load).
- Fixed pipes, installations and others: Level up to the top edge of the pipe; if insulation material is used there will be an overhang of approx. 10 mm above the pipe. Heating pipes must be thermally insulated.
- Adjacent walls must be plastered (prevents formation of sound bridges).
- Attachment of Knauf edge insulation strips to all rising components, thickness ≥ 8 mm.

Figure 8: Laying Knauf Schrenzlage synthetic coated kraft paper

Structurally required screed thickness

The required thickness of the screed is dependent on the construction design, screed quality, load and possibly the insulation material properties. Taking this parameter into consideration, nominal value tables for floating screed have been added to impact noise insulation materials in the DIN 18560-2, see Table 9 on page 21.

The following must be considered

- With single loads up to 2 kN, the compressibility c of the insulating layer may be maximum 5 mm, with a higher individual load it may be a maximum of 3 mm.
- With insulation layer thicknesses up to 40 mm, the nominal screed thickness screed can be reduced by 5 mm, however it must be at least 35 mm.
- However, should an insulation layer EPS DEO (≤ 150 kPa) of 100 to 200 mm be installed in the attic because of the German Energy Saving Ordinance, the nominal screed thickness must be ≥ 40 mm.
- With heating floor screed, this screed nominal thickness means the nominal screed thickness over the heating elements.
- At higher loads or higher single loads, the screed thickness must be increased (observe the extended drying time).
- To keep the drying time as short as possible, the nominal screed thickness should be limited to the structurally required necessary dimension.
- Structural joints must be implemented in the screed.
- With greater temperature changes, e.g. caused by exposure to strong direct sunlight, joints such as those with heating floor screed may be necessary.
- With heating floor screed, the arrangement of the movement joint in accordance with Code of Practice no. 5 (IGE/VDPM) “Joints in flowing calcium sulphate screeds” is recommended.
- Because of their high flexural strengths, it is possible to do without reinforcement (e.g screed mesh) with calcium sulphate flowing screed.. Reinforcement mesh does not increase the load capacity of screeds.

Areas of application for screed on an insulating layer

Table 9: Nominal screed thickness of screed on insulating layer / heated screed (nominal thickness above heating tube)

Load capacities acc. to DIN 18560-2		**Nominal screed thickness in mm for calcium sulphate flowing screeds CAF acc. to DIN 18560-2**		
Area load kN/m²	**Point load** kN	**Flexural strength class to DIN 18560** F4	F5	F7
2	–	35	35	35
3	2	50	45	40
4	3	60	50	45
5	4	65	55	50

Insulating layer – materials

The insulating layer under screed can consist of different materials depending on the area of application and requirements for sound insulation, fire protection, and thermal insulation.

Note	Requirements for airborne and impact sound insulation as well as heat insulation of ceiling constructions in accordance with DIN 4109, DIN 4108 and Germany Energy Saving Ordinance EnEV (calculation of the insulating layers, see page 14).

Customary in the area of floating screeds is the use of insulation materials made of expanded polystyrene (EPS) in acc. to EN 13163. If there are demands made on the non-combustibility of the insulation layer, mineral wool in acc. to EN 13162 is generally used.

Further materials are used in special application cases, such as Knauf Holzfaserdämmplatte WF wood fibre board for lower construction heights.

With thicker insulation layers, a combination of impact noise and airborne noise insulation is recommended. The thermal insulating layer must always be arranged on top of the impact sound insulation board due to the better technical sound insulation behaviour and because of the improvement when applying the screed layer due to the harder base.

With pipes on the basic ceiling, the impact noise insulation is however always on top. As a heat insulation layer, only application type DEO can be used.

If the insulation boards have an aluminium coating, this must be protected with a foil or a further coating against direct contact with the screed mortar, as a chemical reaction will otherwise occur between the aluminium and the alkaline water of the screed mortar.

Explanation of the abbreviations

Table 10: Ceiling application area acc. to DIN 4108-10 (excerpt)

Abbreviation	Application examples
DEO	Internal insulation of the ceiling or floor slab (top side) under screed without sound insulation demands **floor insulation slab**
DES	Internal insulation of the ceiling or floor slab (top side) under screed with sound insulation demands **impact sound insulation slab**

Table 11: Technical sound properties to DIN 4108-10 (excerpt)

Abbreviation	Description
sk	No demands on the sound insulation properties
sh	Impact noise insulation, increased compressibility
sm	Average compressibility
sg	Impact noise insulation, low compressibility

Insulation layer - products

The large range of Knauf products on offer also features a range of premium products for the area of floor insulation materials.

Knauf Insulation GmbH

The product range from Knauf Insulation GmbH encompasses insulation materials made of mineral wool (glass wool and stone wool).

For the floor application areas, impact sound insulation boards made of mineral wool as well as floor insulating boards made of stone wool or wood wool are available.

Knauf Insulation stone wool insulation materials fulfil the highest demands for thermal, sound and fire protection in buildings.

Heraklith wood wool insulation boards consist of wood, water and magnesite or cement. They combine environmental compatibility and excellent insulating properties.

Products for floating screeds

- Impact sound insulation
  - Knauf Insulation Trittschall-Dämmplatte TPT 01 (DES-sh)
  - Knauf Insulation Trittschall-Dämmplatte TPT 03 (DES-sm)
  - Knauf Insulation Trittschall-Dämmplatte TP (DES-sh)
  - Knauf Insulation Trittschall-Dämmplatte TPE (DES-sg)
  - Knauf Insulation Trittschall-Dämmplatte TPS (DES-sm)
  - Knauf Insulation Trittschall-Dämmplatte TP-GP (DES-sg)
- Thermal insulation
  - Knauf Insulation Boden-Dämmplatte TPD (DEO)
  - Knauf Heraklith BM (DEO-dm)

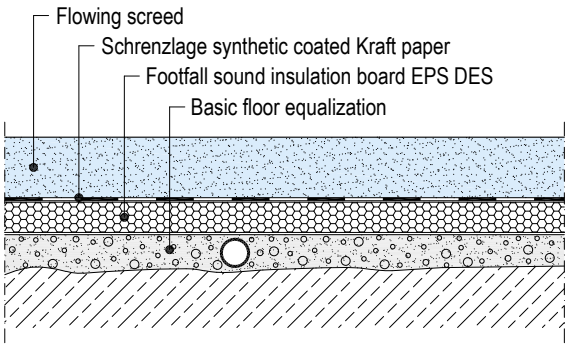
Further information

knaufinsulation.de

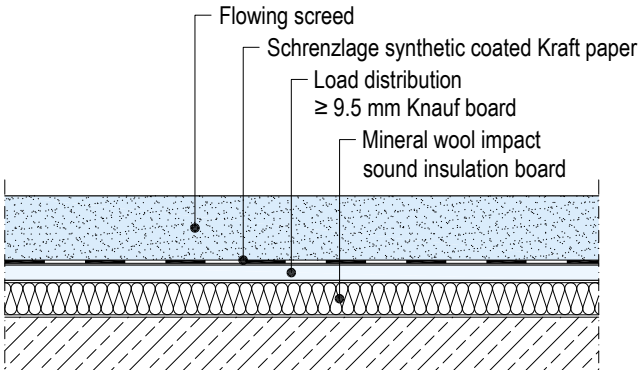
Details

Scale 1:5

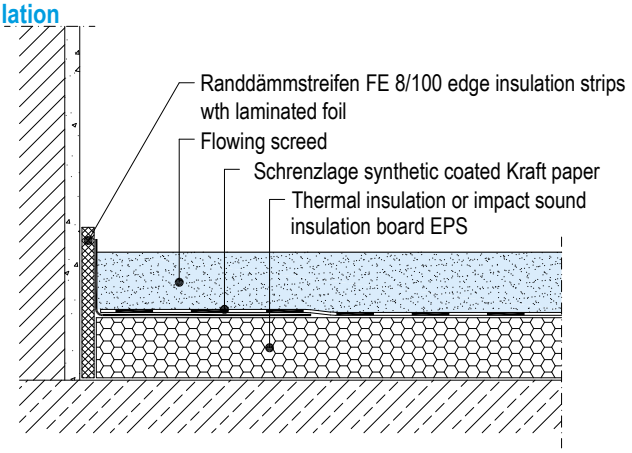
F231.de-V101 Substrate equalization with levelling mortar



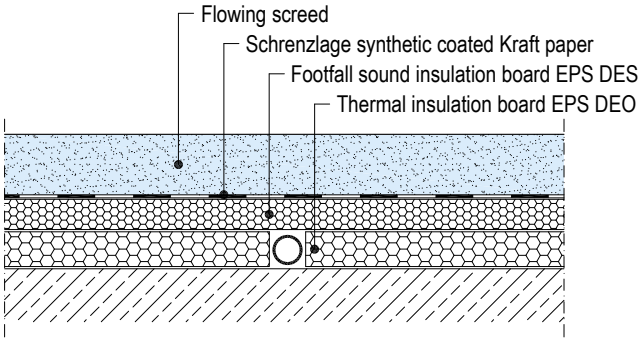
F231.de-V104 Flowing screed on mineral wool insulation



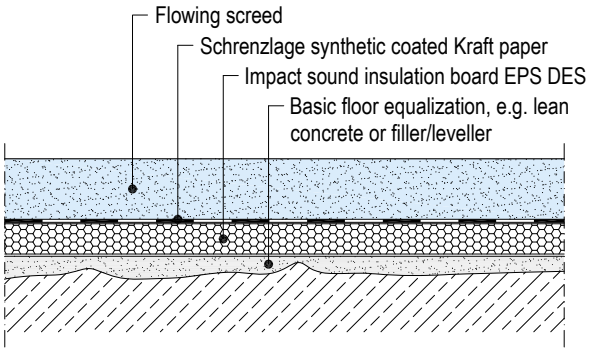
F231.de-V105 Flowing screed on thermal or footfall sound insulation



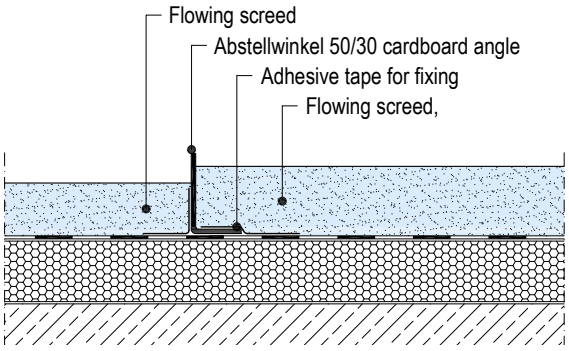
F231.de-V102 Basic floor equalization with EPS DEO



F231.de-V103 Substrate equalization with lean concrete or filling compound



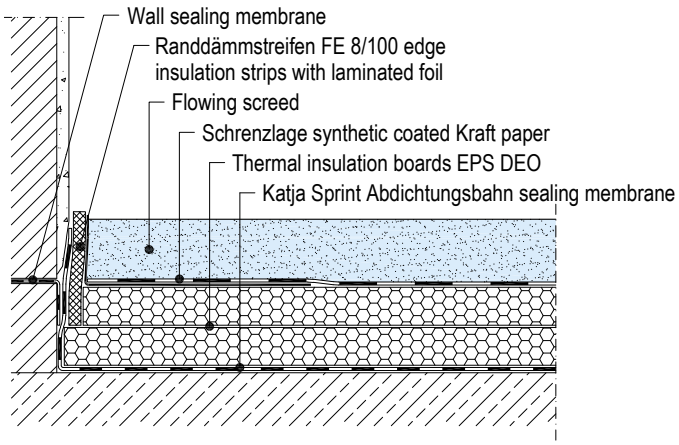
F231.de-V106 Edging with height offset



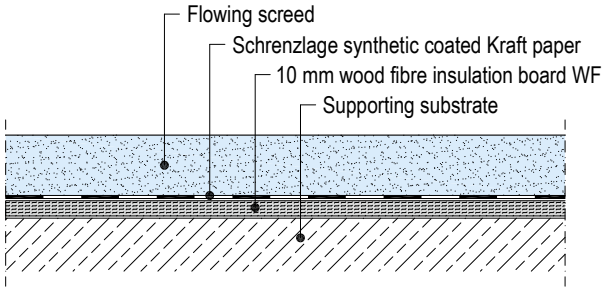
Details

Scale 1:5 I Dimensions in mm

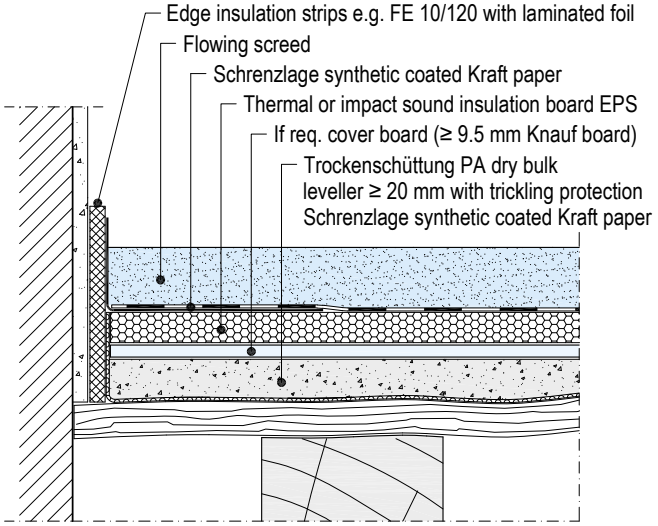
F231.de-V107 Flowing screed on areas contacting the soil



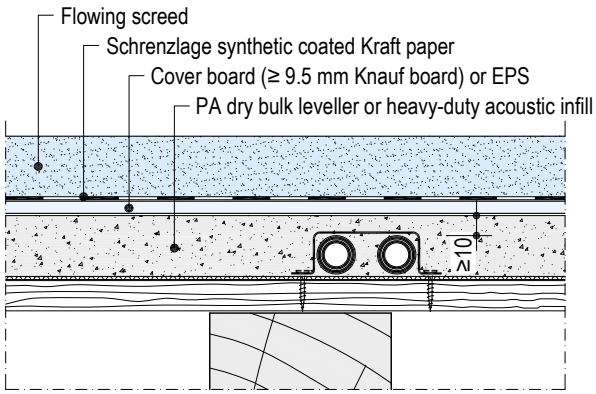
F231.de-V108 Flowing screed on Holzfaserdämmplatte WF



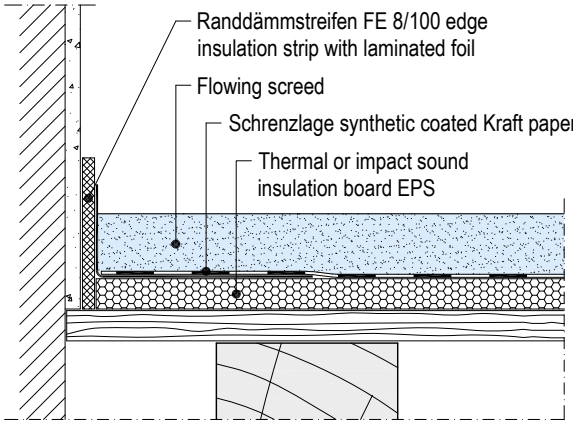
F231.de-V110 Flowing screed on thermal/footfall impact sound insulation with height equalization



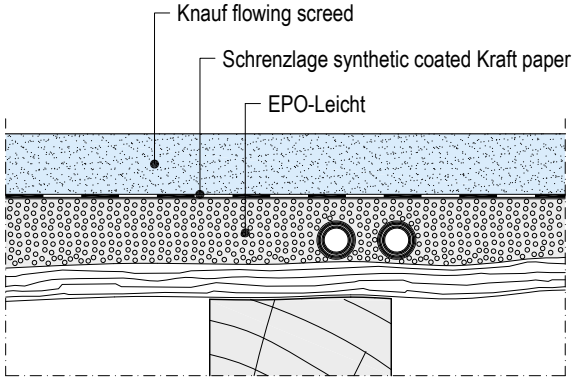
F231.de-V114 Floor equalization with bulk leveller



F231.de-V109 Flowing screed on thermal or footfall sound insulation



F231.de-V115 Floor equalization with EPO-Leicht



Construction designs

Heating elements of heated-water based underfloor heating in heating floor screed type A acc. to DIN 18560 and electrical cable heating

The heating elements are located on top of the insulation layer covering and kept in place on the insulation layer with staples or similar. They are fully embedded by the flowing screed when the screed is applied. They have direct contact with the screed.

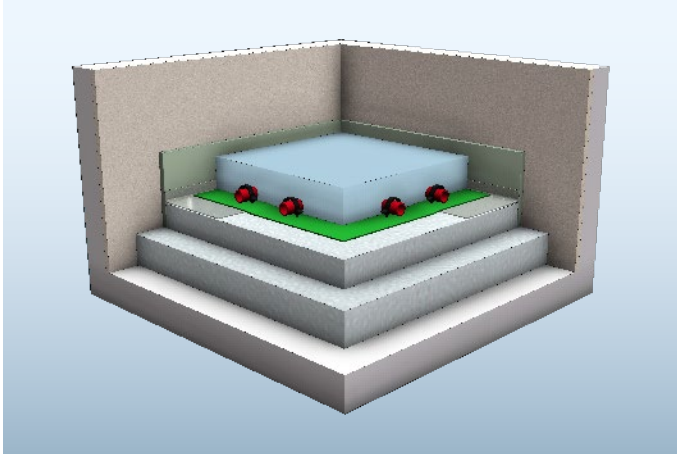


Figure 9: Type A to DIN 18560-2

Figure 10: Apply the heated screed

Note	Calcium sulphate based floor screeds can be heated up more quickly than conventional cementitious screeds, because of the higher thermal conductivity, the optimum contact with the heating tube and the low coverage depths of the tubes. This increases the level of comfort and reduces energy consumption.

Heating elements of heated-water based underfloor heating in heating floor screed type B acc. to DIN 18560 and electrical area heating

The heating elements are located underneath the insulation layer covering (separation layer). The heating tubes are located in the notches provided on the top side of the insulation layer. Area heating elements are also isolated from the screed by a separating layer.

Note	As the screed area must have an almost even substrate, recesses or elevations, such as those where pipes bulge at the turning point should be avoided.

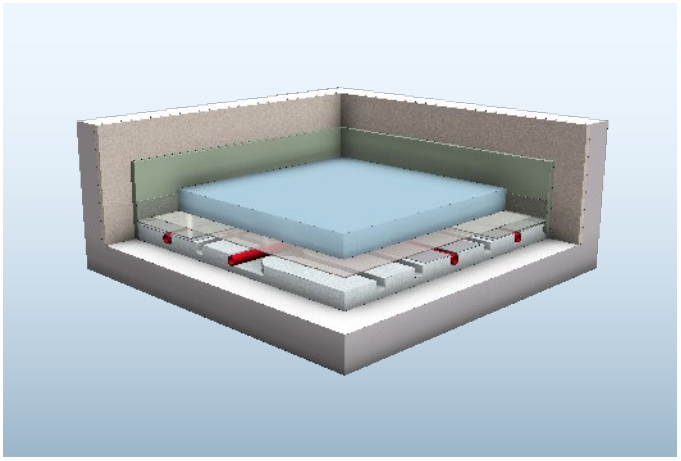


Figure 11: Type B to DIN 18560-2

Development of the surface temperature on screed samples

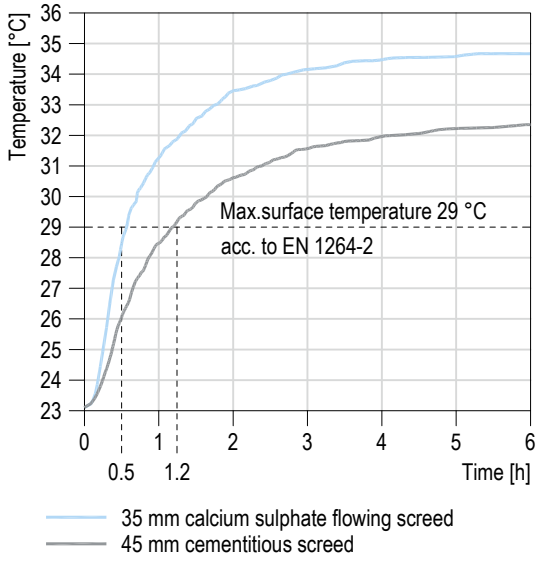


Figure 12: Double heating-up speed with calcium sulphate flowing screeds!

Source: MPA Stuttgart, Examination of the control flexibility of heating floor screeds, September 2008

Construction and application

A heating floor screed is a heatable screed that is generally applied on an insulating layer. It must normally fulfill all demands made on a screed by the insulating layer such as impact noise and thermal insulation as well as stability. Furthermore, the further utilization of the heating screed (used for transferring heat and for heat storage) must consider special characteristics of the construction during installation and in regular usage.
The underfloor heating is embedded in the heating floor screed or under it with a heat conducting plate (tubing systems, plate-shaped elements, electrical resistance cabling).

Heating floor screed, in contrast to normal heating bodies, has a large heating surface that extends over the entire floor layout. As a direct result, the heating can be operated with a low flow temperature. Furthermore, the room air can generally be 2 K lower than rooms heated with convection radiators without any loss of comfort, because of the uniform heating of the room.

Benefits include:

- A more pleasant room climate
- Lower energy consumption

Flowing screeds offer particular advantages for installation on the basis of K-Sentials flowing screed compounds

- High thermal conductivity
- Good encasing of the tube and thus the best thermal conductivity with wet application
- Low screed nominal screed thickness (tube coverage 35 mm for residential buildings)
- Short heating up times (see diagram)
- Heating until dry is possible 3 or 7 days after pouring the screed

Planning of the heating floor screed

The basic rules similar to screed on an insulating layer apply with the construction and application.

Observe the special considerations:
Insulation layers with high dynamic stiffness (e.g. polystyrene EPS DEO; extruded polystyrene foam XPS) are preferred; the compressibility of the insulation layer may not exceed 5 mm. If the insulation boards have an aluminium coating, this must be protected with a foil or a further coating against direct contact with the screed mortar, as a chemical reaction will otherwise occur between the aluminium and the alkaline water of the screed mortar.

- The determining nominal screed thickness is the thickness measurement over the highest point of the heating system (e.g. from the upper edge of the heating tube). The nominal thickness is 35 mm.
- A reinforcement (e.g. steel grid) is not required.
- The largest thermally related changes in length of the heating floor screed caused by temperature differences must be considered during the usage conditions with the design of the joints (see “Joint application” on page 39 ff).
- The arrangement of the movement joints in accordance with Code of Practice no. 5 (IGE/VDPM “Joints in flowing calcium sulphate screeds” is recommended.

Tubing routing with warm water underfloor heating

In order to guarantee uniform heating of the screed slab, a helical application of the tubing has proven to be prudent. A meandering shaped application can cause cracks in the screed under unfavourable conditions in the heating up phase or with quick and large changes in temperature.

Routing a cable using unprotected metal pipes in flowing screed is not recommended in flowing screed.

Application of the screed layer

For installation of screed of type A (warm water underfloor heating), the heating tubes must be at operating pressure. If there is a danger of frost, the heating can be operated at the low flow temperature (max. 20 °C). Application of the screed in a single work step is preferred.

According to EN 1264-4, the planned position of the heating tubes must be horizontally and vertically secured.

If this is not the case, with type A and with electrical cable heating, application of the screed is recommended in two stages.

Double-layer installation

- First of all the initial pour is introduced up to about 2/3 of the heating tube or cable height. The pipes or cables may not float on the screed and it should be prevented if this possibility exists.
- After the initial pour is hard enough to be walked on the subsequent covering pour is undertaken.

If you wait with the application of the covering pour for longer than stated above, the initial pour must be wetted before the covering layer is applied to avoid suction related problems. If the waiting time requires several days, it is recommended that the initial pour is heated until dry and then primed.

The covering pour is then applied as a bonded screed on a dry substrate.

Measurement points

In order to avoid damaging a tube when removing a sample to determine the residual humidity at a later date, measurement points must be marked before the screed is applied.

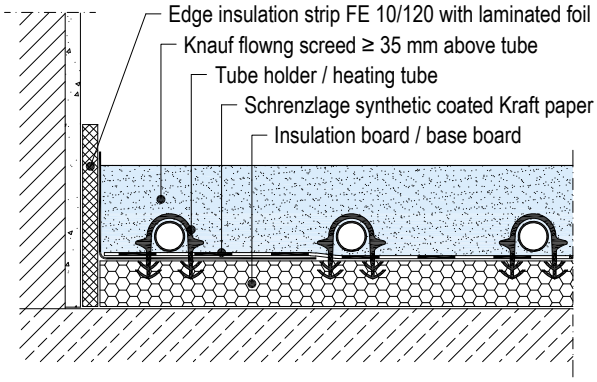
A heating floor screed must always be heated up and dried before the covering is applied. The procedure is described on “Heating of heating floor screed until dry” on page 48 ff.

Details

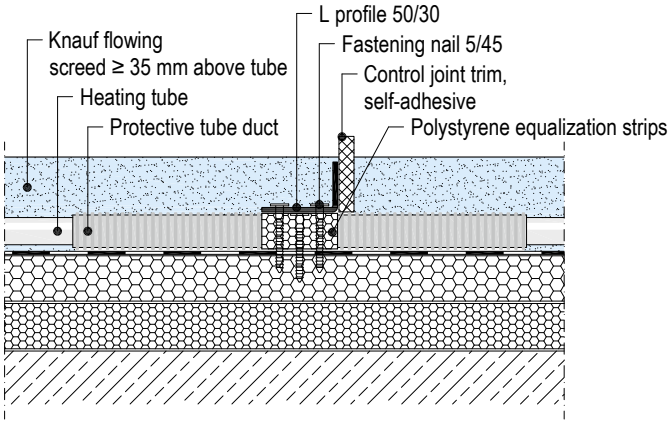
Scale 1:5

F233.de Heating floor screed type A

F233.de-V101 Perimeter application on a solid ceiling

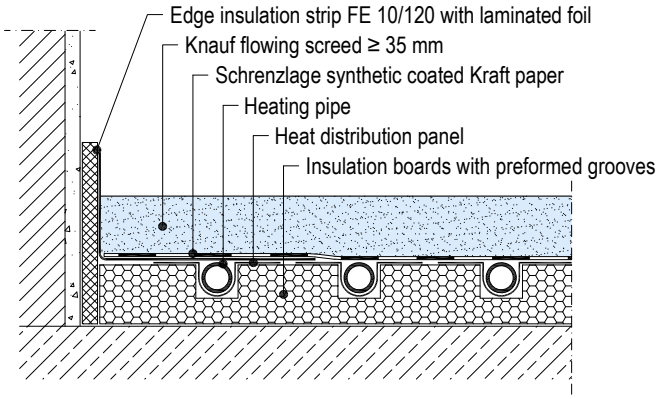


F233.de-V102 Joint application on solid ceiling

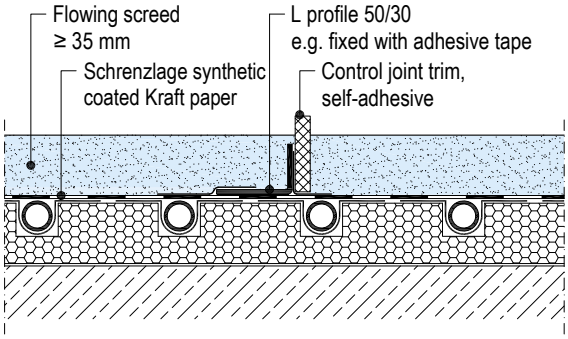


F234.de Heating floor screed type B

F234.de-V101 Perimeter application on a solid ceiling



F234.de-V102 Joint application on solid ceiling



Flowing screed system raised access floor

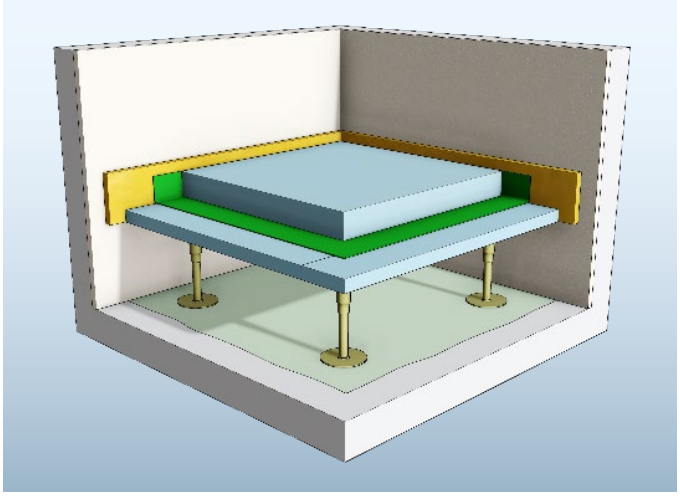


Figure 13: Raised access floor design

Design and construction

The hollow floor is a floor construction forming a cavity between the basic floor and screed layer intended for installations (cables, tubes).
The cavity and the corresponding access panels in the screed construction facilitate very flexible changes in usage, even when required much later in the usage phase.

Raised access floors are used often in office and administration buildings. They are also used frequently in data centres, schools and research facilities as well as in workshops and manufacturing areas. They can support high point loads and linear distributed loads.

Demands and requirements in terms of noise, heat and fire protection can be implemented with the corresponding variants. It is also possible to ventilate, heat or cool the building using the hollow partial access floor space.

Flowing screeds are self-sealing and accordingly feature a uniform, high-level of flexural strength. This is particularly important for a screed slab placed on supports, as flowing screed on a calcium sulphate basis is used almost exclusively for the manufacture of hollow or cavity floors.

Flowing screeds can be applied to large hollow partial access floor areas without joints (with the exception of structural joints). They can be walked on and loaded very quickly facilitating quick progress during a building phase.

They dry very quickly because of the low layer thickness. The surface can be covered with all conventional coverings.

All hollow floor requirements across Europe are defined in the DIN EN 13213.

Note	Further information on hollow partial-access floors can be found in the Codes of Practice as well as the "Anwendungsrichtlinien zur DIN EN 13213 Hohlböden" issued by the German Bundesverband Systemböden e. V.

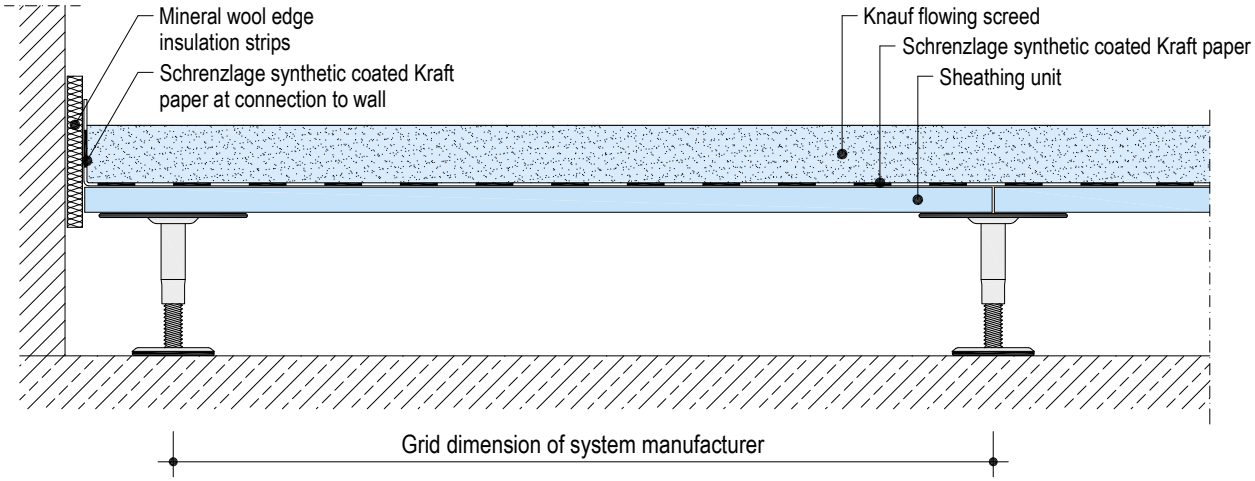
Figure 14: Installation of pedestals and sheathing units

Figure 15: Installation of flowing screed on the prepared raised access floor construction

Figure 16: Completed screed surface as raised access floor with floor duct

Details

F222.de-V104 Raised access floors with metal pedestal supports



Loading classification in acc. to EN 13213

Table 12: Load application via indentor 25 x 25 mm

Load class	Failure load kN	Point load (v = 2.0)[1] kN	Application examples / usage categories
1	> 4.0	2.0	Offices with low frequency of usage
2	> 6.0	3.0	Standard office areas
3	> 8.0	4.0	Office areas with increased static loads, auditoria, training and lecture halls, treatment rooms
5	> 10.0	5.0	Industrial flooring surfaces for light-duty operation, storage rooms, workshops with light-duty usage
6	> 12.0	6.0[2]	Floors intended for operation of industrial trucks, industrial and workshop floors

1) The value for the point load results from the failure load divided by the safety factor v = 2,0.

2) For raised access floors of element class 6 with the higher usage related demands specified in individual cases, further load classes (≥ 6.0 kN) must be defined accordingly.

Note	For a particularly fast construction, the Knauf GIFAfloor FHB flooring system is used. Here high-strength gypsum fibre elements on a base substrate are mounted directly on support elements and glued together. Dry applied hollow flooring can be covered already on the following day. See also knauf-integral.de

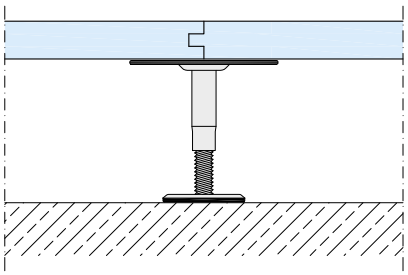


Figure 17: GIFAfloor support

Special notes

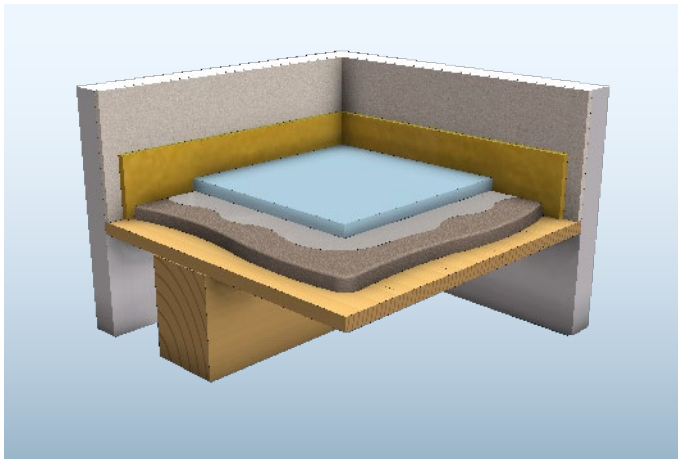


Figure 18: Screed on wood joist ceiling with Knauf EPO-Leicht

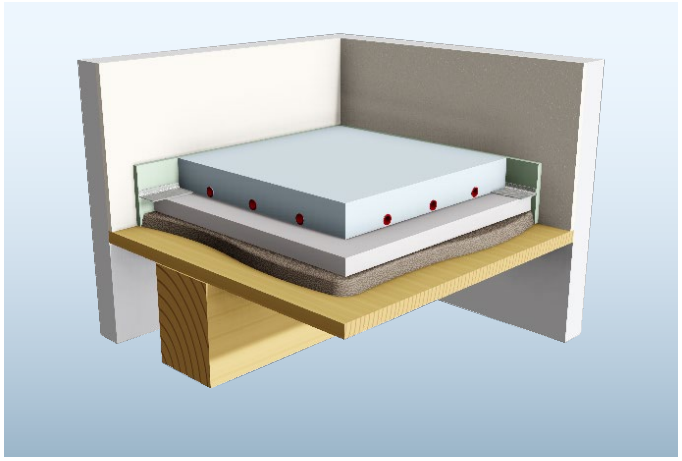


Figure 19: Screed on wood joist ceiling with underfloor heating

Note	If the loading of the ceiling or the installation height of the screed construction is so limited, so that a conventional screed construction cannot be used, the Knauf Fertigteilestrich Brio (pre-fab floor screed) is an ideal solution: Supporting layer thickness from 18 mm, area weight from 23 kg/m² (see system data sheet Knauf Pre-fab Floor Screed F12.de).

Flowing screeds can be applied as a floating screed on wood joist ceilings or as a screed on a separating layer. For these ceilings, the substrate is generally a wooden plank floor. The ceiling deflection due to live loads and self-weight including the additional load due to the screed (approx. 70 kg/m²) may not exceed 1/300 of the span width.

Renovation

If, for example, in the renovation area, the planking above the beams is to be eliminated, the dead floor must be fully capable of supporting the loads from the self-weight of the floor and the imposed loads in the area between the beams. The filling between the beams may not be compressed due to the loads. Above the beam layer and the filling, a layer with a pliable insulating layer at least 8 mm thick must be provided. For filling purposes between the beams and for levelling of sloping surfaces, the light levelling mortar Knauf EPO-Leicht is the ideal solution. It can be walked on after 24 hours and does not contain any moisture. It features a very low weight and good heat insulation properties.

Configuration

In order to avoid accumulation of moisture in the ceiling, no vapour barrier or foil should be applied on the wood joist ceiling. Knauf Schrenzlage can be used as a separating layer. If a vapour barrier is necessary, for example, because high levels of moisture can be found in the lower area, it should be applied underneath the wood joist ceiling.

Impact noise insulation materials are used to improve the impact noise protection on floating screeds.

Application

Overview of the necessary steps

Table 13: Overview of the necessary steps for screed constructions in dependence on the substrate

Application	Substrate Concrete	Old screed	Wooden floorboards	Tiles or natural stone	Mixed substrates
Bonded screed					
Preparation	Clean the substrate, remove crumbling layers (brushing / shot-blasting / keying)	Clean the substrate, remove crumbling layers	Clean the substrate, determine the loose floorboards	Clean the substrate, remove the loose parts	Clean the substrate, remove the loose parts
Substrate pre-treatment:	Flowing screeds on the basis of K-Sentials flowing screed compounds and Knauf N 340: Knauf Estrichgrund (diluted 1:1 with water) or Knauf Schnellgrund (undiluted) Knauf N 440: 2x Knauf Estrichgrund (diluted 1:1 with water) or 1x Knauf Schnellgrund (undiluted)		Seal the joints (Knauf Acryl), Knauf Spezialhaftgrund floor dispersion primer (diluted 1:1 with water)	Flowing screeds on the basis of K-Sentials flowing screed compounds, Knauf N 440, Knauf N 340: 1x Knauf FE-Imprägnierung interspersed with silica sand	Flowing screeds on the basis of K-Sentials flowing screed compounds, Knauf N 440, Knauf N 340: 2x Knauf FE-Imprägnierung interspersed with silica sand
Sealing (if required)	Knauf FE-Abdichtung sealing shield	Knauf FE-Abdichtung sealing shield	–	Knauf FE-Abdichtung sealing shield	Knauf FE-Abdichtung sealing shield
Flowing screed nominal thickness	≥ 25 mm	≥ 25 mm	–	≥ 25 mm	≥ 25 mm
Screed laid on a separating layer					
Preparation	Clean the substrate	Clean the substrate	Clean the substrate	Clean the substrate	Clean the substrate
Equalization layer (if required)	Knauf Estrichgrund (diluted 1:1 with water) or Knauf Schnellgrund (undiluted) Knauf N 320 Sprint / Knauf N 340	Knauf Estrichgrund (diluted 1:1 with water) or Knauf Schnellgrund (undiluted) Knauf N 320 Sprint / Knauf N 340	–	Knauf Estrichgrund (diluted 1:1 with water) or Knauf Schnellgrund (undiluted) Knauf N 320 Sprint / Knauf N 340	Knauf Estrichgrund (diluted 1:1 with water) or Knauf Schnellgrund (undiluted) Knauf N 320 Sprint / Knauf N 340
Sealing (if required)	Knauf Katja Sprint sealing membrane	Knauf Katja Sprint sealing membrane	–	Knauf Katja Sprint sealing membrane	Knauf Katja Sprint sealing membrane
Separating layer	Knauf Schrenzlage	Knauf Schrenzlage	Knauf Schrenzlage	Knauf Schrenzlage	Knauf Schrenzlage
Flowing screed nominal thickness	≥ 30 mm	≥ 30 mm	≥ 30 mm	≥ 30 mm	≥ 30 mm
Screed on insulation layer, heating floor screed type A or B					
Preparation	Clean the substrate	Clean the substrate	Clean the substrate	Clean the substrate	Clean the substrate
Sealing (if required)	Knauf Katja Sprint sealing membrane	Knauf Katja Sprint sealing membrane	–	Knauf Katja Sprint sealing membrane	Knauf Katja Sprint sealing membrane
Equalization layer (if required)	Knauf EPO-Leicht, S 400 Sprint, Knauf heavy-duty acoustic infill + cover or Knauf Trockenschüttung PA dry bulk leveller + cover board	–	Knauf EPO-Leicht, S 400 Sprint, Knauf heavy-duty acoustic infill + cover or Knauf Trockenschüttung PA dry bulk leveller + cover board	–	–
Insulation layer	If required	If required	If required	If required	If required
Underfloor heating	If required	If required	If required	If required	If required
Insulation layer covering	Knauf Schrenzlage + possible cover board	Knauf Schrenzlage + possible cover board	Knauf Schrenzlage + possible cover board	Knauf Schrenzlage + possible cover board	Knauf Schrenzlage + possible cover board
Flowing screed nominal thickness (with heated screed type A: thickness above heating elements)	≥ 35 mm	≥ 35 mm	≥ 35 mm	≥ 35 mm	≥ 35 mm

Preparation

Substrate examination

One of the most important preparation stages for the screed applier is the examination of the substrate to determine the suitability for the application of screed. When suitable, the substrate must be prepared in accordance with the requirements.

The DIN 18202 must be used to evaluate unevenness. Values for unevenness tolerances for the application substrate, see Table 14 (DIN 18202, table 3, line 2a).

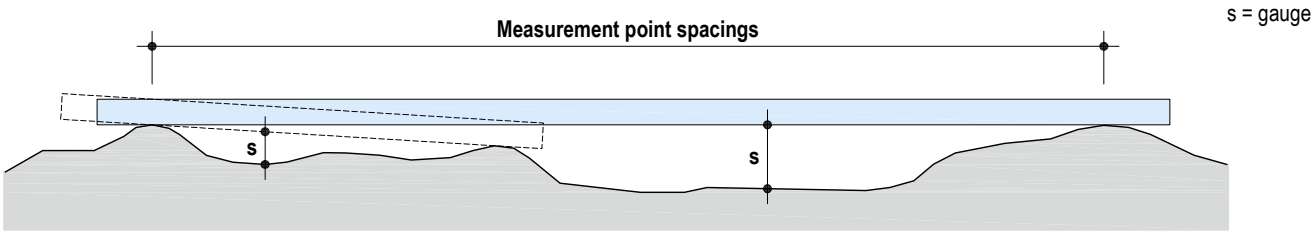
Furthermore, the substrate must be examined for the following defects and they must be repaired if found

- Cracks in the substrate
- Insufficient substrate stability (e.g. with bonded screed)
- Substrate with blooming and efflorescence
- Heavily soiled substrate
- Frozen substrate
- Substrate too damp
- Non-aligned or unsuitable joints in the substrate
- Missing or defective seals
- Existing pipes on the substrate
- Heating circuits not matched to the arrangement of the movement joints
- Missing or insufficient plaster connections to flanking walls
- Missing height reference point
- Unsuitable application climate (temperature, humidity)
- Non-closed door and window openings
- Insufficient ventilation after screed application (drying endangered)
- Insufficient protection devices in accordance with the regulations of the German building trade association

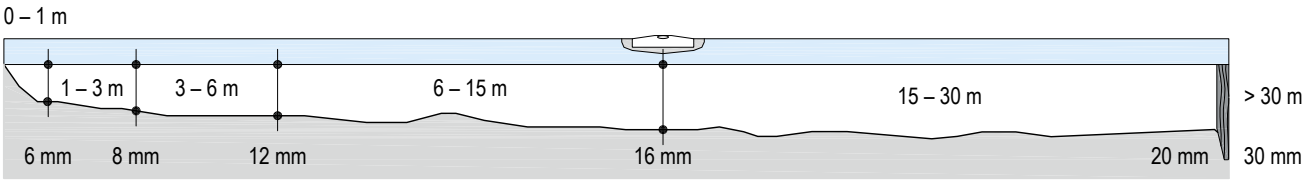
Table 14: Permissible evenness tolerances of basic floors for application of screeds to DIN 18202

Spacing of the measurement points	**Permissible evenness tolerances** (inside micrometer)
Up to 0.1 m	5 mm
Up to 1.0 m	8 mm
Up to 4.0 m	12 mm
Up to 10.0 m	15 mm
Up to 15.0 m	20 mm

Evenness



Angular tolerances



Substrate preparation

An overview of the necessary work stages for preparation of the substrate before screed application is provided Table 15 in dependence on the selected screed construction.

To be assured with all screed variants

- Functioning seals with ground moisture (Knauf Katja Sprint Abdichtungsbahn sealing membrane or FE-Abdichtung sealing shield with bonded screed)
- Possible vapour barrier in multi-storey building, particularly with vapour-proof floor coverings

Screed on fresh concrete covers

On freshly applied concrete covers, the application of a steam barrier or brake is recommended if the use of moisture-sensitive coverings (e.g. parquet) is intended. This should prevent that the residual moisture from the concrete cover rises and damages the covering. In practice, a PE foil (0.2 mm) double layer is generally used as a moisture barrier. With large area, seamless screed application (e.g. on hollow partial-acess floors) on newly applied concrete covers, it may be necessary that the subsequent shrinkage of the concrete cover is considered with the provision of wide edge joints or movement joints in the screed and covering during the planning stage.

Insulation layers

With screed on an insulation layer, any possible faults in the insulation layer covering must be sealed off to prevent the material or water from passing through (e.g. impacts in the edge insulation strips, film of the edge insulation strip on the protruding corners, worn Schrenzlage synthetic coated kraft paper). Spreading drying material on unsealed locations as an alternative must be avoided, to exclude faults in the screed slab, which can act as frangible joints causing cracks later on.

Metal parts made of aluminium

Metal parts made of aluminium must be masked off or covered as they will be affected by the flowing screed mortar.

Figure 20: Cleaning with an industrial vacuum cleaner

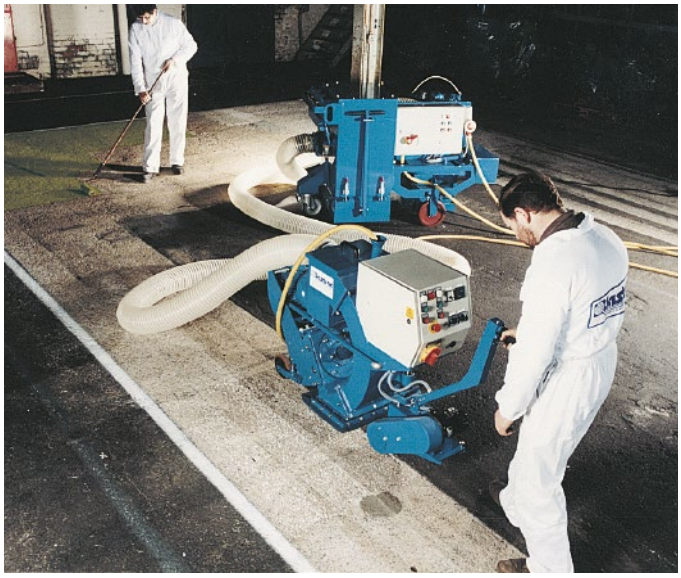


Figure 21: Shot-blasting of the concrete surface to accept a bonded screed

Table 15: Substrate preparation

		Bonded screed	Screed laid on a separating layer	Hollow raised access floors	Screed on an insulating layer / heating floor screed	Screed on wood joist ceilings
Check the substrate		●	●	●	●	●
alternative	Sanding	●	–	–	–	–
	Shot-blasting	●	–	–	–	–
	Grinding	●	–	–	–	–
Clean with an industrial vacuum cleaner		●	●	●	●	–
Fill holes and cracks		–	●	–	–	–
Fill joints		–	–	–	–	●

Knauf Randdämmstreifen edge insulation strip

Figure 22: Apply Knauf edge insulation strips with foil (also on pipes, radiators, etc.). Do not staple at screed height.

Figure 23: Application of Knauf mineral wool edge insulation strips with fire protection requirements

Knauf Randdämmstreifen FE edge insulation strips and Knauf mineral wool edge insulation strips

Randdämmstreifen edge insulation strips are, with the exception of bonded screed, attached to all rising constructional components, to avoid sound bridges and contacts that can impair the insulation properties.

Knauf Randdämmstreifen edge insulation strips FE 8/100

Stable edge strips made of special PE foam with laminated foil strips. Very easy to apply, particularly in inside corners. Installation considering the planned screed height using staples (also on pipes, radiators, etc.). Do not staple at screed height.

Knauf Randdämmstreifen edge insulation strips FE 10/120

Edge strips with insulating properties made of polyethylene foam with laminated foil strips, self-adhesive on the rear for fast and simple attachment. The upper section has slots to ensure ease of separation.

Knauf mineral wool edge insulation strips

For use with screed constructions where fire resistance class requirements apply.

Application

Mark the completed height of the screed on all rising constructional components and fix the Knauf edge insulation strips with upper edge at least 5 mm higher than the completed height using staples (Knauf Edge Insulation Strips FE 8/100 and Knauf mineral wool edge insulation strips) or glue (Knauf Edge Insulation Strips FE 10/120) them instead. The edge strips must protrude over the upper edge of the screed, at least up to the surface of the covering. Ensure that there are no gaps. If required, arrange two strips above one another. Slide the edge insulation strips Knauf FE Dämmung under the foil of the edge insulation strip and loosen the foil by pulling the edge insulation strip smooth and lay it on the insulation. In the area connecting to the wall, apply Knauf Schrenzlage synthetic coated kraft paper on the foil of the edge insulation strip (do not allow to stand up on the edge), then pour the flowing screed. With Knauf mineral wool edge insulation strips, pull up the separating layer or foil on the edge. Ensure that no hollows can be created.

With several insulation material layers, apply the edge insulation strips with the uppermost insulation layer.

Caution	Only remove the protruding part of the edge insulation strip (in acc. with DIN 18560-2) after the floor covering is applied.

Note	Knauf Randdämmstreifen edge insulation strips FE 10/120 In order to guarantee the self-adhesive properties, pay particular attention to ■ Dust-free substrates ■ Push on sufficiently firmly ■ Store in dry rooms with a normal temperature range

Note	See also product data sheet K436a.de Edge insulation strips FE

Import information for application of the insulation layer

Application

- Apply the insulation materials joint on joint and apply as an entire layer. Avoid cavities. Insulation material type and thickness are dependent on the function of the screed. Insulation materials must comply with the valid standards (EN 13162 - EN 13171).
- It is recommended that you do not install footfall sound insulation panels in several layers, as it will not significantly improve the noise insulating effect, but will reduce the stability of the screed construction. (Addition of the compressibility).
- When applying EPS insulation layers on Knauf Trockenschüttung PA dry bulk leveller or Knauf Schwere Schüttung heavy-duty acoustic infill, application of a load distribution board, e.g. Knauf gypsum board 9.5 mm, is recommended. When applying Knauf mineral wool insulation layer or underfloor heating, this covering is required.
- If there is a danger that residual moisture from a freshly applied concrete cover or levelling mortar may rise, the application of a PE foil as a vapour retarder is recommended for use underneath the mineral wool when Knauf mineral wool insulation layers are applied.
- Pull out the foil from the Knauf edge insulation strip onto the insulation.
- Cover the insulation layer and foil of the Knauf edge insulation strip with Knauf Schrenzlage synthetic coated kraft paper with an overlap of ≥ 8 cm.
- In order to avoid *seeping through* the Knauf Schrenzlage synthetic coated kraft paper (screed will flow through a damaged Knauf Schrenzlage synthetic coated kraft paper onto the insulation layer and will impair the impact sound insulation), a compressibility of the insulation layer of c > 3 mm is recommended, e.g. mineral wool CP 5, as well as the application of a load distribution board on the insulating layer, e.g. Knauf gypsum board 9.5 mm.
- If the Knauf Schrenzlage synthetic coated kraft paper is applied directly on the impact sound insulation, it is useful to glue or seal the joint of the Knauf Schrenzlage synthetic coated kraft paper to exclude mortar from getting underneath it.

It is essential to pay particular attention in preparing the substrate in order to guarantee a functional, error-free screed construction. Incorrect applications can lead to reduced impact noise insulation on the screed insulation layer and cause cracks in the screed.

In the images shown on the opposite page, you will see the correct application compared to the most frequent errors made in practice.

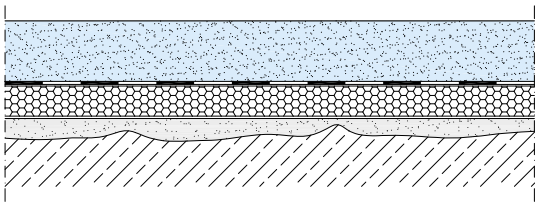
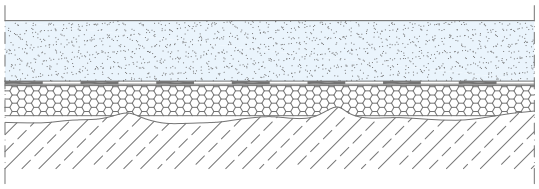
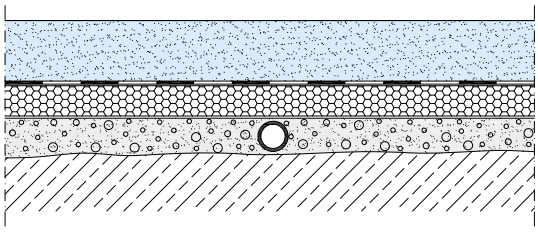
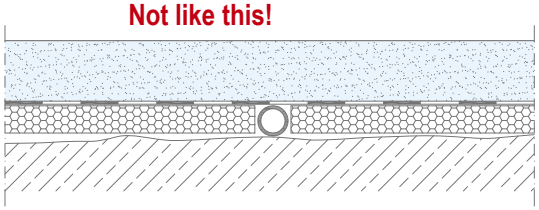
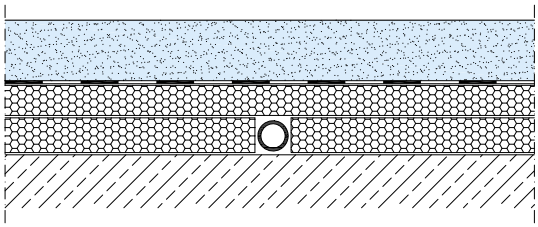
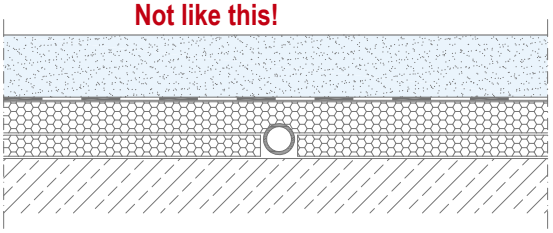
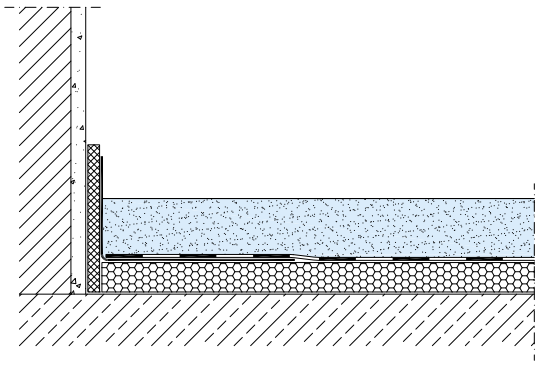
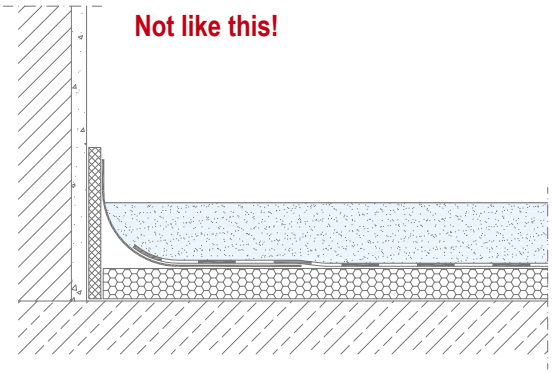
Figure 24: EPS insulation

Slide EPS insulation underneath the foil of the edge insulation strip and apply row by row.

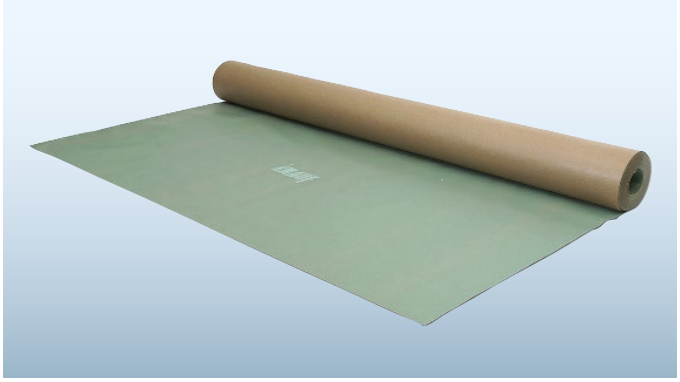
Figure 25: Mineral wool insulation

Apply the mineral wool insulation directly against the edge insulation strips and apply row for row.

Application comparison

Correct application	Incorrect application
Substrate equalization with large levels of unevenness	Equalization absent, impact noise insulation not fully effective
	Not like this! 
Substrate equalization up to top of pipe	Impact noise insulation interrupted, screed - substrate contact
	Not like this! 
Full surface application of impact noise insulation	Weakened impact noise insulation
	Not like this! 
Precise edge application, uniform screed thickness	Weakening of the screed in the edge area
	Not like this! 

Knauf Schrenzlage



Knauf Schrenzlage synthetic coated kraft paper is a premium quality soda kraft paper used for various applications. It is coated on both sides with polyethylene.

The following applications are possible

- As a covering on the insulation layer under flowing screeds or screeds that can be applied conventionally acc. to DIN 18560-2
- As a separating layer under screed on a separating layer acc. to DIN 18560-4
- As trickling protection for dry bulk leveller above wood joist ceilings
- As a separating layer on hollow partial access floor sheathing units under flowing screeds

Knauf Schrenzlage is not a seal or a vapour brake.

With its low s_d value it can also be applied to wood joist ceilings.

Application

Knauf Schrenzlage must be applied with an overlap of at least 80 mm on the joints. On the connection to the walls, it is applied to the installed foil strips of the edge insulation strip.

With screed on mineral wool layers with a compressibility exceeding 3 mm, it is recommended that a load distribution board is applied on the insulation layer, e.g. Knauf gypsum board, t = 9.5 mm. If the Knauf Schrenzlage synthetic coated kraft paper is applied directly on the impact sound insulation, it is useful to glue or seal the joint of the Knauf Schrenzlage synthetic coated kraft paper, to exclude mortar from getting underneath it.

If screed without an insulation layer is applied over a seal (e.g. Knauf Katja Sprint Abdichtungsbahn sealing membrane), apply the Knauf Schrenzlage synthetic coated kraft paper between the seal and screed.

Technical data

Description	Unit	Value
Weight per unit area	g/m²	approx. 100
Material thickness	µm	approx. 110 – 130
Consumption	m²/m²	approx. 1.07
Melting range/melting point	°C	80 – 120
Water vapour permeability	g/m²d	approx. 4.2
Diffusion resistance coefficient µ	–	approx. 77 000
Water vapour diffusion-equivalent air layer thickness s_d value	m	approx. 9

In the area connecting to the wall, apply Knauf Schrenzlage synthetic coated kraft paper on the foil of the Knauf edge insulation strip (do not allow to stand up at the edge).

Figure 26: Connection to wall

A Application direction of the Knauf Schrenzlage synthetic coated kraft paper

B Pouring direction of the flowing screed towards the Knauf Schrenzlage synthetic coated kraft paper overlap

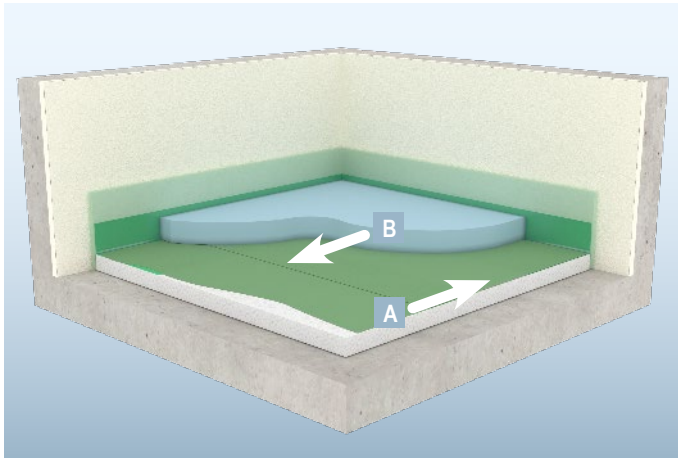
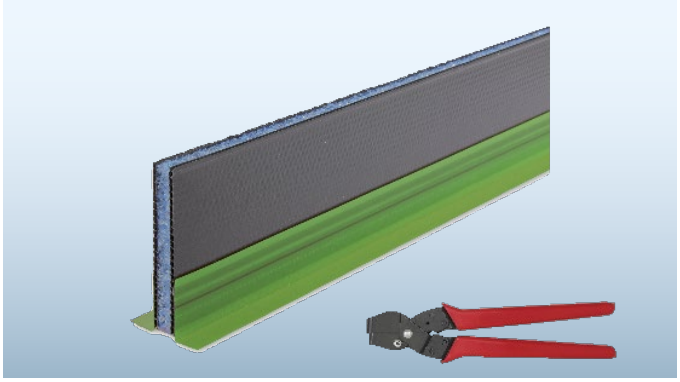


Figure 27: Application direction of Knauf Schrenzlage and pouring direction of flowing screed

Note	See also product data sheet Knauf Schrenzlage K438.de

Joint application



Knauf movement joint 12/80 for use with heated floor screeds at doorways. Matching tool: Ausklinkzange notching pliers for punching holes in the movement joint.

Fundamentals

Flowing screeds are very space neutral in comparison with cementitious screeds and they can be used across large areas without the need for joints.

As heating floor screeds, flowing screeds are subjected to changes in length resulting from temperature changes. For this reason, joints may be necessary in heated screeds.

This may also affect unheated screeds, if they for example, are subjected to large changes in temperature due to the action of direct sunshine (also refer to Code of Practice No. 5 of the IGE/VDPM).

Dummy joints in flowing screeds may be useful, if large screed areas (edge length > 25 m), remain open over extended periods and can dry out to a very low level of residual moisture. The application of dummy joints can act against the uncontrolled formation of cracks.

The screed slab should be cut into about half the screed thickness for this purpose. Dummy joints should generally be sealed with a frictional bond before the covering is applied (resin application, see “Surface preparation” on page 58).

Note	Knauf offers constructional solutions for implementing movement joints, where very precise joints are possible.

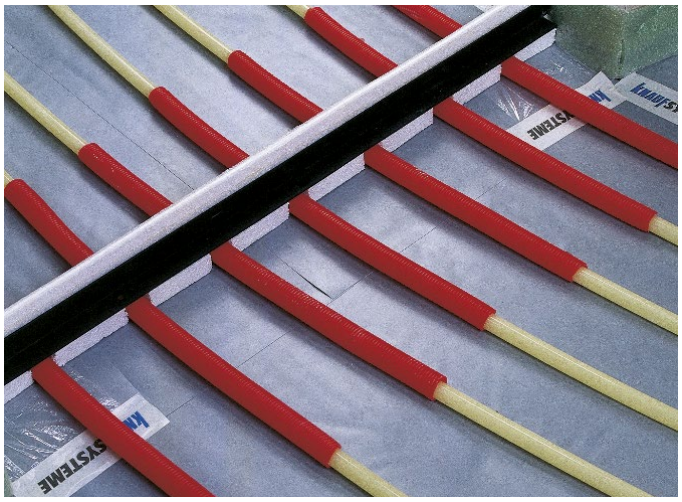


Figure 28: Movement joint in a heating floor screed, type A on door passageways

Note	See also the technical information Bo16.de Knauf movement joints for flowing screed and technical information K431F.de Knauf Movement joint 12/80

Joint types acc. to DIN 18560-2

In the DIN 18560-2 "Floor screeds in building construction", a differentiation is made between the following joint types:

Structural joints and movement joints

These are in the bearing substrate of the building and must be carried through all sulphate screed and in the floor covering at the same location and in the full width.

Structural joints

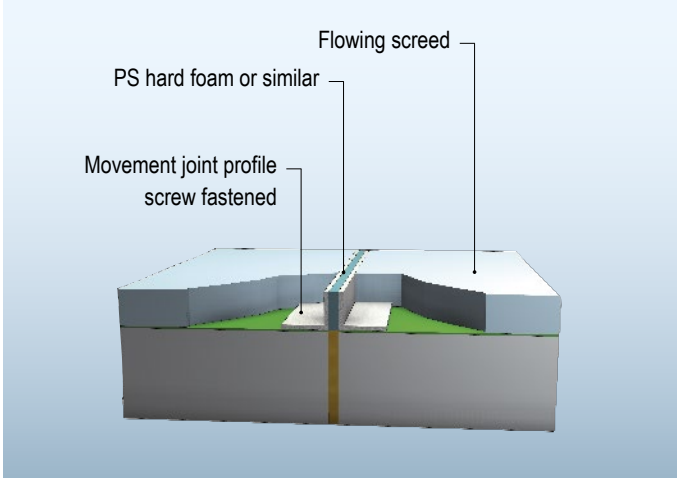


Figure 29: Structural joint (movement joint)

Movement joints

These joints must be applied to accept movements and deformation caused by shrinkage and temperature effects.

For the arrangement of movement joints there is Code of Practice No. 5 "Joints in flowing calcium sulphate screeds" (IGE/VDPM) providing detailed recommendations. Movement joints must encompass all building disciplines. A joint plan must be prepared to indicate the arrangement of the joints.

The joints shall be applied so that compact bays (ideally square) result. Joints have been particularly well proven in protruding areas, in large areas, in door areas and for separation of heated and unheated areas. Movement joints should not lead through heating circuits.

Non-expanding or working joints

Non-expanding joints result in the creation of adjacent bays, which are poured at different times. They are necessary when larger areas are not created in a single pour. On the non-expanding joint (technological joint), a hairline crack can result, which must be subsequently sealed with a frictional bond using epoxy resin.

Edge joints

They must be applied on all screeds on insulating layers and on separating layers on rising components (on pipework, console feet, door frames).

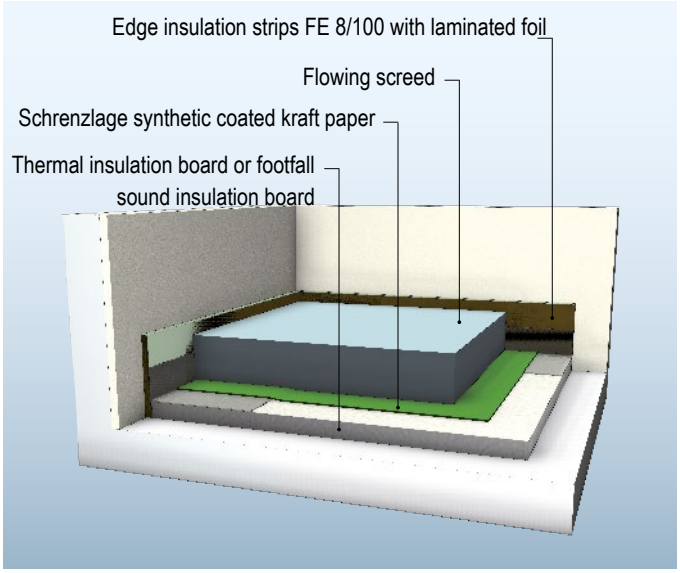


Figure 30: Edge joint

Dummy joints

They are required, especially with cementitious screeds, to facilitate shrinkage.

Stoppage joint

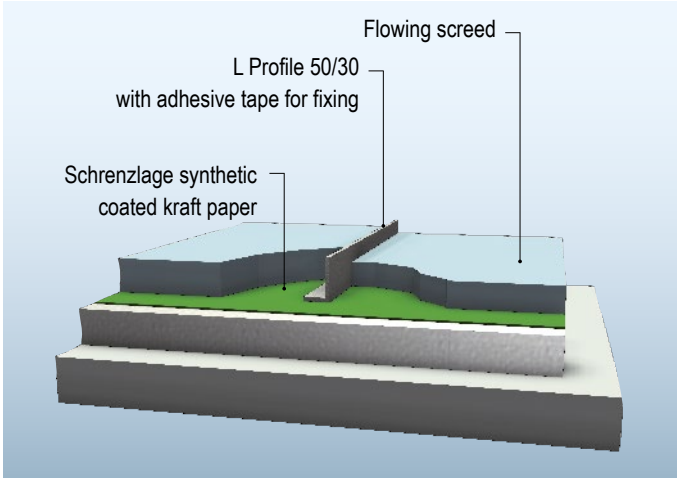


Figure 31: Stoppage joint with height offset

Joint application

L Profile

Proper joints can also be created with the L Profile 50/30 in conjunction with control joint trim 10/70.

The differing arm lengths of the profile and the Bewegungsfugenbands (control joint trims) facilitate individual joint solutions.
Design variants are shown in the images Figure 32 to Figure 35.
For particularly long, straight and stable joint design, a second profile can be glued to the other side of the Control Joint Trim.

Heating floor screed

If underfloor heating tubes pass through the movement joints, levelling up to the upper edge of the tube is required in the joint area, e.g. by the application of installation foam or polystyrene strips onto which the profile is placed and fixed.

In order to avoid a step between the screed slabs, it is recommended that you cut the protruding control joint trim to the height of the planned screed surface *window*.

Alternatively, leading pipes through movement joints even with Knauf Bewegungsfuge 12/80 (movement joint) is possible. The stable hollow cavity profile with PE foam features a self-adhesive base, facilitating simple attachment to the substrate.

In addition to the Knauf movement joint, the notching pliers is available. With this accessory, holes can simply be notched in the foot area of the movement joint.

Application

Cut off the Knauf movement joint to fit the door width. Notch holes in the Knauf movement joint foot area with the notching pliers suitable for the applied heating tubing. Subsequently remove the protective foil from the adhesive base and stick it to a clean and stable substrate, and seal the side connections to the Knauf edge insulation strips, e.g. with adhesive tape.

Examples for movement joints with heating floor screed, type A

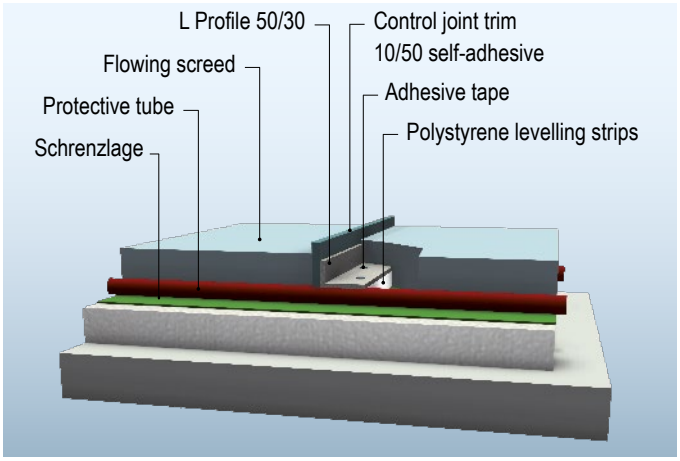


Figure 32: Application variant 1: Joints with L profile

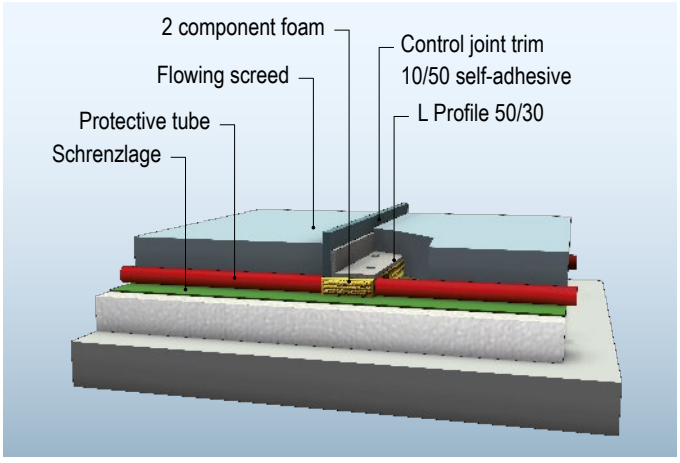


Figure 33: Application variant 2: Joints with L profile

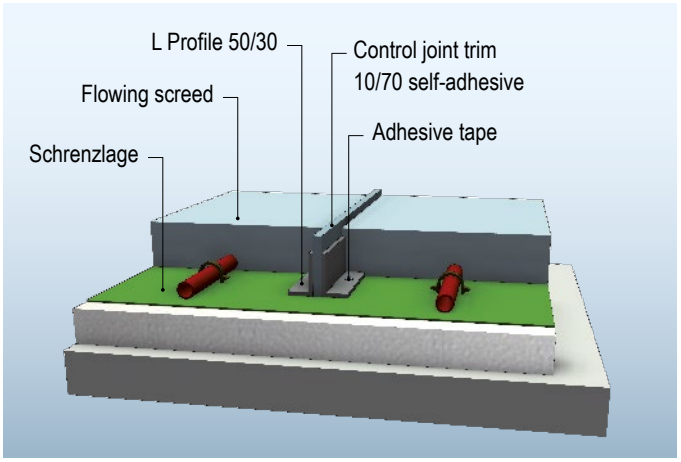


Figure 34: Application variant 3: Joints with L profile

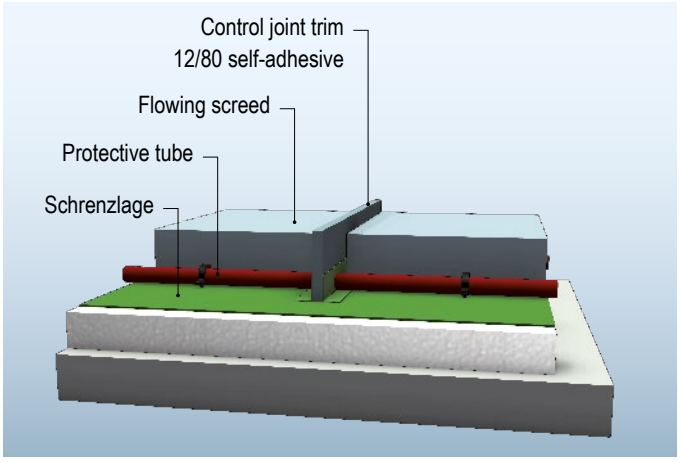


Figure 35: Application variant 4: Joints with L profile

Application of flowing screeds

Application temperature

The ambient temperature and the mortar temperature are decisive factors for professional application of flowing screeds.

With heated floor screeds, it is important to prevent water freezing in the heating tubes (antifreeze, heating at low temperature in operation).

Depending on the material, certain mortar application temperatures should not be - exceeded (Table 16 on page 44).

Flowing screeds with Durhydrit F plus, Durhydrit MW and Durhydrit M WoF should be protected for the first two days against drying too quickly due to draughts and radiated heat (strong sunlight in window areas - danger of crack formation).

Furthermore, general experience with flowing screed technology at external temperatures from approx. 35 °C has shown that even when correctly applied taking all precautionary measures, consequential damage cannot be ruled out.

Open time

The open time, i.e. the time in which the mortar is poured and distributed and worked with the brush or dappling bar is material dependent.

This open time must be considered when determining the size of the screed bays.

The open time may be slightly reduced at higher temperatures and with smaller screed thicknesses (evenness with bonded screeds, 20 mm).

Application consistence

The correct water quantity must be added to the mortar for professional screed application. Addition of excessive water leads to a surface of the hardened screed that is too soft and generally results in complaints from the contractor or the following trades (floor covering specialists). On the other hand, adding too little water does not negatively affect the quality of the screed, however, application and levelling is made more difficult and the required evenness may not be achievable.

Considering this aspect (assurance of the quality of the screed bay by avoidance of excessive water), the screed mortar should initially be set to a thick flowing mass (lowest limit of the slump flow) and when necessary more water can be added to set the *ideal consistence*. The slump flow is used as a method for setting the consistence. The slump flow is determined using a Hägermann funnel by placing the funnel on a glass plate filled with mortar and then lifting the funnel. The diameter of the spreading material is the slump flow. It is measured, at the earliest, 10 seconds after lifting the funnel. Reference values for slump flows of mixtures manufactures using standard sand, are specified in Table 16 on page 44. The values in this table are only orientation values (not strictly defined for application), as the ideal consistence depends on the aggregate (type, grading), age of the material, on the intensity of the mixing of the mortar (dependent on the machine technology used) and is also influenced by the screed thickness. The product-dependent, ideal slump from it therefore to be stipulated by the mixing plant.

Note	The application consistence of the mortar is determined by the water quantity added. The consistence should be set so that the mortar flows but no *watery slurry* separates when pouring.

Note	After coordination of trades with area heating and area cooling systems of the BVF in conjunction with heated screeds, the measurement points for CM measurement must be arranged.

Table 16: Orientation data for application

The following applies for a screed mix following EN 13454-2 consisting of 33 % K-Sentials flowing screed compound and 67 % standard sand (CEN standard sand DIN EN 196-1)

Compound	Mortar temperatures	Solidification time	Hägermann slump flow[1)]	Heatable after	Product data sheet knauf.de
Duralpha F 2003	5 – 32 °C	approx. 300 min	approx. 240 – 260 mm	3 days	IC015.de
Duralpha F 2201	5 – 32 °C	approx. 400 min	approx. 230 – 250 mm	3 days	IC016.de
Duralpha F 2202	5 – 32 °C	approx. 300 min	approx. 230 – 250 mm	3 days	IC017.de
Durhydrit F plus	5 – 25 °C	approx. 300 min	approx. 220 – 250 mm	7 days	IC021.de
Duralpha M 2011	5 – 40 °C	approx. 150 min	approx. 240 – 260 mm	3 days	IC007.de
Duralpha M 2015	5 – 40 °C	approx. 150 min	approx. 260 – 290 mm	3 days	IC011.de
Duralpha M 2211	5 – 40 °C	approx. 120 min	approx. 230 – 260 mm	3 days	IC012.de
Duralpha M 2215	5 – 40 °C	approx. 180 min	approx. 230 – 260 mm	3 days	IC029.de
Durhydrit M W	5 – 25 °C	approx. 150 min	approx. 220 – 250 mm	7 days	IC023.de
Durhydrit M WoF	5 – 25 °C	approx. 70 min (binder)	approx. 230– 240 mm when a suitable liquefier is added	7 days	IC019.de

1) With larger layer thicknesses the slump flow or the water quantity should be reduced if permitted by the levelling characteristics. The screed may not lose water during application.

Determination of the slump flow

Figure 36: Tools

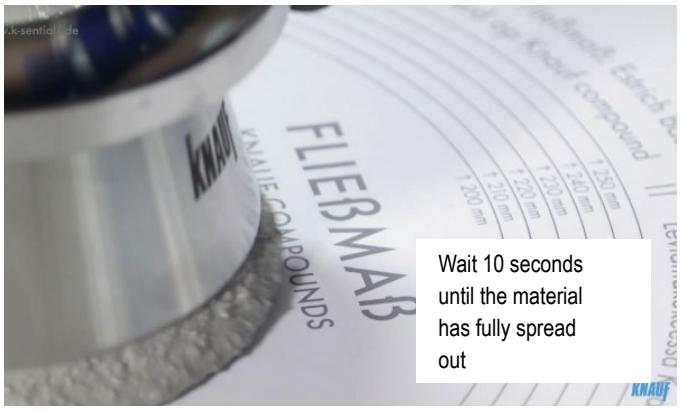


Figure 38: Lift the Hägermann funnel

Figure 37: Fill the Hägermann funnel with mortar

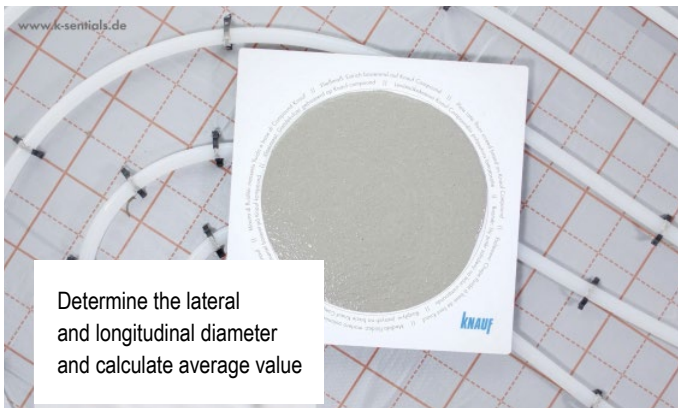


Figure 39: Measurement of the diameter

Installation of the screed

To achieve a uniform and sufficiently good surface quality of the screed bay, the area levelling sensors are distributed and set to the correct height with a levelling device (recommended: PFT levelling sensors). With floating screeds, the feet of the levelling sensors can be pushed through the insulating layer down to the basic floor so long as a moisture barrier is not damaged as a result. The levelling sensors then have a secure base.

If the edges of the Schrenzlage are not glued, it is important to ensure that the Schrenzlage synthetic coated kraft paper is not swamped with mortar. The mortar should be poured in the room so that it always flows from the upper Schrenzlage synthetic coated kraft paper to the lower.

The material should be distributed uniformly using the pouring hose. The path of flow of the mortar should be kept to a minimum to avoid separation of the fine particles, additives and water.
This is why it is incorrect to place the hose in the centre of the room and to wait until a level screed with a uniform surface quality results. The size of the area to be poured in a single pass is dependent on the application time of the mortar, the capacity of the screed machine as well as the thickness of the screed. Narrow, large surfaces can be created in a single pour when you work progressively. During application of the screed, work with the broom or dappling bar is undertaken where the nominal screed thickness is achieved and the surface is horizontal. The possible width of the surface is also determined by the application time, machine capacity and screed thickness.

After the screed has been poured to the correct level and the levelling sensors have been removed, the screed is worked with a dappling bar. Using this procedure, smaller irregularities are eliminated (levelled) and the mortar is de-aired.

Note	With heated screed: To check the residual moisture with a CM device by the floor covering specialists, positions must be marked for measurement before the screed is applied to avoid damage to tubes when samples are taken.

Figure 40: Setting the height with PFT levelling sensors

Figure 41: Pouring the screed

Application with a dappling bar

The screed is worked initially with a dappling bar in a single direction. The dappling bar dips right down to the base. The second step is performed at right angles to the first step, whereby the screed is only worked on the surface with the dappling bar.

Figure 42: Working with a dappling bar

Drying

Drying of calcium sulphate flowing screeds

According to DIN 18560-1, calcium sulphate screeds should be allowed to dry unhindered. The drying of the screed is mainly dependent on the temperature, the air humidity and the air speed of the ambient air as well as the screed thickness. The lower the air humidity, the higher the air speed and temperature and the quicker the screed dries until it is ready to accept floor covering.

The screed can only dry when the used, moist air is continuously replaced by fresh, dry air. The optimum situation is when the screed is exposed to draughts with wide open windows and doors (ensure that it is protected against rain). Thus, a quick exchange of the air, i.e. an exchange of the moisture-enriched room air is achieved by fresh external air (see Table 17 on page 47).

Tilting the windows is not sufficient to ensure quick drying as the number of air exchanges is too low.

If the drying of the screed is prevented with cold internal temperatures, the setting expansion may increase slightly. Under these special conditions, additional measures relating to the joint arrangement may be necessary with large area application. In particular for raised access floors with double floor tracks, this may be necessary to avoid the restraints of the double floor boards.

In practice this means

- When hard enough for foot traffic (generally after about 24 hours), tilt the windows to reduce the formation of condensed water on the windows.
- From 2 days after screed installation, open the doors and windows fully to assure the exchange of air (draught). In contrast to cementitious screeds, draughts are not damaging for flowing screeds on the basis of K-Sentials flowing screed compounds and are in fact desirable to ensure quick drying.
- If the ventilation openings are not sufficient, e.g. too few window areas, the damp air should be exhausted externally using fans.
- If a sufficient exchange of air is not possible, room air dehumidifiers should be used in conjunction with fans that ensure sufficient air circulation.
- Additional heating supports the drying process whereby continuous airing is required here.
- The screed thickness should be limited to the statically necessary dimension, as the drying time rises disproportionately with larger screed thicknesses.
- Drying of the screed surface should not be hindered by storing building materials on the surface.

Drying of the flowing screed is very quick in the first 7 days as can be seen by the steep slope of the drying curve, see Figure 43. This is down to the typical capillary water transport for flowing screeds in the initial phase. This phase can be used to accelerate drying by an intensive exchange of air. Subsequent drying occurs due to diffusion. Now a particularly low level of air humidity supports quick drying. Quick drying for flowing screeds is generally not damaging due to the unique properties of calcium sulphate as a binder.

Table 17: Number of air exchanges in dependence on the window position according to Gertis and Hauser

Window position	Number of air exchanges per hour
Windows closed, doors closed, windows tilted	0 – 0.5
Roller shutters closed	0.3 – 1.5
Windows tilted, no roller shutters	0.8 – 4.0
Windows half open	5 – 10
Windows fully open	9 – 15
Windows and French doors fully open (opposite one another)	Approx. 40

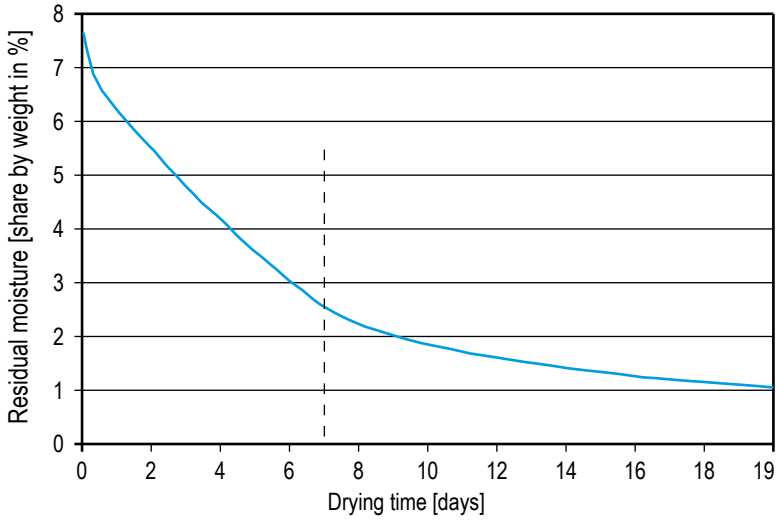


Figure 43: Flowing screed drying curve

Drying of heating floor screed

Heating of heating floor screed until dry

The heating floor screed must be heated up before floor covering is applied. Furthermore, a heating protocol must be documented and provided to the floor covering installer (in accordance with the requirements of the German VOB part C, "Flooring work"). Heating protocol templates for flowing screeds on the basis of K-Sentials with a detailed description of the heating up phase is available from Knauf Gips KG (see from page 51).

Heat up dries the screed and reduces the build up of stresses in the screed bay. If a heating screed is not heated up sufficiently before the floor covering is applied, this can lead to subsequent damage of the screed and the floor covering. Even a screed that has dried naturally must be heated up before the covering is applied.

The start of heating up of the screed and the duration of the heating up phase or drying is dependent on the screed type, screed thickness, ventilation, flow temperature and weather conditions. Also for heating floor screed, the screed thickness should be limited to the statically necessary dimension as the drying time rises disproportionately with larger screed thickness's.

For flowing screeds on the basis of K-Sentials flowing screed compounds, heating up can only commence at least 7 days after application of the screed, for some K-Sentials flowing screed compounds this may be possible after 3 days, see "Table 16: Orientation data for application" on page 44. The flow temperature should be set to 25 °C and kept at this temperature for three days. The flow temperature is then set to the highest temperature (dependent on the heating system, max. 55 °C – at low flow temperature you must expect a longer heating up phase). Alternatively, heating up can be implemented in steps of 5 K per day. The highest temperature must be retained without temperature reductions resulting from night-time operation mode while assuring simultaneous ventilation, until the screed is fully dry (see "Checking the surface for readiness to accept coverings").

The heating screed bays in a building must be heated up simultaneously and with the same temperature. All heating circuits within the screed bay must be heated up uniformly. This also concerns areas, such as corridors through which the connections lead to other rooms.

Subsequently, the flow temperature is reduced until a surface temperature of 15 to 18 °C is achieved. At very low external temperatures (≤ 0 °C), ensure that during heating up of the screed surface the temperature fluctuations are not too large (caution with windows at floor level) or that the screed does not cool too quickly with a reduction of the flow temperature of the screed.

Inspecting the foil

The required drying of the screed as a prerequisite for application of the covering can be examined with a PE foil (dimensions 50 x 50 cm) as an initial test, by applying the foil in a ventilated room at a maximum flow temperature (max. 55 °C) and on the heating screed and taping down the edges with adhesive tape. No condensation may form under the foil within 12 hours. Otherwise, continued heating and ventilation is necessary. The foil test does not replace the need for a CM measurement before floor covering application, see page 55.

Note	With electrical underfloor heating, the heat up is controlled by the floor thermostat instead of the flow temperature. The maximum floor thermostat setting is 50 °C. For later operation of the underfloor heating with a room thermostat control, the temperature limitation of the floor thermostat must be set to max. 45 °C (see page 52).

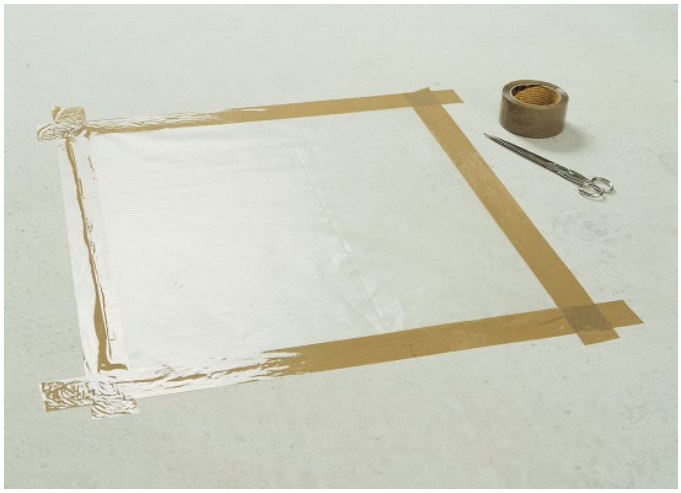
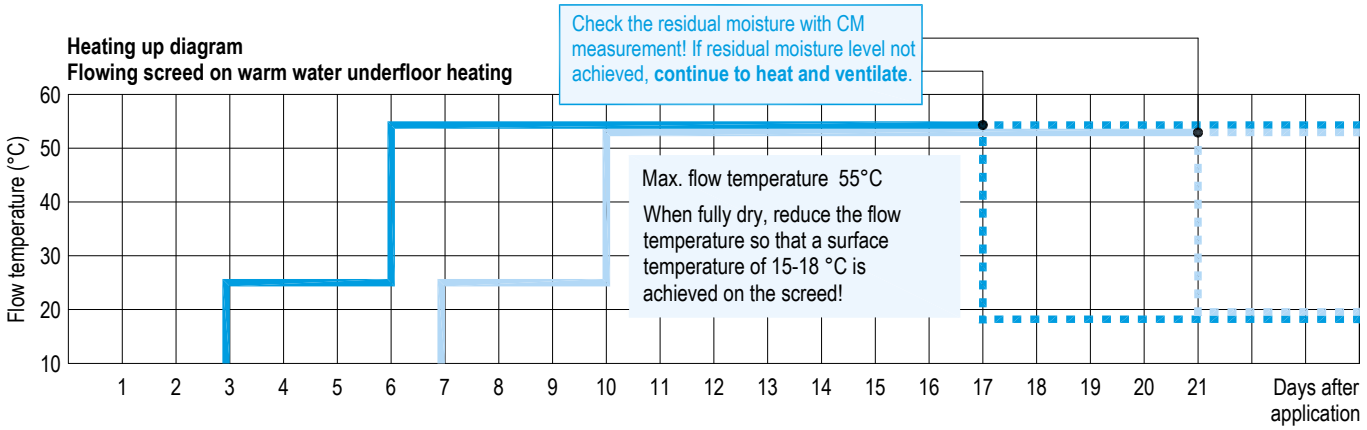


Figure 44: Initial inspection of drying with foil on the heating floor screed

Figure 45: Check for the formation of condensation under the foil



Flowing screeds on the basis of K-Sentials flowing screed compound Duralpha

Flowing screeds on the basis of K-Sentials flowing screed compound Durhydrit

Figure 46: Heating up diagram for flowing screeds on the basis of K-Sentials flowing screed compounds

Heat up regulations and heating protocol

Warm water underfloor heating

Screed nominal thickness

≥ 35 mm over the heating system (tube including attachment)

Movement joints

With area offsets and steps, in larger areas, in doorways and for separation of heated and unheated areas. Detailed recommendations can be found in the Code of Practice No. 5 "Joints in flowing calcium sulphate screeds" (IGE/VDPM).

Drying

The screed must be heated until dry. The drying time is dependent on the temperature, air humidity and air speed. Drying is accelerated significantly by heating up the screed using underfloor heating. Adequate ventilation should be provided during heating.

Please note

- Avoid draughts for the first two days after application, then provide good ventilation.
  Heat up at the earliest after 7 days or after 3 days acc. to Table 16 on page 44.
- Functional heating must be performed on a heated floor screed acc. to EN 1264-4 before the floor covering is applied. Furthermore, the screed must be heated until dry (heat to ensure covering suitability). With the heating regulations provided, functional heating is combined with floor coverage ready heating.

Covering of the screed

Apply hard and vapour-proof coverings about 1 to 3 days after cooling down. If you wait for longer than 3 days with application of the floor covering, the heated floor screed must be heated up yet again directly before the floor covering is applied, and the foil test described above must be performed to ensure that the surface is dry. Mechanically clean the screeds before covering with an industrial vacuum cleaner and prime with an acrylic dispersion primer, e.g. Knauf Estrichgrund screed primer. Use an adhesive for the covering that is suitable for underfloor heating. Use an elasticized adhesive with a rigid covering (tiles, natural stone).

Note	The heating up protocol must be documented and must be provided to the floor covering specialist! (in accordance with the requirements of the German VOB part C, "Flooring work" DIN 18365)

Heating up regulations for flowing screeds with Knauf Durhydrit

Heat up can start: 7 days after application in acc. with EN 1264-4

1. Set the flow temperature to 25 °C and retain it for three days.
2. Then set the highest temperature (max. 55 °C) and retain it (without night-time operation reduction) until the screed is dry. Alternatively, heating up can occur in steps of 5 K per day.
   Reference values for drying at max. flow temperature and ventilation
   Thickness ≈ 35 mm (type B): approx. 10 days
   Thickness ≈ 55 mm (type A): approx. 14 days
   Check the residual moisture.
3. After drying, reduce the flow temperature so that the surface temperature of the screed achieves 15 to 18 °C.
   The screed will now be ready for floor coverings.

Heating up regulations for flowing screeds with Knauf Duralpha

Commencement possible 3 days after application

1. Set flow temperature to 25 °C, and retain it for 3 days and then increase to max. 55°C and retain it (without nighttime operation reduction) until the screed is dry. Alternatively, heating up can occur in steps of 5 K per day.
   Reference values for drying at max. flow temperature and ventilation
   Thickness ≈ 35 mm (type B): approx. 10 days
   Thickness ≈ 55 mm (type A): approx. 14 days
   Check the residual moisture.
2. After drying, reduce the flow temperature so that the surface temperature of the screed achieves 15 to 18 °C.
3. Hereafter, the screed is ready to be covered.

Check drying in acc. with item 2 of the heat up regulations

Place PE foil (dimensions approx. 50 x 50 cm) on the heating screed surface, tape down the edges with adhesive tape.

At maximum flow temperature, no condensation may form within 12 hours in ventilated rooms under the foil - otherwise heat and ventilate further.

The foil test does not replace the need for CM measurement immediately before covering application. According to DIN 18560-1 the measured value may not exceed 0.5 %.

Flow temperature

max. 55 °C

Edge insulation strips

To be suitable for flowing screed they must be compressible by at least 5 mm (only cut off after the floor covering has been laid).

Heater coil

Must be filled with water and under pressure when the screed is applied.

Note	Further notes in the brochures, technical brochures and product data sheets.

Flowing screeds on warm water underfloor heating
Heating protocol for coverage ready heating

Flowing screed product

_ _

Investor:

Building site:

Heating engineer:

Site manager:

Fill in every change of flow temperature (warm water heating) during the heating up process and during reduction of temperature exactly to 5 °C.
Every drying test should be documented.

Heating system:

Screed applied on:

Average screed thickness: mm

Coverage of heating element:

Min.: mm **Max.:** mm

Heat up (coverage ready heating):

Date	Flow temperature in °C	Signature

☐ **Ventilation**
☐ **Window ventilation**

Date from	to	Ø h per day

Preliminary drying test
(e.g. foil test[1])

Date	Dry yes/no	Signature

Drying test
(CM measurement)

Date	Residual moisture in %	Signature

Reduction of the flow temperature

Date	Flow temperature in °C	Signature

Coverage ready heating completed

Date	Outdoor temperature in °C	Signature

1) Does not replace CM measurement before laying floor covering.

Please keep this document!

Place / Date

Signature (Site manager)

Electrical underfloor heating

Drying

The screed must be heated until dry. The drying time is dependent on the temperature, air humidity and air speed. Drying is accelerated significantly by heating up the screed using underfloor heating. Adequate ventilation should be provided during heating.

Please note

- Avoid draughts for the first two days after application, then provide good ventilation.
  Heat up at the earliest after 7 days or after 3 days acc. to Table 16 on page 44.
- Temperature control occurs during the heating up phase via the floor thermostat, the room thermostat is out of service at this time! The floor thermostat should be placed on the bottom of the screed on the heating elements.
- Functional heating must be performed on a heated floor screed before the floor covering is applied. Furthermore, the screed must be heated until dry (heat to ensure covering suitability). With the heating regulations provided, functional heating is combined with floor coverage ready heating.

Covering of the screed

Apply hard and vapour-proof coverings about 1 to 3 days after cooling down. If you wait for longer than 3 days with application of the floor covering, the heated floor screed must be heated up yet again directly before the floor covering is applied, and the foil test described above must be performed to ensure that the surface is dry. Mechanically clean the screeds before covering with an industrial vacuum cleaner and prime with an acrylic dispersion primer, e.g. Knauf Estrichgrund screed primer. Use an adhesive for the covering that is suitable for underfloor heating. Use an elasticized adhesive with a rigid covering (tiles, natural stone).

Note	The heating up protocol must be documented and must be provided to the floor covering specialist! (in accordance with the requirements of the German VOB part C, "Flooring work" DIN 18365)

Heating up regulations for flowing screed with Knauf Durhydrit

Heat up can start: 7 days after application

1. Set the floor thermostat to 25 °C and retain the value for 3 days.
2. Then set the underfloor thermostat to max. 50 °C and retain the temperature until the screed is dry.
   Reference values for drying at maximum floor thermostat temperature and good ventilation
   Thickness ≈ 40 mm: approx. 12 days
   Check the residual moisture.
   Alternatively, heating up can occur in steps of 5 K per day.
3. After drying, reduce the floor thermostat temperature setting so that the surface temperature of the screed achieves 15 to 18 °C.
   Hereafter, the screed is ready to be covered.

Heating up regulations for flowing screeds with Knauf Duralpha

Heat up can start: 3 days after application

1. Set the floor thermostat to 25 °C and retain the value for 3 days.
2. Then set the underfloor thermostat to max. 50 °C and retain the temperature until the screed is dry.
   Reference values for drying at maximum floor thermostat temperature and good ventilation
   Thickness ≈ 40 mm: approx. 12 days
   Check the residual moisture.
3. Switch off the heating after drying.

With thicker screed layers (80 mm, heating storage screed), the drying time is extended. For later operation of the underfloor heating with room thermostat control, the temperature limitation of the floor thermostat must be set to max. 45 °C.

At very low external temperatures (≤ 0 °C), ensure that during heating up of the screed surface the temperature fluctuations are not too large (caution with windows at floor level) or that the screed does not cool too quickly with a reduction of the flow temperature of the screed.

Check drying in acc. with item 2 of the heat up regulations

Place PE foil (dimensions approx. 50 x 50 cm) on the heating screed surface, tape down the edges with adhesive tape.

At heating with the maximum flow floor thermostat setting (50 °C), no condensation may form within 12 hours in ventilated rooms under the foil - otherwise heat and ventilate further.

The foil test does not replace the need for CM measurement immediately before covering application. According to DIN 18560-1 the measured value may not exceed 0.5 %.

Heating temperature

max. 50 °C on heating element

Edge insulation strips

To be suitable for flowing screed they must be compressible by at least 5 mm (only cut off after the floor covering has been laid).

Screed nominal thickness

≥ 35 mm over electrical underfloor heating.

Movement joints

With area offsets and steps, in larger areas, in doorways and for separation of heated and unheated areas. Detailed recommendations can be found in the Code of Practice No. 5 "Joints in flowing calcium sulphate screeds" (IGE/VDPM).

Note	Further notes in the brochures, technical brochures and product data sheets.

Flowing screeds on electrical underfloor heating
Heating protocol for coverage ready heating

Flowing screed product

Investor:	**Heating engineer:**
Building site:	**Site manager:**

Fill in every change (electrical heating) of flow temperature during the heating up process and during reduction of temperature exactly to 5 °C Every drying test should be documented.

Heating system:	**Average screed thickness:** mm
Screed applied on:	**Coverage of heating element:**
	Min.: mm **Max.:** mm

Heat up (coverage ready heating):

Date	Floor thermostat setting in °C	Signature

☐ **Ventilation**
☐ **Window ventilation**

Date from	to	Ø h per day

Preliminary drying test
(e.g. foil test[1])

Date	Dry yes/no	Signature

Drying test
(CM measurement)

Date	Residual moisture in %	Signature

Reduction of the floor thermostat temperature

Date	Floor thermostat setting in °C	Signature

Coverage ready heating completed

Date	Outdoor temperature in °C	Signature

1) Does not replace CM measurement before laying floor covering.

Please keep this document!

Place / Date

Signature (Site manager)

Application of floor covering

Evenness

The screed surface must comply with the evenness tolerances acc. to DIN 18202. See Table 18 for permissible tolerances.

The corresponding tests must be performed using area levelling elements or by using a browning rod and measuring wedge (measurement acc. to DIN 18202, section 6.5).

Table 18: Permissible evenness tolerances of the screed surface to DIN 18202

Spacing of measurement points m	**Permissible evenness tolerances** mm
Up to 0.1	2
Up to 1.0	4
Up to 4.0	10
Up to 10.0	12
Up to 15.0	15

Determination of the residual moisture

Flowing screeds on the basis of K-Sentials flowing screed compounds in conjunction with further floor covering work may not exceed the moisture content listed in Table 20 over the entire screed surface in dependence on the type of floor covering to be used.

The CM device (carbide method) must be used for residual moisture testing on the building site.

Samples are taken using a chisel and hammer. The sample material is taken uniformly from the entire layer thickness. As the screed dries from the top downwards, this should avoid that the sample taken at the surface has too little moisture and sample taken at the bottom has too much moisture. The value should be read off after about 10 minutes as otherwise the crystallized water content will be measured (value will be incorrect) should the sample remain any longer in the CM device. The sample material should be crushed with a hammer and placed into the pressure bottle.

The original sample weight is dependent on the expected residual moisture, see Table 19. When determining the measuring points, the most unfavourable drying areas must be considered. Electrical measuring devices are not suitable for reliable measurement of the residual moisture. They can be used at best to make a rough estimate of the moisture content, but generally produce non-reproducible values.

Notes	Flowing screeds used as heated screed must be heated until dry. The foil test (see“Inspecting the foil” on page 48) does not replace CM measurement. According to DIN 18560-1 the measured value may not exceed 0.5 %.

Table 19: Determination of residual moisture with the CM device, original sample weight in dependence on the expected water content

Assumed water content %	**Necessary original sample weight** g
1	100
2	50
5	20
10	10

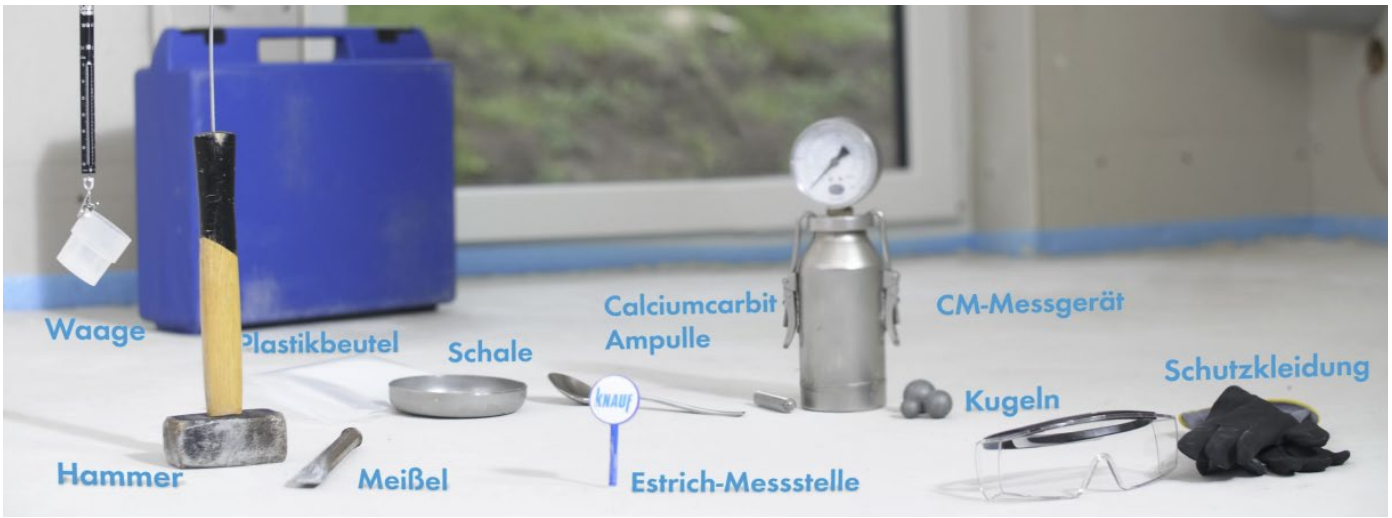


Figure 53: Testing the readiness for floor covering with the CM tester

Table 20: Residual moisture with readiness for covering of Knauf flowing screeds on the basis of K-Sentials flowing screed compound

Covering	**Vapour-proof coverings** (PVC) as well as parquet etc.	**Vapour-retardant, rigid floor coverings** Tiles, natural stone	**Vapour permeable floor coverings** (textile, etc.)
Unheated flowing screed	0.5 CM %	0.5 CM %	0.5 CM %
Heated flowing screed	0.5 CM %	0.5 CM %	0.5 CM %

Surface strength

Figure 47: Flowing screed cross-section, magnified by 4

Flowing screeds have a solid surface when they have been correctly applied (mortar consistence). The aggregate particle is evenly distributed over the cross-section.

Flowing screeds on the basis of K-Sentials flowing screed compounds have a surface adequate for the respective function when applied correctly. Product related milling of the screed surface is therefore not necessary.

The above mentioned statement does not apply to the necessary cleaning work (e.g. mechanical brushing or milling to clean surface) directly before cover application.

Test and evaluation of whether the screed is applied correctly and whether the surface quality is sufficient can be established using the following methods.

Scratch test

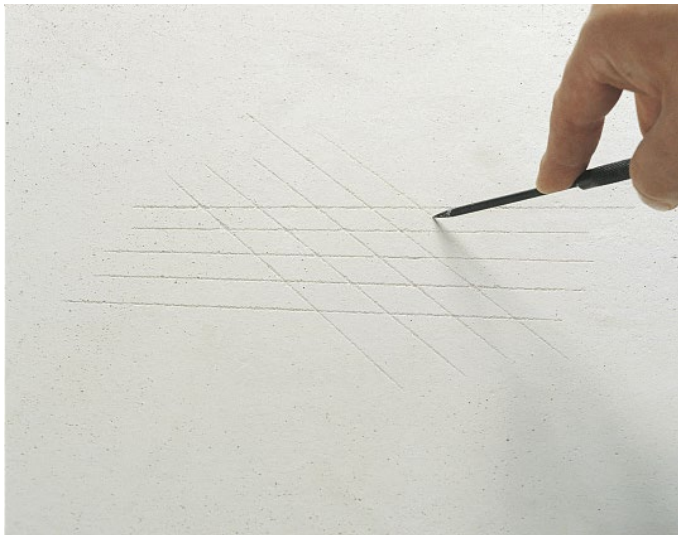


Figure 48: Scratch test

Scratch the screed surface with a knife or scratching device so that a grid pattern is created. It is possible to determine whether the screed has a soft surface layer by the force applied, the depth of the scratches and the type of breakline.

However, this test method requires practical experience and should always be combined with the examination of the grain structure to provide a better estimation of the result.

Particle composition

A characteristic for a well applied flowing screed is a homogeneous particle composition. Whether the homogeneous particle composition reaches right up to the surface can be determined at best by the removal of a piece of the cross-section. By lightly scraping the surface, e.g. with a knife, it is possible to determine whether the homogeneous particle composition extends to the uppermost zone. The particle composition is more visible when the scraped surface is slightly dampened. If the scratch test and the test of the particle composition does not produce a clear result, further tests determining the resistance to peeling and the bond strength can be used to test the surface quality.

Figure 49: Inspection of the grain structure

Note	The test methods for surface strength must be performed on dry screed (residual moisture ≤ 1 %).

Bonding test and test of the resistance to peeling

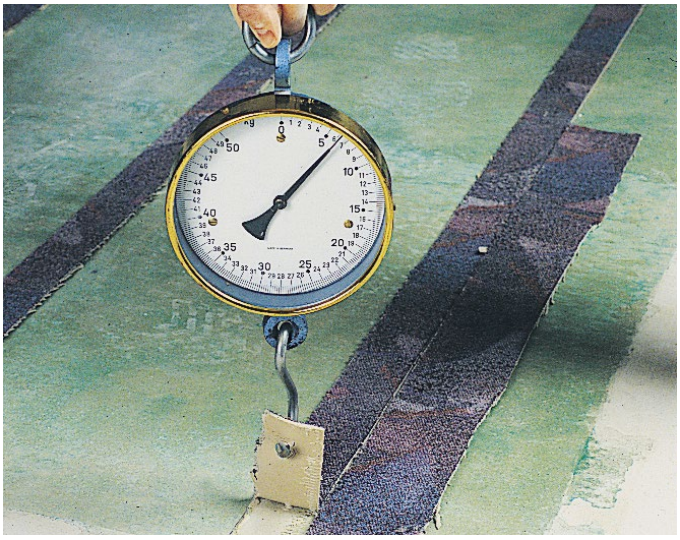


Figure 50: Bonding test and test of the resistance to peeling

This procedure is used when carpets, PVC or similar are intended as the covering. For this purpose, a 50 mm wide covering strip of the planned application layer (primer or filler, adhesive) is applied on the dry and cleaned screed surface. After the adhesive layer has set and dried, the resistance to peeling is determined by peeling it off using a dynamometer (force applied perpendicular to the surface). The minimum peeling force of 50 N (= 1 N/ mm covering width) may not be undercut (requirement on the adhesive acc. to DIN EN 14259 minimum resistance to peeling for textile coverings 0.5 N/ mm, for PVC coverings 1 N/mm, for elastomeric coverings 1.2 or 2.0 N/mm). If the peeling force is less than 50 N and the rupture occurs in the covering, adhesive or in the filler, this means that the screed surface has a higher tensile strength then the subsequent flooring covering. In this case, the test result cannot be used for evaluation of the screed surface strength.

Tensile bond strength

Figure 51: Test of the bond strength

Metal discs with a diameter of 50 mm are applied with adhesive in order to measure the bond strength (surface tensile strength). We recommend Silikal RI/21 (two-component adhesive) adhesive.

After the adhesive has set (approx. 30–60 minutes, depending on the temperature and added curing agent) the metal discs are pulled out with a force measuring device, e.g. System SATTEC or DYNA ESTRICH, with a uniform increase in the tractive force. If the bond strength is at least 1 N/ mm², the screed surface is sufficiently strong enough for the application of all coverings (minimum requirement for adhesive bonds acc. to DIN 18156: bond strength 0.5 N/mm^2). For parquet, a value of 1.2 N/ mm² is required occasionally, for reaction resin coatings with commercially used floors a value of 1.5 N/mm² should be achieved. With lower values, a decision must be taken on whether the surface strength is sufficient based on the individual case depending on the adhesive bonding value and the load expected. If the rupture occurs in the adhesive, the measurement must be repeated. Conclusions with regard to the surface quality can be made based on the failure pattern of the rupture.

Bonding sample and failure pattern

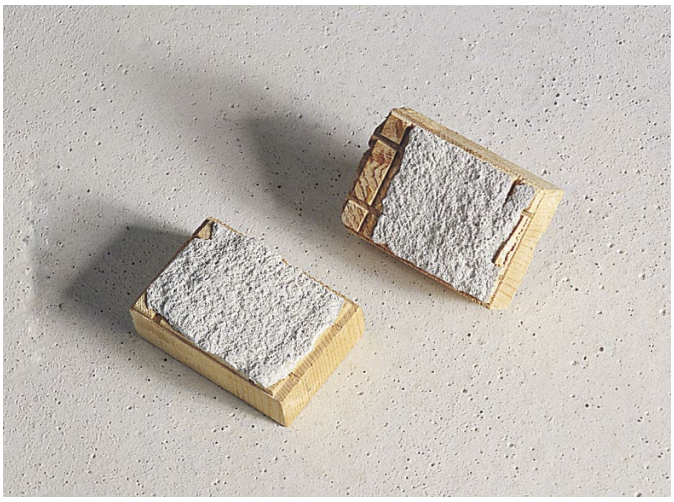


Figure 52: Parquet and screed failure patterns

A relatively simple test is the evaluation of the failure pattern. A tile or section of parquet to be applied later is glued onto the screed. After the adhesive or filler has set, the tile or parquet is broken off using a hammer. If the fracture is 1 to 2 mm deep or even deeper in the screed, where the aggregate particle is clearly visible, the screed has a sufficient or good surface quality.

Note	See also IGE/VDPM Code of Practice No. 4

Surface perparation

Screed surfaces that comply with the test criteria should be cleaned of any loose or adhering dirt. The screed should be ground to remove stubborn dirt or soiling and vacuumed off. After this preparation work, the screed should be primed and filled if necessary. If the screed surface does not meet the quality requirement for covering, it should be treated as such before covering:

Uneven surfaces

Uneven surfaces can be transformed to an even surface as follows.

- By grinding them down (suitable Abrasive sanding disc, grain size 16) or
- By filling, e.g. with Knauf N 410

Please note: Remodelling should be undertaken after the screed has dried as the filler compound will significantly delay the drying speed.

Surfaces too soft

Soft, unstable surfaces should be ground down (suitable: abrasive sanding disc, grain size 16) until a sufficiently stable layer (visible grain) is achieved. The ground surfaces should be cleaned with an industrial vacuum cleaner.

Depending on the states of the ground surfaces, double coats of Knauf Estrichgrund primer (dilute with water 1:2 + 1:1) or Knauf FE-Imprägnierung impregnation agent (+ silica sand) should be applied. If necessary, a levelling filler layer up to the planned height should be applied.

Cracks

Open cracks are not permissible in the screed. Even when the screed substrate has been correctly applied (particularly when standard-compliant insulation materials are used with floating screed) and the minimum thickness has been observed but cracks have still occurred (e.g. due to unfavourable curing conditions, uneven drying), they should be sealed with a frictional bond using epoxy resin before the covering is applied.

The crack areas should be cleaned with an industrial vacuum cleaner before pouring. A preceding widening of the crack on the surface particularly with thin cracks helps the resin to penetrate the crack. Depending on the width of the crack, the following is recommended for pouring:

- Hairline cracks up to 0.2 mm
  Pour a thin-bodied injection resin into cracks, e.g. Knauf FE-Imprägnierung impregnation agent.
- Cracks 0.2 to 1.0 mm
  Pour epoxy resin into cracks (Knauf FE-Imprägnierung impregnation agent); depending on the crack width, add material such as ground anhydrite or gypsum and fill the crack with this mix.
- Cracks 1.0 to 5.0 mm
  Similar to option 2; dilute depending on the crack width with 1:2 (ratio resin : added material).

Figure 54: Filling cracks with epoxy resin

Resin and screed should have a temperature of approx. 20 °C (room air temperature). Pouring should continue with all cracks until the cracks are filled (filing can no longer be determined). Excessive overflowing epoxy resin should be removed with a spatula and the resin surface should have dry sand or similar applied (as a result the adhesion for the surface covering should be improved in the repaired area). With heated screed constructions, the dry heated screed should be subsequently briefly heated up again to the maximum flow temperature (max. 55 °C). If no new cracks become evident, the heating floor screed is technically free of defects and is ready for floor covering.

Additional nailing of the crack transverse to the crack by applied dowels is also possible, but not necessary. Knauf FE-Imprägnierung is not aggressive when it comes in contact with insulation materials and heating tube materials.

Priming

Figure 55: Application of Knauf Estrichgrund

The screed must be primed before covering work is performed. Suitable primers must be applied that suit the adhesive and covering material systems in use. Knauf Estrichgrund (acrylic dispersion), should be applied once (diluted 1:1 with water) or twice depending on the level of absorbency, or alternatively Knauf Schnellgrund (undiluted) e.g. an ideal primer for resin-modified Knauf thin-bed mortars (tiles, natural stone slabs) or floor covering adhesives (carpets, PVC coverings).

The primer is used to improve the bond between the screed and adhesive or filler. It regulates the absorbency of the substrate and prevents suction related problems with filler materials and adhesive.

Knauf Estrichgrund (screed primer) or Knauf Schnellgrund should be poured in portions onto the screed and then evenly distributed with a floor coater, painter's brush, prime brush or roller and worked into the screed surface. Avoid ponding (danger of film formation). Any possible required second primer coat with Estrichgrund screed primer should only be applied after the first screed coat has dried.

Filling

Figure 56: Manual application of Knauf N 410

Figure 57: Machine application of Knauf N 410

For levelling of flowing screed, e.g. as a substrate for PVC coverings or for levelling underlay, Knauf N 410 or Knauf N 430 gypsum based compound should be preferred (low-stress hardening and advantageous thermal expansion properties (heating screed)).
The flowing screed should be dry before the leveller is applied. The maximum leveller thickness is 10 mm.

For thicknesses ranging from 10 to 40 mm Knauf N 440 is the ideal equalization compound. Knauf N 410 or Knauf N 430 when applied do not generally require a primer before a floor covering is applied. Should equalization be applied twice, as in exceptional cases, a primer will be required before the second layer is applied. Should the applied and set equalization material exhibit cracks giving the appearance of a map or even small holes, this is an indication of absent or insufficient primer.

The structural strength of the equalization compound as well as the adhesion to the screed can suffer as a result.

Coating

Two component epoxy resin coatings have proven to be useful on flowing screeds. The screed surface should first of all be ground with a suitable milling disc (16 grain). Do not shot blast. The ground dust is subsequently removed, the surface vacuumed with an industrial vacuum cleaner and a low-viscosity epoxy resin primer suitable for the following layer applied.

The residual moisture of the screed should also be ≤ 0.5 % with coatings open to vapour and heating floor screed.

Sealing in wet areas

Knauf flowing screeds can also be used in domestic bathrooms and kitchens. If water is expected on the floor, it is recommended that screeds and insulation layers are protected by suitable sealing against moisture from above. Detailed recommendations can be found in the Code of Practice No. 1 "Calcium sulphate flowing screed in wet rooms" (IGE/VDPM).

Sealing options

There are two suggested options for sealing

- An approx. 2 mm layer of Knauf Flex-Dicht[1)] is applied to the primed screed. The connection to the wall is sealed with Knauf Flächendichtband sealing tape[1)], which is embedded on the screed and on the wall in Knauf Flex-Dicht[1)].
- The screed is coated three times with Knauf Flächendicht sealing primer[1)] using a brush or plastic roller. The layers should be applied crosswise. The Knauf Flächendichtband sealing tape[1)] is applied to the fresh second layer and the third coat is applied after drying. The drying time between coats is at least 4 hours (reference value) and is dependent on the ambient climatic conditions.

The application of tiles is undertaken after these preliminary steps using a thin bed method with hydraulic setting thin bed mortars acc. to EN 12004.

Note	Dispersion tile adhesives are not recommended for applying tiles on Knauf Flächendicht sealing primer[1)] and Knauf Flex-Dicht[1)] (very long setting and hardening duration)!

1) Knauf Bauprodukte GmbH

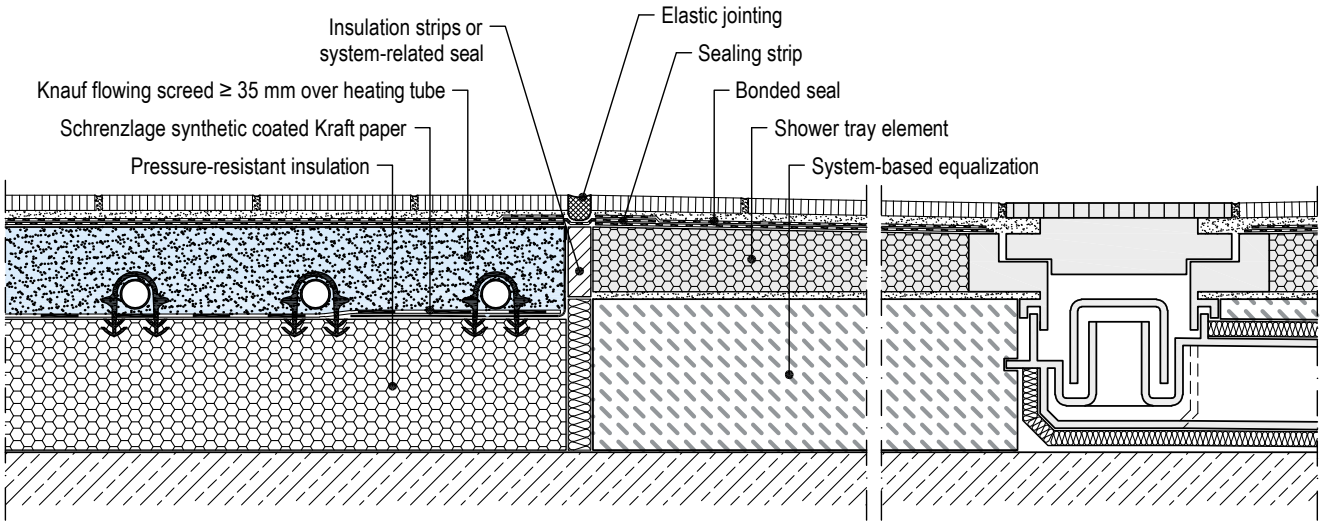
Wet rooms and areas

Flowing screed is not suitable for wet areas where slopes and drains are intended, (e.g. commercial kitchens, communal showers, swimming pools). Flowing screeds may not be exposed to permanent moisture penetration. A temporary penetration of moisture, e.g. from water damage, does not damage the screed if it is allowed to dry unhindered afterwards.

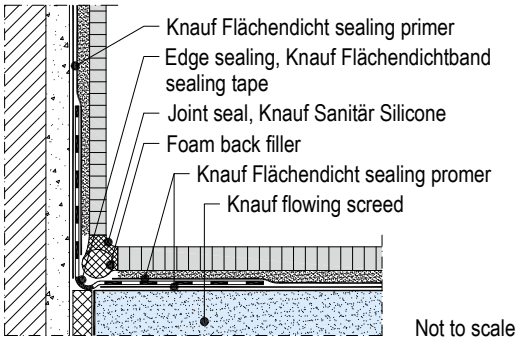
Details

F233.de-V104 Floor connection of shower tray with Knauf flowing screed

Scale 1:5



F231.de-V111 Flowing screed in domestic applications subject to moisture



Not to scale

Flowing screeds on the basis of K-Sentials flowing screed compound can be applied with all conventional floor coverings: carpets, PVC, linoleum, tiles, parquet, laminate flooring, coatings.

Joints in the screed should generally be implemented in the floor covering.

Floor tiles, natural stone slabs

Tiles are laid using the thin bed method on Knauf flowing screed. Suitable adhesives are hydraulic setting thin bed mortars acc. to DIN EN 12004. In general, it is important to ensure that a sufficient bed thickness is available.

With natural stone slabs, differences in the slab thickness must be compensated for in the mortar bed. This is undertaken with the medium bed method. For translucent tiles or tiles subject to discolouration, white adhesive mortar with a high water retention capacity (e.g. Knauf Marmor- und Natursteinkleber - marble and natural stone adhesive) must be used.

When applied with the thick bed method, the screed surface must be sealed with synthetic resin (e.g. 2 coats of epoxy resin with sand applied) or a separating layer should be provided between the screed and mortar bed.

Carpet, PVC and linoleum

Figure 58: Example of carpet

Suitable adhesives must be used with carpets (needle felt, foam backed, etc.), PVC and linoleum coverings. Prior application of a filler on the primed screed with thin coverings (e.g. PVC) is standard practice.

► **Good to know**
The overhang of the Knauf edge insulation strips must be cut off once the covering work has been completed. This is intended to avoid that the filler, adhesive or joint mortar from the covering work does not create a sound bridge between the screed and wall.

Application of large tiles and slabs

Figure 59: Example of tiles

Large format tiles and boards can be applied on flowing screeds. Joints relieve stresses in bonded tile - screed systems. This is why special measures may be necessary on larger surfaces with a lower share of joints. The application of cross joints is recommended on heated screeds in accordance with the German ZDB Code of Practice (ceramic tiles and boards, natural stone work and artificial stonework on heated cementitiious floor constructions). Should it not be desirable to forego the offset application or if the edge lengths exceed 60 cm, special adhesive systems and decoupled intermediate layers must be used after consultation with the adhesive manufacturer on heating floor screed. This may also be the case for other surfaces with higher temperature loads, e.g. areas subjected to direct sunshine.

If leaktight, non-absorbent tiles (e.g. stoneware) are applied to large areas, the adhesive properties of normal adhesive systems to the substrate may be affected due to the long exposure to moisture. This can be avoided by the application of a sealing preliminary coating (2-layer epoxy resin with sanding) or by using the recommended quick drying adhesive mortar.

Note	With heated screed An elasticized adhesive should be used for the application of rigid coverings (tiles) on heating floor screed. The elasticized adhesive bed should reduce flow stresses resulting from the different thermal rates of expansion of screed and covering, and thus avoid detachment of the screed and covering and formation of cracks in the tiles and screed.

Table 21: Notch depths of trowel in dependence on the tile edge length.

Tile edge length	Notch depth
Up to 50 mm	3 mm
From 50 to 108 mm	4 mm
From 108 to 200 mm	6 mm
More than 200 mm	8 mm

Parquet

Figure 60: Example of parquet

Flowing screeds on the basis of K-Sentials flowing screed compound can be applied with all conventional parquet coverings: The adhesives generally used are 1 or 2 component polyurethane adhesives (PUR), silane-terminated adhesives or powder adhesives. A precoating adapted to the adhesive is to be used. For application, the parquet must exhibit the moisture content prescribed for the corresponding type of wood.

Joints can occur in the parquet, that can widen on the heating floor screeds, particularly during heating periods. They must be acceptable in their appearance. Joints up to 1 mm in width are not considered to be a defect.

Special adhesives are used with wood blocks due to the large swelling value. To keep the swelling pressure low, ensure that there are no large deviations in the humidity levels with wooden blocks, for example, during the building phase. This applies in particular to wood blocks with low layer thickness's, as the change in humidity occurs quickly over the entire cross-section.

Application recommendation

Table 22: Application recommendation on flowing screeds

Floor covering	Pretreatment	Consumption per m²	Adhesive	Approx. consumption per m²
Floor tiles in thin and medium bed	Acrylate dispersion primer e.g. Knauf Estrichgrund (1:1 with water) or Knauf Schnellgrund (undiluted)	0.1 kg	Resin-modified application mortar	Dependent on the tile format and trowel notch size
Floor tiles on heating floor screed	Acrylate dispersion primer e.g. Knauf Estrichgrund (1:1 with water) or Knauf Schnellgrund (undiluted)	0.1 kg	Resin-modified application mortar	Dependent on the tile format and trowel notch size
Non-translucent natural stone slabs	Acrylate dispersion primer e.g. Knauf Estrichgrund (1:1 with water) or Knauf Schnellgrund (undiluted)	0.1 kg	Application mortar with optimized water retention	Dependent on the tile format and trowel notch size
Carpet	Acrylate dispersion primer e.g. Knauf Estrichgrund or Knauf Schnellgrund	0.1 kg	Resin dispersion adhesive	0.3 kg
PVC coverings	Acrylate dispersion primer e.g. Knauf Estrichgrund or Knauf Schnellgrund Knauf N 410 or Knauf N 320 Sprint	0.1 kg 1.6 kg per mm layer thickness	Resin dispersion adhesive	0.3 kg
Linoleum Cork covering Wood parquet	See PVC coverings See PVC coverings System specific adhesive primer	See PVC coverings	Linoleum adhesive Cork adhesive Resin-based or dispersion adhesive	0.3 kg
Floor screed (without covering)	With limited loading: Apply Knauf Estrichgrund screed primer 2x or Knauf Schnellgrund primer 1x. Otherwise impregnation, sealing or coating must be undertaken after use.	0.2 kg		

Further information

Tips for newcomers

Of particular significance for the floor quality and the duty to provide information is the proof of the substrate regarding its suitability for the application of screed (VOB part C, DIN 18353, point 3), see “Overview of the necessary steps” on page 32.

Extensive testing requiring significant effort and expense (e.g. chemical testing) cannot be demanded of the screed applier. In principle, it is sufficient to undertake testing using the means and equipment generally available to the trade. If the substrate does not meet requirements, the concerns should be made known. If, irrespective of compliance with these tolerances for the substrate, the screed surface quality stipulated by the contract requires more than 20 % of additional material to produce the stipulated nominal screed thickness, these concerns should also be made known. The document outlining the concerns should be sent by registered mail with advice of receipt. It should be addressed to the investor/client (copy to the architect's)

The applier of the screed is obliged to provide information relating to any features or anomalies of the screed that are of relevance to the subsequent trades. This concerns, for example, application of screed with excessive thickness in partial areas, as the applier of the floor coverings must assume that these locations are unfavourable measurement points for the determination of the level of residual moisture. In this case, it is also recommended to provide the information in writing to the investor/client.

Note	In accordance with VOB, part B, DIN 1961 § 4, No. 3 "the contractor is required to inform the company without delay and in writing if they have any concerns about the quality of the materials or components supplied or if they have concerns with the intended way in which the work is to be carried out – when possible before commencement of work". Strict compliance with this undertaking should serve as the basis for every screed applier to ensure that unjustified warranty claims are excluded from the outset.

DIN 18202 is also a standard for determining the quality of the applied screed. The screed complies with the evenness tolerances if the evenness tolerances as specified in table 3, line 3 are observed in conjunction with the angular tolerances as specified in DIN 18202, table 2. Demands by the investor for tolerances exceeding the evenness and angular tolerances must be agreed in a written contract (e.g. acc. to DIN 18202, table 3, line 4).

Standards and regulations

- BGB German Civil Code
- VOB Part A – General provisions relating to the award of construction contracts
- VOB Part B – General conditions of contract relating to the execution of construction work
- DIN 4108 Thermal insulation and energy economy in buildings
- DIN 4109 Sound insulation in buildings
- DIN 18157 Execution of tilings and coverings by thin mortar bed technique
- DIN 18195 Waterproofing of buildings
- DIN 18202 Tolerances in building construction – Buildings
- DIN 18336 Waterproofing
- DIN 18352 Wall and floor tiling works
- DIN 18353 Laying of floor screed
- DIN 18356 Laying of parquet flooring and wood block flooring
- DIN 18365 Flooring works
- DIN 18533 Waterproofing of elements in contact with soil
- DIN 18534-1 Waterproofing for indoor applications
- DIN 18560 Floor screeds in building construction
- DIN EN 1991-1-1 General actions - Densities, self-weight, imposed loads for buildings
- DIN EN 1991-1-1/NA National Annex - Nationally determined parameters EN 1991-1-1
- DIN EN 1264 Floor heating - Systems and components
- DIN EN 12004 Adhesives for ceramic tiles
- DIN EN 13162 to 13171 Thermal insulation products for buildings
- DIN EN 13213 Hollow floors
- DIN EN 13813 Screed material and floor screeds
- TRGS 610, Annex to German Ordinance on Hazardous Substances

BVG Codes of Practice, Industriegruppe Estrichstoffe / Industrieverband WerkMörtel

- No. 1 “Flowing calcium sulphate screeds in areas of high humidity”
- No. 2 “Drying of flowing calcium sulphate screeds”
- No. 3 “Flowing calcium sulphate screeds in areas of high humidity”
- No. 4 “Assessment and treatment of the surfaces of flowing calcium sulphate screeds”
- No. 5 “Joints in flowing calcium sulphate screeds”
- No. 6 “Coloured flowing screeds”
- No. 7 “Flowing calcium sulphate screeds for remodeling, renovation and modernization”
- No. 8 “Light levelling mortar under flowing screed”
- No. 9 "Flowing calcium sulphate screeds as a substrate for large format tiles”

Code of Practice 4 BVG, Industriegruppe Baugipse

- No. 1 “Safe handing of transportable building site silos” (German only) of the BVG

Codes of Practice of the Zentralverbandes des Deutschen Baugewerbes (ZDB) (German only)

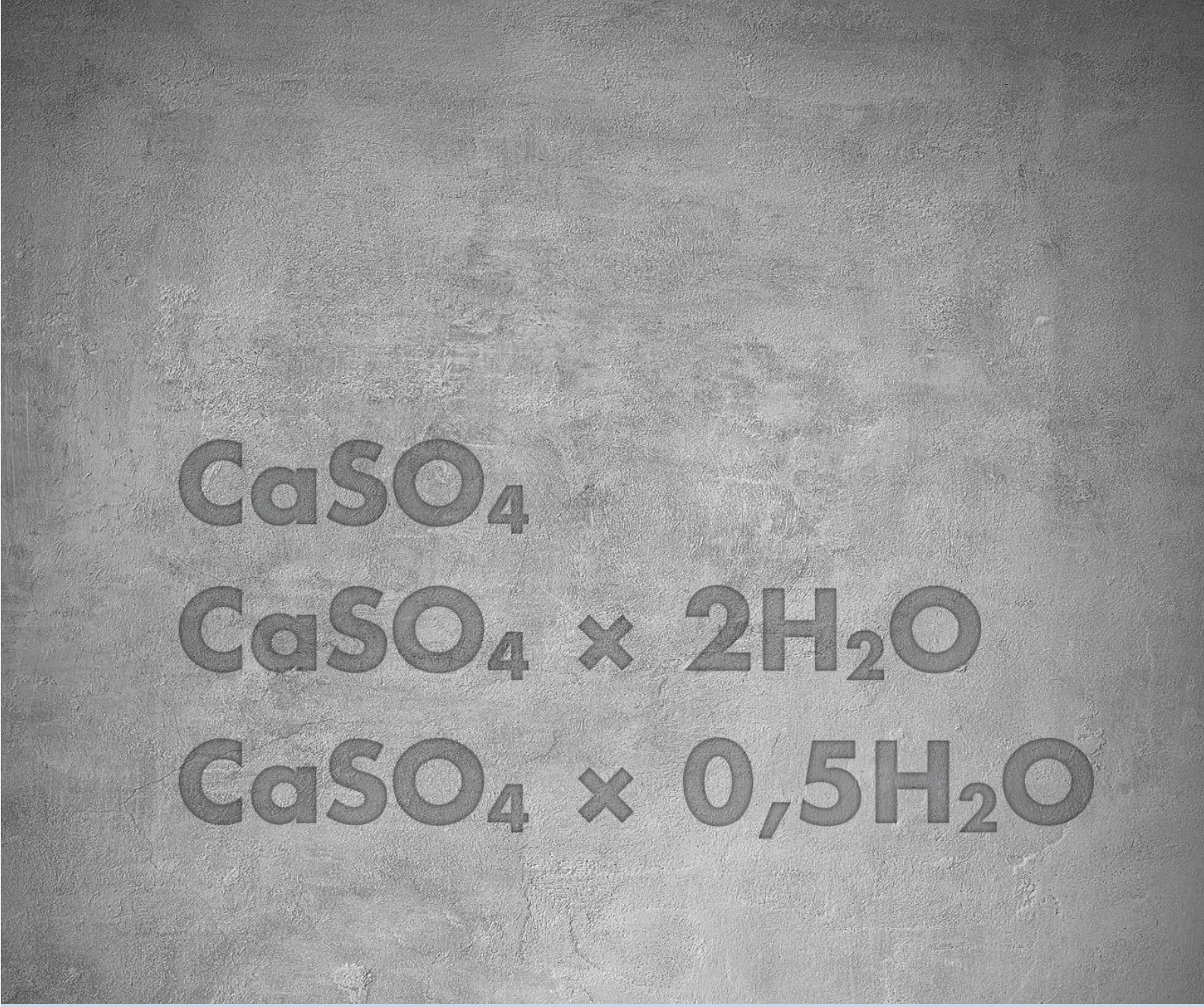
- [Assessment and preparation of substrates, application of elastic coverings, textile coverings and parquet].
- [Movement joints in linings and coverings made of tiles and ceramic panels].
- [Instructions for application of seals with linings and coverings made of tiles and ceramic panels for interiors].
- [Ceramic tiles and panels, natural stone work and artificial stonework on heated cementitious floor constructions].
- [Costing principles for calculations in the screed application trade].
- [Ceramic tiles and panels, natural stone work and artificial stonework on calcium sulphate screeds].

Technical information from the Association for Screed and Floor Covering (BEB)

- Instructions for planning, application and evaluation as well as surface preparation of calcium sulphate screeds
- Surface tensile strength and adhesive pull strength of floors
- Information on joints in screeds parts 1 + 2
- Climatic building conditions for drying screeds
- Instructions for clients for the time preceding the application of calcium sulphate screeds.
- Evaluation and preparation of substrates.
- Pipes, cables and cable ducts on basic ceilings
- Equalization layers made of light mortar
- Sealant materials in combination with floor coverings
- Accelerated drying of calcium sulphate screeds
- Calcium sulphate flowing screeds in highly trafficked areas
- Realization of floors with drains not used systematically (Emergency drainage)
- Interface between individual trades
- Evaluation and preparation of substrates/Adhesive application of elastic and textile coverings.

Informationsdienst Flächenheizung vom Bundesverband Flächenheizung und Flächenkühlung e.V. (BVF) in German only

- [Coordination of trades with area heating and area cooling in existing buildings]
- Coordination of trades with area heating and area cooling in existing buildings



Knauf product overview

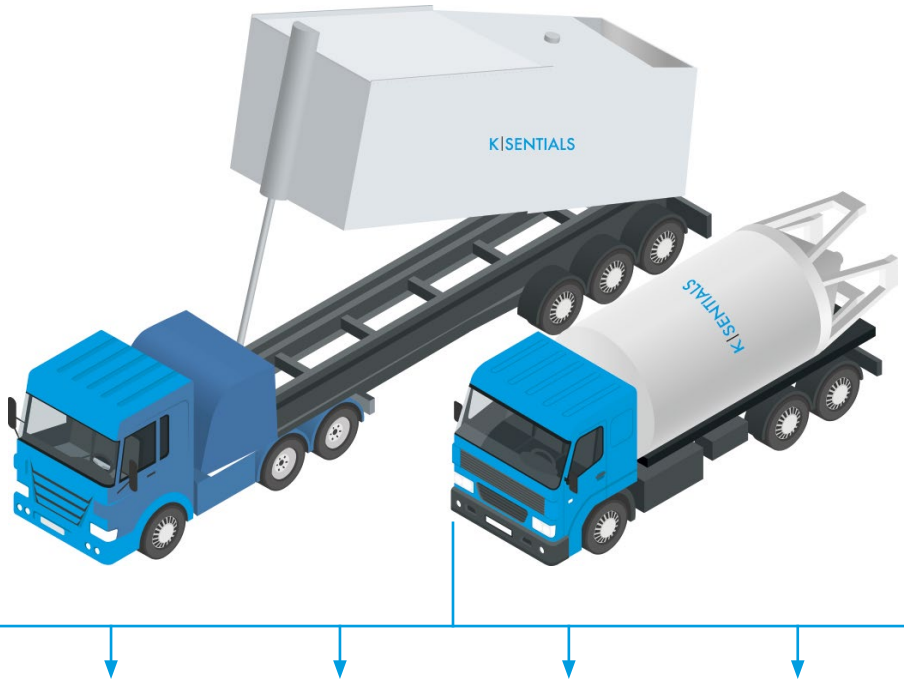
Flowing screed compounds for truck mixers and factory-mixed dry mortar technology

Knauf K-Sentials flowing screed compounds

Product	Duralpha F2003	Duralpha F 2201	Duralpha F2202	Durhydrit F plus
Classification acc. to EN 13454	CAB 30	CAB 30	CAB 30	CAB 30
pH value	≥ 7	≥ 7	≥ 7	≥ 7
Bulk density (bulk)	1120 - 1150 g/l	1120 - 1150 g/l	1120 - 1150 g/l	1120 - 1170 g/l
Storage (dry)	3 months	3 months	3 months	3 months
Order information	Bulk	Bulk	Bulk	Bulk
Mixer technology	Truck mixer	Truck mixer	Mobile mixer Truck mixer	Truck mixer
Common grain size of the aggregate	0 – 8 mm	0 – 8 mm	0 – 8 mm	0 – 8 mm
The following applies for a screed mix following EN 13454-2 consisting of 33 % K-Sentials flowing screed compound and 67 % standard sand (CEN standard sand DIN EN 196-1)				
Quality properties to EN 13813	CA-C25-F5	CA-C25-F5	CA-C25-F5	CA-C25-F5
Compressive strength (after 28 days)	≥ 25 N/mm²	≥ 25 N/mm²	≥ 25 N/mm²	≥ 25 N/mm²
Flexural strength (after 28 days)	≥ 5 N/mm²	≥ 5 N/mm²	≥ 5 N/mm²	≥ 5 N/mm²
Water / solid content ratio	approx. 0.15	approx. 0.15	approx. 0.15	approx. 0.15
Hägermann slump flow	approx. 240 – 260 mm	approx. 230 – 250 mm	approx. 230 – 250 mm	approx. 220 – 250 mm
Solidification time	approx. 300 min	approx. 400 min	approx. 300 min	approx. 300 min
Application/mortar temperature	5 – 32 °C	5 – 32 °C	5 – 32 °C	5 – 25 °C
Walkable after	24 hours	24 hours	24 hours	24 hours
Heatable after	3 days	3 days	3 days	7 days
Max. flow temperature with underfloor heating	55 °C	55 °C	55 °C	55 °C
Loadable after	3 days	3 days	3 days	3 days
Surface hardness	No grinding[1)]	No grinding[1)]	No grinding[1)]	No grinding[1)]
Product data sheet	IC015.de	IC016.de	IC017.de	IC021.de

1) No product-specific grinding required, but does not apply to sanding (cleaning process) of the screed surface directly before the top cover is applied.

Flowing screed compounds for mobile mixer and silo technology (unicameral and bicameral silo)



	Duralpha M 2011	Duralpha M 2015	Duralpha M 2211	Duralpha M 2215	Durhydrit M W	Durhydrit M WoF
	CAB 30	CAB 30	CAB 30	CAB 30	CAB 30	CAB 30
	≥ 7	≥ 7	≥ 7	≥ 7	≥ 7	≥ 7
	1120 - 1150 g/l	1120 - 1150 g/l	1120 - 1150 g/l	1120 - 1150 g/l	1120 - 1170 g/l	1150 - 1190 g/l
	3 months	3 months	3 months	3 months	3 months	3 months
	Bulk	Bulk	Bulk	Bulk	Bulk or Big Bag	Bulk
	Mobile mixer Factory-mixed dry mortar	Mobile mixer Factory-mixed dry mortar	Mobile mixer Factory-mixed dry mortar	Mobile mixer Factory-mixed dry mortar	Mobile mixer Factory-mixed dry mortar	Mobile mixer Factory-mixed dry mortar
	Mobile mixer 0 – 8 mm Factory-mixed dry mortar 0 – 4 mm	Mobile mixer 0 – 8 mm Factory-mixed dry mortar 0 – 4 mm	Mobile mixer 0 – 8 mm Factory-mixed dry mortar 0 – 4 mm	Mobile mixer 0 – 8 mm Factory-mixed dry mortar 0 – 4 mm	Mobile mixer 0 – 8 mm Factory-mixed dry mortar 0 – 4 mm	Mobile mixer 0 – 8 mm Factory-mixed dry mortar 0 – 4 mm
	The following applies for a screed mix following EN 13454-2 consisting of 33 % K-Sentials flowing screed compound and 67 % standard sand (CEN standard sand DIN EN 196-1)					
	CA-C25-F5	CA-C25-F5	CA-C25-F5	CA-C25-F5	CA-C25-F5	CA-C25-F5
	≥ 25 N/mm²	≥ 25 N/mm²	≥ 25 N/mm²	≥ 25 N/mm²	≥ 25 N/mm²	≥ 25 N/mm²
	≥ 5 N/mm²	≥ 5 N/mm²	≥ 5 N/mm²	≥ 5 N/mm²	≥ 5 N/mm²	≥ 5 N/mm²
	approx. 0.15	approx. 0.15	approx. 0.15	approx. 0.15	approx. 0.15	approx. 0.15
	approx. 240 – 260 mm	approx. 260 – 290 mm	approx. 230 – 260 mm	approx. 230 – 260 mm	approx. 220 – 250 mm	approx. 230 – 240 mm with addition of superplasticizing admixture
	approx. 150 min	approx. 150 min	approx. 120 min	approx. 180 min	approx. 150 min	approx. 70 min (binder)
	5 – 40 °C	5 – 40 °C	5 – 40 °C	5 – 40 °C	5 – 25 °C	5 – 25 °C
	24 hours	24 hours	24 hours	24 hours	24 hours	24 hours
	3 days	3 days	3 days	3 days	7 days	7 days
	55 °C	55 °C	55 °C	55 °C	55 °C	55 °C
	3 days	3 days	3 days	3 days	3 days	3 days
	No grinding[1)]	No grinding[1)]	No grinding[1)]	No grinding[1)]	No grinding[1)]	No grinding[1)]
	IC007.de	IC011.de	IC012.de	IC029.de	IC023.de	IC019.de

1) No product-specific grinding required, but does not apply to sanding (cleaning process) of the screed surface directly before the top cover is applied.

Knauf leveller and equalization compounds

Table 23: Knauf leveller and equalization compounds

Properties	Knauf N 345 Form (F417a.de)	Knauf N 320 Sprint (F411.de)	Knauf N 320 Flex (F415.de)
			
Field of application	Stable levelling compound	Ideal for cementitious substrates	Ideal on wooden and critical substrates
Layer thickness	1 – 45 mm	0 – 20 mm	3 – 20 mm
Quality properties to EN 13813	CT-C50-F8	CT-C30-F7	CT-C25-F5
Tensile strength (ref. values) after 28 days Compressive strength Bending tensile strength	 ≥ 50 N/mm² ≥ 8 N/mm²	 ≥ 30 N/mm² ≥ 7 N/mm²	 ≥ 25 N/mm² ≥ 5 N/mm²
Material consumption per mm layer thickness	approx. 1.5 kg/m²	approx. 1.6 kg/m²	approx. 1.6 kg/m²
Density wet dry	 approx. 1.9 kg/l approx. 1.8 kg/l	 approx. 2.0 kg/l approx. 1.8 kg/l	 approx. 2.0 kg/l approx. 1.8 kg/l
■ Machine application bags ■ Machine application silo ■ Manual application	– – Agitator	PFT G 4 + PFT ROTOMIX disc or agitator – Agitator	PFT G 4 + PFT ROTOMIX disc or agitator – Agitator
Agitator application Water quantity	25 kg bag approx. 5.5 l	25 kg bag approx. 5.75 l	25 kg bag approx. 5.75 l
Machine application slump flow (1.3 l checking tin)	–	< 63 cm	≤ 64 cm
Application time ("Pot life") Work life on the surface	– 	approx. 30 min approx. 20 min	approx. 30 min approx. 20 min
Walkable (depending on thickness and temperature)	after approx. 0.5 h	after approx. 1.5 h	after approx. 3 h
Ready to cover for floor covering (20 °C, 65% relative humidity) ■ Vapour-tight coverings ■ Vapour retardant coverings ■ Vapour permeable coverings ■ Tiles ■ As a heated screed	 approx. 45 min	 3 mm ca. 3 – 4 hours, 5 mm ca. 12 hours, 10 mm ca. 24 hours, 20 mm ca. 48 hours – – approx. 4 hours –	 3 mm ca. 3 – 4 hours, 5 mm ca. 12 hours, 10 mm ca. 24 hours, 20 mm ca. 48 hours – – approx. 4 hours –
Ready for covering with residual moisture (test with CM tester) ■ For vapour-tight coverings ■ For vapour-retardant covering ■ For vapour-permeable coverings ■ For tiles ■ As a heated screed	 ≤ 2.5 CM-% – ≤ 3.0 CM-% ≤ 3.0 CM-% –	 ≤ 2.5 CM-% – ≤ 3.0 CM-% ≤ 3.0 CM-% –	 ≤ 2.5 CM-% – ≤ 3.0 CM-% ≤ 3.0 CM-% –
Chair roll resistance from layer thickness	2 mm	2 mm	3 mm
Application on heated screed	Yes	Yes	Yes
Supplied in bags silo	25 kg sack –	25 kg sack Bulk (on request)	25 kg sack –
Storage (dry)	Up to 9 months in orig. packaging	Orig. packaging 9 months, bulk 9 months	Up to 9 months in original packaging

	Knauf N 330 Premium (F412b.de)	Knauf N 340 (F413.de)	Knauf N 340 Sprint (F413a.de)
			
	Easy to sand premium equalization compound	Ideal for exterior and wet areas	Quick layer thickness allrounder
	0 – 30 mm	5 – 40 mm	2 – 40 mm
	CT-C35-F7	CT-C25-F7	CT-C35-F7
	≥ 35 N/mm² ≥ 7 N/mm²	≥ 25 N/mm² ≥ 7 N/mm²	≥ 35 N/mm² ≥ 7 N/mm²
	approx. 1.5 kg/m²	approx. 1.6 kg/m²	approx. 1.7 kg/m²
	approx. 2.0 kg/l approx. 1.8 kg/l	approx. 2.0 kg/l approx. 1.8 kg/l	approx. 2.0 kg/l approx. 1.8 kg/l
	PFT G 4 + agitator – Agitator	PFT G 4 + PFT ROTOMIX D-pumps PFT FERRO 50 Agitator	PFT G 4 + PFT ROTOMIX disc or agitator – Agitator
	25 kg bag approx. 6.0 l	25 kg bag 5 – 20 mm approx. 4.75 l 20 – 40 mm approx. 4.50 l	25 kg bag approx. 4.75 l
	≤ 66 cm	5 – 20 mm ≤ 57 cm 20 – 40 mm ≤ 55 cm	≤ 64 cm
	approx. 20 min approx. 10 min	approx. 30 min approx. 20 min	approx. 30 min approx. 20 min
	after approx. 1.5 – 2.0 h	after approx. 3 h	after approx. 3 h
	Textile floor coverings ca. 3 – 4 hours, PVC/linoleum approx. 12 hours, rubber/parquet approx. 24 h – – approx. 2 hours –	20 mm approx. 6 days, 40 mm approx. 16 days – – 20 mm approx. 3 days, 40 mm approx. 10 days –	3 mm ca. 3– hours, 5 mm ca. 12 hours, 10 mm ca. 24 hours 20 mm ca. 48 hours, 30 mm ca. 72 hours – – approx. 4 hours –
	≤ 2.5 CM-% – ≤ 3.0 CM-% ≤ 3.0 CM-% –	≤ 2.5 CM-% – ≤ 3.0 CM-% ≤ 3.0 CM-% –	≤ 2.5 CM-% – ≤ 3.0 CM-% ≤ 3.0 CM-% –
	2 mm	5 mm	2 mm
	Yes	Yes	Yes
	25 kg sack –	25 kg sack Bulk	25 kg sack Bulk (on request)
	Up to 18 months in original packaging	Original packaging up to 18 months, bulk 9 months	Original packaging up to 9 months, bulk 9 months

Knauf leveller and equalization compounds (continued)

Properties	Knauf N 410 (F421.de)	Knauf N 410 Flex (F421a.de)	
			
Field of application	Ideal on pre-fab floor screed	Ideal on wooden and critical substrates	
Layer thickness	0 – 10 mm	3 – 10 mm	
Quality properties to EN 13813	CA-C25-F7	CA-C25-F7	
Tensile strength (reference values) after 28 days Compressive strength Bending tensile strength	 ≥ 25 N/mm² ≥ 7 N/mm²	 ≥ 25 N/mm² ≥ 7 N/mm²	
Material consumption per mm layer thickness	approx. 1.6 kg/m²	approx. 1.6 kg/m²	
Density wet dry	 approx. 1.9 kg/l approx. 1.7 kg/l	 approx. 1.9 kg/l approx. 1.7 kg/l	
■ Machine application bags ■ Machine application silo ■ Manual application	PFT G 4 + PFT ROTOMIX disc or agitator – Agitator	PFT G 4 + PFT ROTOMIX disc or agitator – Agitator	
Agitator application Water quantity	25 kg sack approx. 6.0 l	25 kg sack approx. 6.0 l	
Machine application slump flow (1.3 l checking tin)	≤ 67 cm	≤ 67 cm	
Application time ("Pot life") Work life on the surface	approx. 30 min approx. 20 min	approx. 30 min approx. 20 min	
Walkable (depending on the thickness and temperature)	after approx. 2 h	after approx. 2 h	
Ready to cover for floor covering (20 °C, 65% relative humidity) ■ Vapour-tight coverings ■ Vapour retardant coverings ■ Vapour permeable coverings ■ Tiles ■ As a heated screed	 2 mm approx. 2 days, 10 mm approx. 8 days – – 2 mm approx. 1 days, 10 mm approx. 5 days –	 3 mm approx. 3 days, 10 mm approx. 8 days – – 3 mm approx. 1 days, 10 mm approx. 5 days –	
Ready for covering at residual moisture (check with CM tester) ■ For vapour-tight coverings ■ For vapour-retardant covering ■ For vapour-permeable coverings ■ For tiles ■ As a heated screed	 ≤ 0.5 CM-% – ≤ 1.0 CM-% ≤ 1.0 CM-% –	 ≤ 0.5 CM-% – ≤ 1.0 CM-% ≤ 1.0 CM-% –	
Chair roll resistance from layer thickness	2 mm	3 mm	
Application on heated screed	Yes	Yes	
Supplied in bags silo	25 kg sack –	25 kg sack –	
Storage (dry)	Up to 18 months in original packaging	Up to 18 months in original packaging	

	Knauf N 430 (F423.de)	Knauf N 440 (F422.de)
		
	Layer thickness allrounder	Ideal for thin layer underfloor heating
	2 – 30 mm	10 – 40 mm
	CA-C20-F6	CA-C25-F6
	≥ 20 N/mm² ≥ 6 N/mm²	≥ 25 N/mm² ≥ 6 N/mm²
	approx. 1.6 kg/m²	approx. 1.8 kg/m²
	approx. 1.9 kg/l approx. 1.7 kg/l	approx. 2.2 kg/l approx. 2.0 kg/l
	PFT G 4 + PFT ROTOMIX disc or agitator – Agitator	PFT G 4 + PFT ROTOMIX D-pumps PFT FERRO 50 Agitator
	25 kg sack approx. 6.5 l	25 kg sack approx. 4.4 – 5.0 l
	≤ 66 cm	< 56 cm
	approx. 30 min approx. 20 min	approx. 30 min approx. 10 min
	after approx. 3 h	after approx. 5 h
	2 mm approx. 2 days, 10 mm approx. 8 days – – 2 mm approx. 1 days, 10 mm approx. 5 days –	20 mm approx. 14 days 20 mm approx. 7 days 20 mm approx. 7 days 20 mm approx. 7 days 20 mm approx. 7 days
	≤ 0.5 CM-% – ≤ 1.0 CM-% ≤ 0.5 CM-% –	≤ 0.5 CM-% ≤ 1.0 CM-% ≤ 1.0 CM-% ≤ 1.0 CM-% ≤ 0.5 CM-%
	2 mm	10 mm
	Yes	Yes
	25 kg sack Bulk (on request)	25 kg sack Bulk
	Up to 6 months in original packaging Bulk material up to 6 months	Up to 6 months in original packaging Bulk material up to 6 months

Knauf special products

Table 24: Knauf special products

Products	Application	Consumption	Order information	Images
Knauf Stretto Quick setting screed mortar consisting of Stretto Sand and Knauf FE-Imprägnierung impregnation agent, water-free, ready for covering after 24 hours.	By machine with a compressed air conveyor or batch mixer	Approx. 17 kg Stretto-Sand and 0.7 kg FE-Imprägnierung impregnation agent per 1 cm thickness and m²	Stretto Sand Bag 25 kg FE-Imprägnierung impregnation agent Bucket 1 kg Bucket 5 kg Bucket 10 kg (combo pack)	
Knauf Schnellestrich CT Conventional, fast-setting cementitious screed that can be used as a bonded screed, on a separating layer or on an insulating layer. At a layer thickness of 40 mm, Knauf Schnellestrich CT is ready for covering after 24 hours.	By machine or by hand	Approx. 20 kg/ m² per cm screed thickness	Bag 25 kg	
Knauf FE-Imprägnierung impregnation agent Two component epoxy resin as a bonding primer under bonded screed, as a component for quick-setting screed Knauf Stretto, as a component of the quick setting levelling mortar Knauf EPO-Leicht	Agitator, lambskin roller	Approx. 150 – 400 g/ m^2 depending on area of application	Bucket 1 kg Bucket 5 kg Bucket 10 kg (combo pack)	

Knauf floor leveller

Table 25: Basic floor levelling

Products	Application	Consumption	Order information	Images
Knauf Trockenschüttung PA dry bulk leveller For levelling uneven substrates. Min. leveller height 2 cm. Under flowing screed with cover boards. Also for levelling under pre-fab floor screeds.	By hand, with levelling board and height gauges	10 l per 10 mm/m² height adjustment	Bag approx. 28 kg = 50 l	
Knauf Schwere Schüttung heavy-duty acoustic infill Infill for improvement of the sound insulation with wood joist ceilings and for levelling uneven substrates. Min. leveller height 1.5 cm. Under mineral wool insulation layer and flowing screed with cover board. Also for levelling under thin-layer underfloor heating and pre-fab floor screeds.	By hand, with levelling board and height gauges	16.5 kg per 10 mm/m^2 height adjustment	Bag approx. 25 kg	

Products	Application	Consumption	Order information	Images
Knauf EPO-Leicht Quick setting light levelling mortar consisting of Knauf EPO-Perl and Knauf FE-Imprägnierung, low weight, water-free.	Agitator	10 litres EPO-Perl and 0.17 kg FE-Imprägnierung impregnation agent per 1 cm thickness and m²	EPO-Perl Bag 60 litres FE-Imprägnierung impregnation agent Bucket 1 kg Bucket 5 kg Bucket 10 kg (combo pack)	
Knauf S 400 Sprint Knauf S 400 Sprint is a quick-drying light levelling mortar made of EPS aggregate and a cement-based special binder. The high compressive strength and quick drying ensures that Knauf S 400 Sprint can be subjected to high loads after just one day. Knauf S 400 Sprint is resistant to water.	Agitator	10 liters Knauf S 400 Sprint per 1 cm thickness and m²	Knauf S 400 Sprint Bag 60 litres	

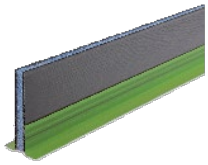
Knauf seals

Table 26: Seals

Products	Application	Consumption	Order information	Images
Knauf Katja Sprint Abdichtungsbahn sealing membrane Sealing membrane made of polymer bitumen with glass fleece and aluminium layer, self-adhesive on long edge, 1.25 m wide. For sealing against ground moisture acc. to DIN 18533-1: W 1.1-E and W 1.2-E.	Roll out and bond by hand	1:08 m^2 per m^2	Roll 32 x 1.25 m (40 m^2)	
Knauf Katja Sprint Anschlussstreifen connector tape Self-adhesive 200 mm wide polymer bitumen strips. For establishing connections between Knauf Katja Sprint Abdichtungsbahn sealing membrane and rising constructional components. Sealing of front end joints with Knauf Katja Sprint Abdichtungsbahn sealing membrane	By hand, if required with hot air gun	1 m per m connection length	Roll 15 x 0.2 m	
Knauf Katja Sprint Anschlussfix High-quality, plastic and permanently sticky surface adhesive on the basis of a hybrid polymer. For connection of the Knauf Katja Sprint Abdichtungsbahn sealing membrane to the moisture barrier in interiors	By machine or by hand	Approx. 62 ml per m	Cartridge	
Knauf FE-Abdichtung sealing shield A "liquid foil" on the basis of a two component epoxy resin. On basic concrete substrates, as sealing bonding primer under bonded screeds, against ground moisture to DIN 18195-4.	Agitator, lambskin roller floor coater	Approx. 600 – 1000 g/m^2	Bucket 10 kg (combo pack)	

Knauf accessories

Table 27: Knauf accessories

Products	Application	Consumption	Order information	Images
Knauf Holzfaserdämmplatte WF ■ As an impact noise layer under screeds such as Knauf N 440 on thin layer underfloor heating ■ As a covering board on Knauf Trockenschüttung PA dry bulk leveller 10 mm thick, 598 mm wide, 1198 mm long Thermal conductivity λ_R 0.07 W/(m·K)	1 m^2 per m^2 screed surface	–	Pallet: 226 pieces	
Knauf Schrenzlage Foil coated soda kraft paper acc. to DIN 18560 1.25 m wide For covering the insulation layer or for screed on the separating layer	Approx 1.1 m^2 per m^2 screed surface (overlap)	–	Roll 80 x 1.25 m (approx. 100 m^2)	
Knauf mineral wool edge insulation strips 12 mm thick, 100 mm wide	1 m per m connection length	–	Package 100 pieces	
Knauf Randdämmstreifen FE **8/100** 8 mm thick, 100 mm wide with laminated foil **10/120** 10 mm thick, 120 mm wide with laminated foil and adhesive strip on rear	1 m per m connection length	–	Roll 40 m	
Knauf Movement Joint 12/80 As a movement joint, e.g. in doorways, made of elastic foam and self-adhesive base. The notching pliers is used to make holes in the movement joint to facilitate heating tubes	1 m per m joint	–	Unit 2 m	
Movement joint made of Knauf individual components As a movement joint, e.g. in doorways. Joint tape (A) is placed against profile (B), which it then attached with adhesive tape to the insulation layer: A: Knauf Control joint trim profile 10/70 B: Knauf L profile 50/30	Per m joint length 1 m 1 m	–	Application see ppage 39. Roll 25 m Unit 3 m	 

Products	Application	Consumption	Order information	Images
Knauf Abstellwinkel 30/60 Cardboard angle made of multi-layer paper, both arms can be used to suit height. For manufacturing movement joints with heating floor screed in doorways or with different screed heights (levels), as a construction joint. Size: 30/60 mm	1 m per m joint length	–	Unit 3 m	
Knauf Spezialhaftgrund floor dispersion primer Primer concentrate on the basis of a synthetic resin emulsion. For regulating the absorptivity, improving bonding properties and moisture protection before the application of floor levelling compound or tiles.	Floor coater, painter's brush, prime brush or roller	Normally absorbent substrates: 50 – 100 g/m^2 Non-absorbent substrates: 40 – 60 g/m^2 Old tile coverings, terrazzo: 70 – 100 g/m^2 Wooden substrates: 60 – 80 g/m^2 On pre-fab floor screed: approx. 50 g/m	Bucket 5 kg	
Knauf Estrichgrund screed primer Solvent-free primer and bonding primer For regulating the absorptivity and improving bonding properties on basic floor, as a surface treatment on flowing screeds and with pre-fab floor screed	Floor coater, painter's brush, prime brush or roller	Undiluted ■ On basic floor: approx. 150 g/m^2 ■ On flowing screed: approx. 100 g/m^2 ■ On pre-fab floor screed approx. 50 g/m²	Bucket 5 kg Bucket 10 kg	
Knauf Schnellgrund rapid primer Quick-drying, solvent-free primer and bonding primer For regulating the absorptivity and improving bonding properties on basic floor, as a surface treatment on flowing screeds and with pre-fab floor screed	Floor coater, painter's brush prime brush or roller	On basic floor: approx. 150 g/m^2 On flowing screed: approx. 110 g/m^2 On chipboard V100: approx. 90 g/m² On pre-fab screed: approx. 80 g/m^2	Bucket 5 kg Bucket 10 kg	

Further products for flooring

Sealing products range

Knauf Flex-Dicht

Highly-flexible fibre-reinforced sealing materials on a cementitious basis. Also covers subsequently appearing cracks. For sealing areas subject to moisture, rooms with drains in the floor, areas subjected to high changes in temperature (heating floor screeds, balconies, terraces).

Knauf Flächendicht sealant

Ready-to-use solvent-free and bitumen-free emulsion for sealing areas of high humidity (e.g. bathrooms, showers).

Knauf Flächendichtband sealing tape

For corners and edges. For use in conjunction with Knauf Flex-Dicht or Knauf Flächendicht.

Adhesive mortar range

All Knauf powder adhesives are tested acc. to EN 12004.

Knauf Bau & Fliesenkleber (building and tile adhesive)

Cementitious powder-adhesive for thin-bed application of ceramic tiles, mosaics, and similar. Exceeds C1TE.

Knauf Flexkleber extra

Extra strong, highly-flexible thin-bed adhesive in premium quality: 90 % dust reduced and high yield.

Suitable for all common substrates. Also for tile-on-tile. Precision application of large format wall tiles. For all ceramic tiles, porcelain, stoneware, earthenware and non-translucent natural stone. Also perfect for thermally stressed substrates such as underfloor heatings, terraces and balconies. Exceeds C2TE S1.

Knauf Mittelbettkleber XXL

Flexible, fast thin-bed, middle-bed and pourable bed adhesive. Levelling and adhesive application in a single step. Ideal for large format and uncalibrated floor tiles made of ceramic, stoneware, earthenware, cotto and non-translucent natural stone. Can be set from firm to flowable - for rust-free application. Also perfect for highly stressed and thermally stressed substrates such as underfloor heating, terraces, balconies, steps, etc. walkable and ready for grouting after just 3 hours. Exceeds C2FE.

Knauf Flexkleber schnell

Quickly loadable thin bed mortars for ceramic coverings and stoneware. Walkable and ready for grouting after 3 hours. Exceeds C2FT S1.

Knauf Marmor- & Granitkleber

White thin-bed mortar for natural stone slabs, marble, glass mosaic and other translucent tiles and slabs. Exceeds C1FT.

Grouting mortar range

Knauf Deco-Flexfuge

Grouting mortar for absorbent ceramic tiles. Joint width 2 to 8 mm.

Knauf Flex-Fugenbreit

Slurry-lile and pourable consistence, self-levelling grout for grouting floors with 5 to 50 mm gap between tiles. For cavity-free grouting. Ideal for irregular joint widths and difficult to clean covering materials.

Knauf Marmor- & Granit-Flexfuge

Flexible, quick-setting special grouting mortar for marble and natural stone coverings with joint gaps from 2 to 15 mm.

Knauf Flexfuge schnell

Flexible, quick setting special grouting mortar for non-absorbent tiles and stoneware. With Knauf pearl effect. Ideal for areas of high humidity, pre-prefab floor screeds, heating floor screed, gypsum boards, gypsum fibre boards, balconies and terraces. For joint widths from 2 to 15 mm.

Note	See also knauf-bauprodukte.de

Notes on the document

Knauf technical brochures are the information documents on special topics as well as on the specialist competence from Knauf. The contained information and specifications, constructions, details and stated products are based, unless otherwise stated, on the certificates of usability (e.g. National Technical Test Certificate (abP) valid at the date they are published as well as on the applicable standards. Furthermore, design and structural requirements and those regarding building physics (fire protection and sound insulation) are considered.

The contained construction details are examples and can be used in a similar way for various cladding variants of the respective system. At the same time, the demands made on fire resistance and/or sound insulation as well as any necessary additional measures and/or limitations must be observed.

References to other documents

Technical information

- Heating up regulations and protocol for flowing screeds manufactured on the basis of K-Sentials flowing screed compound Durhydrit and aggregates VT06.de
- Heating up regulations and protocol for flowing screeds manufactured on the basis of K-Sentials flowing screed compound Duralpha and aggregates VT07.de
- Drying schedule for flowing screed manufactured on the basis of K-Sentials flowing screed compound Duralpha VT08.de
- Drying schedule for flowing screed manufactured on the basis of K-Sentials flowing screed compound Durahydrit VT09.de
- Application instructions K-Sentials flowing screed compounds for truck mixers VT11.de
- Knauf movement joints for flowing screed Bo16.de

Technical brochures

- The right bond is decisive Bo20.de
- Knauf Binders - Gypsum for industrial applications So63.de

Folders

- Fire resistance with Knauf BS1.de (German only)
- Sound insulation and room acoustics with Knauf (only sections in English)

Product data sheets

- Observe the product data sheets of the Knauf system components

Symbols in this technical brochure

The following symbols are used in this document:

Insulation layers

(S) Mineral wool insulation layer acc. to EN 13162
non-combustible
melting point ≥ 1000 °C acc. to DIN 4102-17
(insulating material, e.g. from Knauf Insulation)

Intended use of Knauf systems

Please observe the following:

Caution	Knauf systems may only be used for the application cases as stated in the Knauf documentation. In case third-party products or components are used, they must be recommended or approved by Knauf. Flawless application of products / systems assumes proper transport, storage, assembly, installation and maintenance.

KNAUF

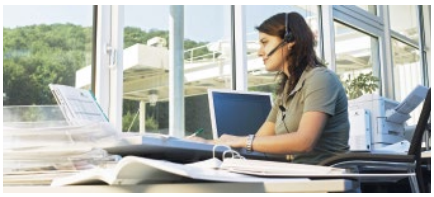
K|SENTIALS

BENEFIT FROM THE VALUABLE SERVICES FROM KNAUF

KNAUF DIREKT

Our technical advisory service – from professionals for professionals! Choose the direct line to "just in time" consultation and benefit from our extensive experience giving you the assurance that you need..

› Contact us at knauf-direkt@knauf.de



KNAUF CUSTOMER SERVICES

Our customer services support your daily business and are happy to help whenever you need assistance. For regional customer services and more information please consult

› www.knauf.com

KNAUF DIGITAL

Web or App – Technical documentation, calculation tools, interactive animations, and lots more are available around the clock and free-of-charge from the digital world of Knauf. Clicks that are really worth it!

› www.k-sentails.com
› www.knauf.de
› www.youtube.com/knauf
› www.twitter.com/Knauf_DE
› www.facebook.com/KnaufDE

Knauf Gips KG
Am Bahnhof 7
97346 Iphofen
Germany

F20-IC.de/eng/10.20/0/TBr

Knauf AMF
Ceiling systems

Knauf Bauprodukte
Professional DIY solutions

Knauf Design
Competence in surfaces

Knauf Gips
Drywall systems
Plaster and façade systems
Floor systems

Knauf Insulation
Insulation system for renovation and new projects

Knauf Integral
Gypsum fibre technology for floors, walls and ceilings

Knauf Performance Materials
TecTem®
Loose fill insulation material

Knauf PFT
Machine technology and plant engineering

Marbos
Mortar systems for cobblestone paving

Sakret Bausysteme
Dry mortars for new projects and renovations