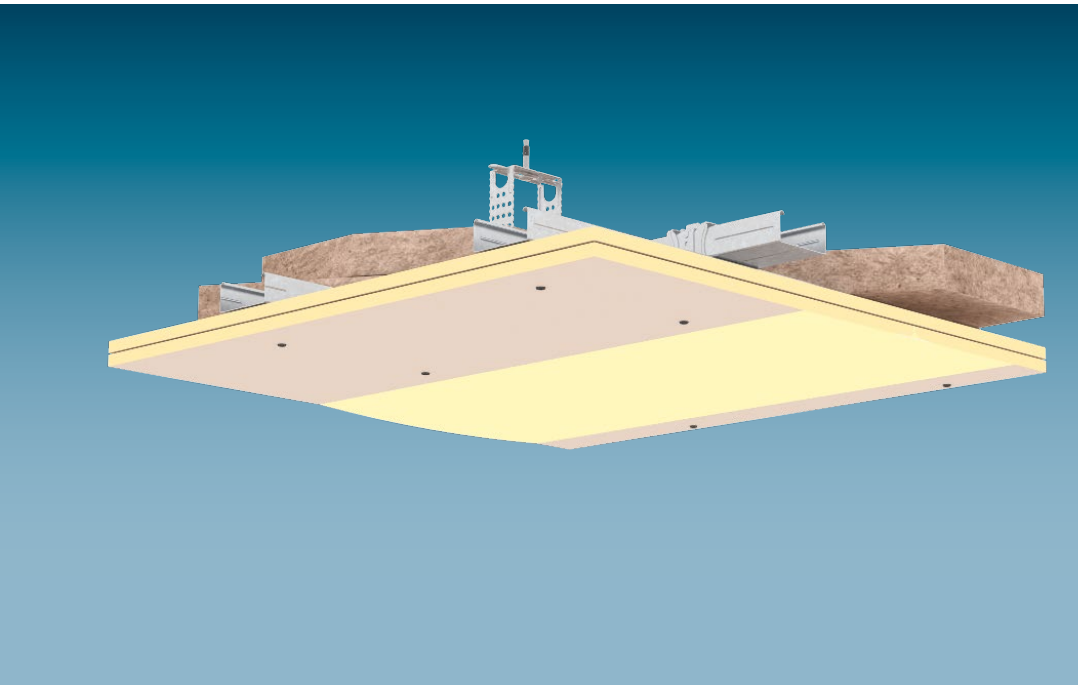


Drywall Systems

K11.de

System Data Sheet 2022-09

Knauf X-Ray Shielding Ceiling Systems

K112.de – Knauf X-Ray Shielding Ceiling Safeboard
K115.de – Knauf X-Ray Shielding Ceiling Lead Sheet

Note on English translation / Hinweise zur englischen Fassung

This is a translation of the system data sheet 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 Detailblattes. 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

Notes on the document

Knauf system data sheets are the basis for planning and application for planners and professional installers when applying Knauf systems. 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 (e.g. abP) valid at the date they are published as well as on the applicable standards. Additionally, design and structural requirements and those relating to building physics (fire resistance 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

System data sheets

- Knauf Board Ceiling D11.de
- Knauf X-Ray Shielding Partition Systems K13.de
- Knauf X-Ray Shielding Furring and Lining K15.de

Folders

- Fire resistance with Knauf BS1.de (German only)

Product data sheets

- SYSTEM X-ray shielding Safeboard E139.de
- Observe the product data sheets of the Knauf system components.

Pictograms in the system data sheet

The following pictograms are used in this document:

X-Ray shielding

With Knauf Safeboard X-Ray Shielding Boards (lead-free)

With lead sheet laminated gypsum boards

Symbols in the system data sheet

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 materials e.g. from Knauf Insulation)

Stud frame spacings

a Spacing of suspenders/anchors

b Axial spacing furring channel (cladding span width)

c Axial spacing carrying channel (spacing furring channel)

Legend symbols

1 Legend number that will be explained when used

Intended use of Knauf systems

Please observe the following:

Caution	Knauf systems may only be used for the application cases specified 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.

General notes on Knauf systems

Term definition

Lead equivalence (mm Pb)

An material of lead equivalence 1 mm Pb (Pb = chemical symbol for lead) provides the equivalent shielding effect of a 1 mm thick lead sheet.

Field of application

The specifications in this system data sheet only apply for suspended ceilings in interiors. X-ray shielding ceilings are applied in the fields of X-ray diagnostics and low-power X-ray therapy. Radiation protection is provided in the form of shielding, room-enclosing components with specific lead equivalences of the used materials.

Notes on X-ray shielding

The rules for the application of structural X-ray shielding are defined in the DIN 6812. The basis of all structural measures for X-ray protection is the radiation protection plan, which has to be created by the manufacturer of the X-ray unit.

The thickness of the required radiation shielding depends on the tube voltage of the device type used (depending on the medical application) and is stated for lead as the shielding material. The higher the tube voltage, the thicker the necessary layer of lead or the necessary Safeboard cladding thickness.

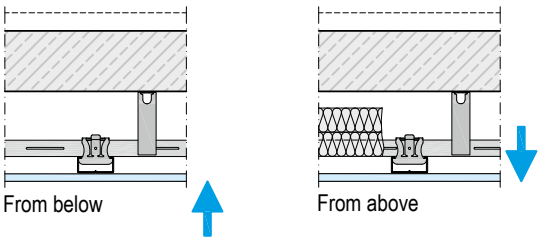
Note	Knauf Safeboard is designed for shielding against X-rays up to 150 kV.

Notes on fire resistance

If the fire resistance effect from the classification of Knauf board ceiling is achieved without involvement or consideration of the basic ceiling, the fire resistance is referred to as *solely*.
This is relevant in particular when the plenum is to be protected against the exposure to fire from the room (fire resistance *solely from below*) or a protective effect for the room against fire exposure in the plenum (fire resistance *solely from above*).
A combination of both requirements may be necessary depending on the requirements stipulated by the building inspectorate and/or fire resistance concept.

Representation of the fire resistance effect

- Suspended ceilings allocated solely to a single fire resistance class
  - Room-enclosing



Note	Fire protection from below and from above in connection with raw ceilings of construction types I-III (solid ceilings) and IV (wooden joist ceilings) according to the specifications of the folder Knauf BS1.de, observing the maximum furring profile axial spacing of ≤ 400 mm, preferably 312.5 mm.

Construction notes

Movement joints

Movement joints of the main structure should be integrated into the construction of the X-Ray shielding ceiling. In case of continuous X-ray Shielding Ceilings, at spacing of approx. 15 m movement joints are required.

Proof of Usability

Knauf System	X-Ray shielding	Fire resistance	Sound insulation Airborne and footfall sound
K112.de	TÜV NORD Röntgentechnik, Technical report of 22.09.2008	AbP P-2100/199/15-MPA BS	On request
K115.de	DIN 6812	–	–

The stated constructional and structural properties, and characteristic building physics of Knauf systems can solely be ensured with the exclusive use of Knauf system components, or other products expressly recommended by Knauf. The validity and up-to-datedness of the stated proofs have to be considered.

Notes on fire resistance

The specifications marked with plus offer additional application options, which are not directly included in the Proof of Usability. On the basis of our technical assessments, we assume that these marked design solutions can be assessed as a non-significant divergence. On request, we can make the documentation on which this assessment is based, such as experts opinions or technical assessments, available to you together with the Certificate of Usability. We recommend that a non-significant divergence be coordinated and authorised in advance in consultation between the persons responsible for fire resistance and/or the relevant authorities.

plus Extension of the fire resistance Proof of Usability

Prior consultation with respect to fire resistance notes recommended.

Knauf System	Divergences
K112.de	■ Divergences to the abP

Dimensioning principles

To read off the required spacings for the grid, it is first of all necessary to determine the load class taking into consideration the self-weight of the selected system variant including any existing or planned additional loads.

Example: K112.de Knauf X-Ray Shielding Ceiling Safeboard

Step 1:

Determination of the rated weight

The rated weight is used for determining the necessary frame and does not include any safety values. In dependence on the selected cladding thickness (system variants), the rated weight (cladding with timber frame) of the suspended ceiling / ceiling cladding can be read off from the Knauf systems table.

Fire resistance class		Cladding		Rated weight	Furring channel	Insulation layer Required for fire resistance	
In case of fire exposure			Minimum thickness	Without insulation layer	Maximum spacings (b)	Minimum thickness	Minimum density
From below	From above	Safeboard	mm	kg/m²	mm	mm	kg/m³
K112.de Knauf X-Ray Shielding Ceiling Safeboard							
F30	–	●	2x 12.5	39.4	312.5	–	

Note	Rated weight with larger board thicknesses and/or other board types on request.

Step 2:

Consideration of additional loads

Additional loads, e.g. consisting of fire resistance necessary and unnecessary insulation materials, as well as planned anchoring loads (see page 15) increase the total area weight of the ceiling lining / suspended ceiling and must be considered with the rating of the load class.
(Rated weight + weight of additional loads = total area weight)

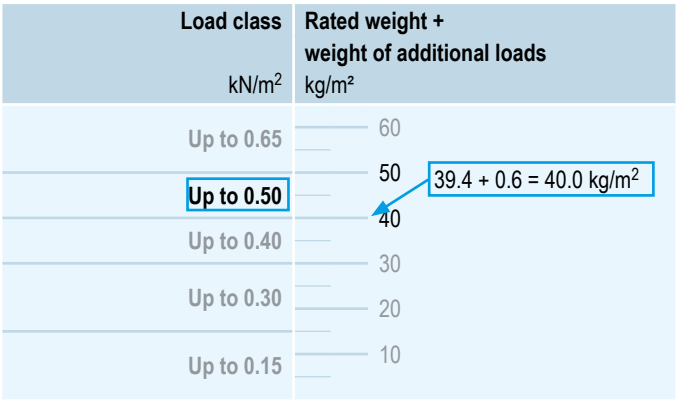
Example additional load: 20 mm insulation material = 0.6 kg/m²

Step 3:

Determination of the load class

Based on the resulting total area load of the ceiling lining / suspended ceilings, the corresponding load class (kN/m²) can be determined from the load class diagram.

Determination of the load class



The self-weight of the ceiling may not exceed 0.50 kN/m². The load class up to 0.65 kN/m² may only be used in combination with additional loads, e.g. multi-level ceiling system. Rated acc. to DIN 18168-1.

Step 4:

Dimensioning of the grid

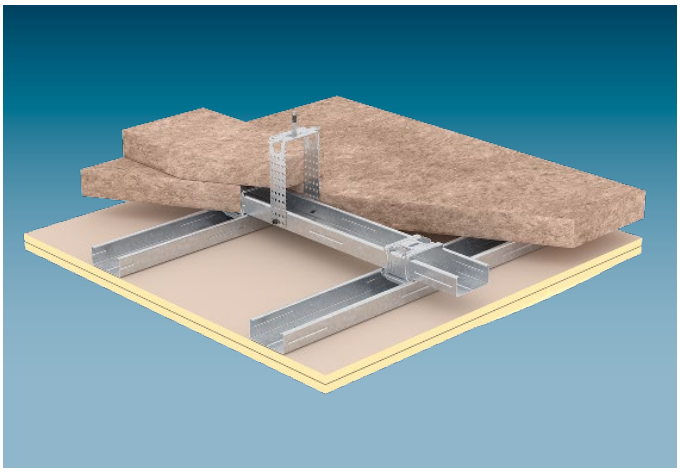
Using the determined load class, the maximum permissible spacings of the suspenders (a) as well as the profiles (b) can be read off (c) from the tables “System variants” and “Maximum grid spacings” depending on the fire resistance requirements and the selected grid/frame.

Axial spacings carrying channel (c)	Suspender spacings (a) Load class in kN/m²		
	Up to 0.30	Up to 0.50[1)]	Up to 0.65[1)]
500	950	800	750
600	900	750	700
700	850	700	650

Knauf X-Ray Shielding Ceiling

Knauf X-Ray Shielding Ceilings consist of a suspended grid that is clad with Knauf Safeboard or Knauf X-Ray shielding boards GKF with lead sheet. X-Ray Shielding Ceiling systems protect against X-rays.

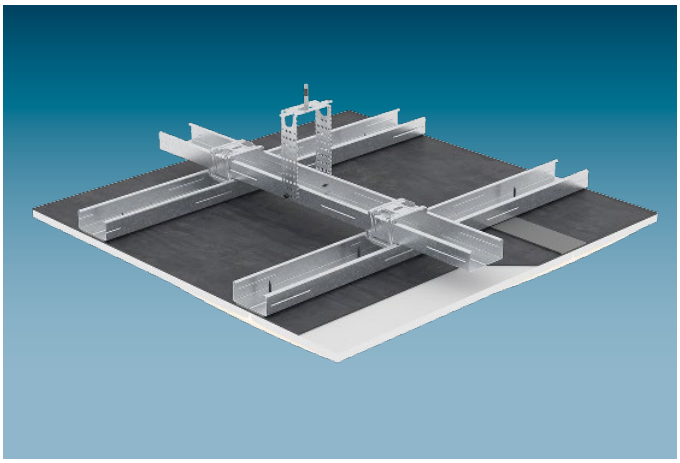
K112.de Knauf X-Ray Shielding Ceilings Safeboard



Knauf Safeboards are fixed with screws to a metal frame made of carrying and furring channels (double-layer profile) made of sheet metal profiles CD 60/27. Anchoring of the CD channels is undertaken with suspenders on the basic ceiling.
The low self-weight of Safeboard in comparison to the lead-laminated boards simplifies application. Fire resistance and high special protection demands are also implemented.

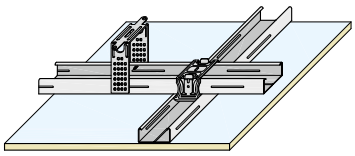
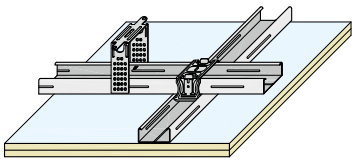
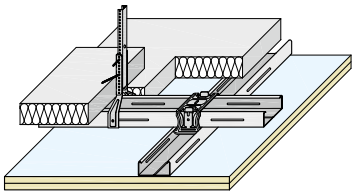
- Without lead sheet
- Joint backing with lead strips not required

K115.de Knauf X-Ray Shielding Ceilings lead sheet



Knauf X-Ray Shielding Boards GKF with lead sheet are fixed with screws to a metal grid of carrying and furring channels (double-layer profile) made of sheet metal profiles CD 60/27. Anchoring of the CD channels is undertaken with suspenders on the basic ceiling.
In case of enhanced requirements on the X-ray shielding (high lead equivalence), X-ray shielding ceilings are clad with X-Ray Shielding Boards with 0.5 to 3 mm thick lead lamination.
Fire protection requirements cannot be fulfilled with X-Ray Shielding Ceilings lead sheet boards.

System variants

Requirements on the basic ceiling for fire exposure **From below** No fire resistance requirements for basic ceiling **From above** (Plenum) Basic ceiling must have same fire resistance class as the suspended ceiling	Fire resistance class For fire exposure From below	From above	Cladding (lateral application) Safeboard	Minimum thickness t mm	Furring channel Max. axial clearances (b) mm	Nominal weight Without insulation layer kg/m²	Insulation layer Required for fire resistance Minimum thickness mm	Minimum density kg/m³
K112.de Knauf X-Ray Shielding Ceiling Safeboard with metal grid								
	–	–	•	**12.5**		21.0	–	
	**F30**	–	•	**2x 12.5**	≤ 400 preferably 312.5	39.4	–	
	**F30**	**F30**	•	**2x 12.5**		39.4	Mineral wool (S) 40 40 + Mineral wool (S) 40 40 150 mm wide on carrying channel	

Determination of the load class

Load class kN/m²	Rated weight + weight of additional loads kg/m²
Up to 0.65	60
Up to 0.50	50
Up to 0.40	40
Up to 0.30	30
Up to 0.15	20
	10

Lead equivalence values for Safeboard

Cladding of Safeboard mm	Lead equivalence (mm Pb) depending on the tube voltage (kV) **60** kV	**70** kV	**80** kV	**90** kV	**100** kV	**125** kV	**150** kV
12.5	0.45	0.60	0.75	0.70	0.70	0.50	0.40
2x 12.5	0.90	1.20	1.50	1.40	1.40	1.00	0.80
3x 12.5	1.35	1.80	2.20	2.10	2.10	1.50	1.10

- Intermediate values can be interpolated in linear fashion. Calculation of lead equivalence acc. to DIN 6812.
- One layer of Safeboard is sufficient for X-ray shielding in mammography screening (35 kV)
- Combination of Safeboard possible with Knauf GKB (I), GKF (I) and Diamant boards.

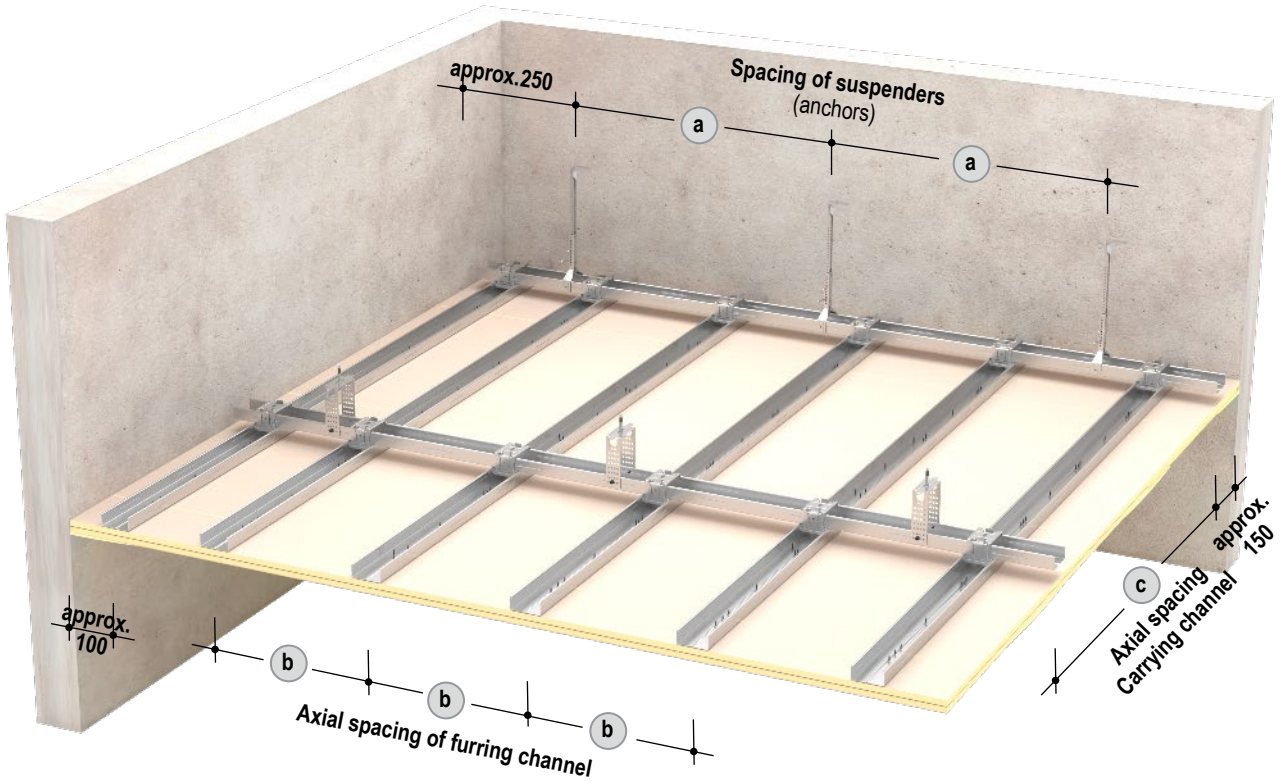
Notes

plus Extension of the fire resistance Proof of Usability see page 5.

Observe the notes page 4.

Maximum grid spacings

Dimensions in mm



Without fire resistance/fire resistance solely from below, carrying and furring channel

Axial spacings carrying channel (c)	Suspender spacings (a) Load class in kN/m²		
	Up to 0.30	Up to 0.50[1)]	Up to 0.65[1)]
500	950	800	750
600	900	750	700
700	850	700	650
800	800	700	–
900	800	–	–
1000	750	–	–

1) Use suspenders of load carrying capacity class 0.40 kN

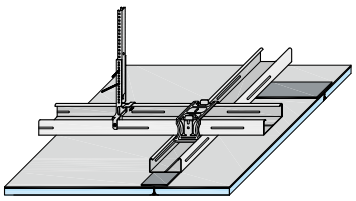
Fire protection solely (from below and) from above, carrying and furring channel

Axial spacings carrying channel (c)	Suspender spacings (a) Load class in kN/m²		
	Up to 0.40[1)]	Up to 0.50[1)]	Up to 0.65[1)]
500	850	800	700
600	800	700	700
700	750	700	650

1) Use suspender of load bearing capacity class 0.40 kN.

Notes	
	Customized dimensioning of the ceiling substructure is possible on request.
	plus Extension of the fire resistance Proof of Usability see page 5.
	Observe the notes page 4.

System variants

Requirements on the basic ceiling for fire exposure From below No fire resistance requirements for basic ceiling From above (Plenum) Basic ceiling must have same fire resistance class as the suspended ceiling	Fire resistance class For fire exposure From below	From above	Cladding (parallel cladding) X-Ray Shielding Board GKF	Minimum thickness t mm	+	Lead sheet lining Pb mm	+	Lead tape mm	Lead equivalence mm Pb	Furring channel Max. axial clearances (b) mm	Rated weight Without insulation layer kg/m²	Insulation layer Required for fire resistance Minimum thickness mm	Minimum density kg/m³
K115.de Knauf X-Ray shielding ceiling with metal grid													
	–	–	•	**12.5**	+	0.5	+	0.5	**0.5**	≤ 312.5	22.9	–	
						1.0	+	1.0	**1.0**		29.5		
						1.5	+	2.0	**1.5**		37.0		
						2.0	+	2.0	**2.0**		42.6		
						2.5	+	3.0	**2.5**		48.3		

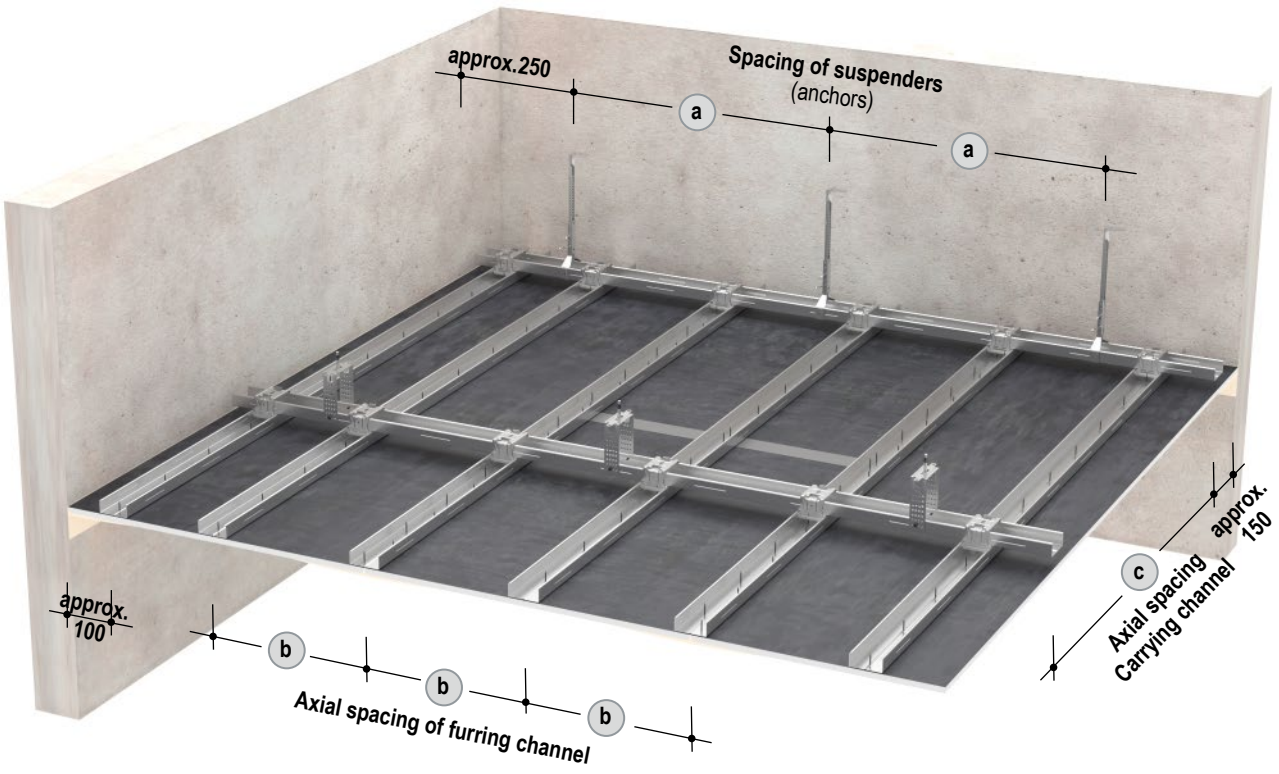
Determination of the load class

Load class kN/m²	Rated weight + weight of additional loads kg/m²
Up to 0.65	60
Up to 0.50	50
Up to 0.40	40
Up to 0.30	30
Up to 0.15	20
	10

Note Observe the notes page 4.

Maximum grid spacings

Dimensions in mm



Without fire resistance – carrying and furring channel

Axial spacings carrying channel (c)	Suspender spacings (a) Load class in kN/m²			
	Up to 0.30	Up to 0.40 [1]	Up to 0.50 [1]	Up to 0.65 [1]
500	1100	1000	925	850
600	1025	925	875	800
700	975	875	825	750
800	925	850	775	725
900	900	825	750	675
1000	875	800	725	600

1) Use suspender of load bearing capacity class 0.40 kN.

Notes	Customized dimensioning of the ceiling substructure is possible on request. Observe the notes page 4.

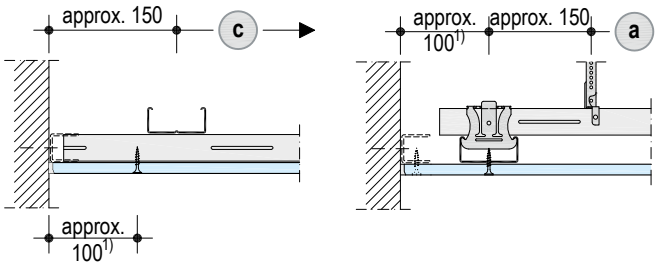
Perimeter spacings of the grid

(Scheme drawings I Examples I Dimensions in mm)

Alternative 1: Non-load-bearing connection

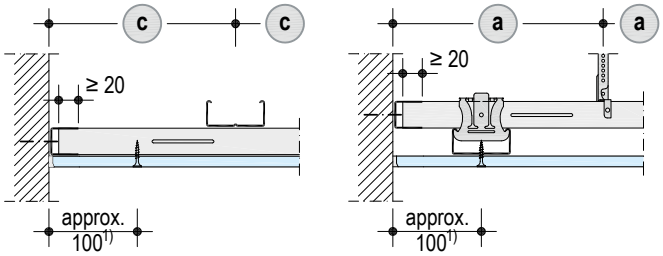
Connection is not used for load transfer of the ceiling.

- Without perimeter joint backing
- Backing with UD runner as fire resistance and sound insulation or as installation aid, spacing of anchors of UD runner up to approx. 1 m.



Alternative 2: Load-bearing connection

- The spacing of the UD Runners is reduced to ≤ 625 mm (for fire resistance too). Use fasteners and anchors suited to the substrate.
- In load-bearing UD runners, the carrying / furring channels should be inserted by at least 20 mm.
- The maximum permissible spacings for suspenders, carrying / furring channels are given in the tables for the respective systems.



Legend:

a *Spacing of suspenders*

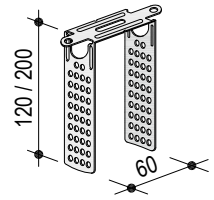
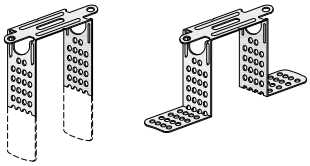
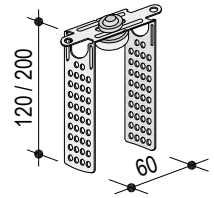
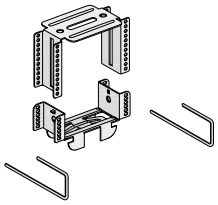
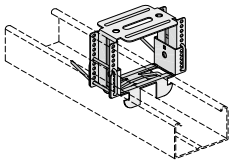
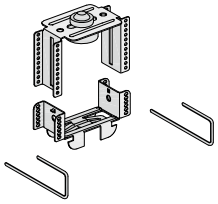
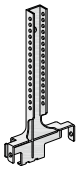
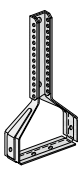
b *Axial spacing furring channel (cladding span width)*

c *Axial spacing carrying channel (spacing furring channel)*

1) Maximum projection of the cladding

Suspenders

Dimensions in mm

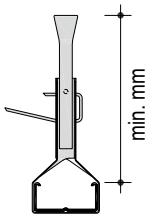
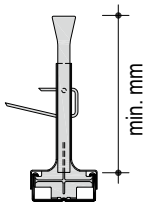
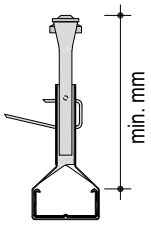
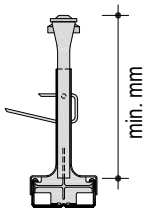
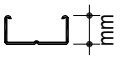
Suspension	Drawing		Anchors
0.40 kN (40 kg) load bearing capacity class			
Universal Bracket For CD 60/27			Anchoring to the reinforced concrete ceiling with **1x Knauf Ceiling Steel Dowel** at centre
Damping universal brackets For CD 60/27		Bend or cut the universal bracket / damping universal bracket according to the required suspension height, screw fasten to CD 60/27 (2x metal screws LN 3.5 x 11).	Anchoring to the reinforced concrete ceiling with **1x suitable steel dowels** at centre (observe the anchoring length)
Adjustable Universal Bracket For CD 60/27			Anchoring to the reinforced concrete ceiling with **1x Knauf Ceiling Steel Dowel** at centre
Adjustable Damping universal brackets For CD 60/27		Adjust the Adjustable Universal Bracket / Damping Universal Bracket to suit the required installation height. Connect the upper and lower section with 2x Nonius pins (secure against sliding out).	Anchoring to the reinforced concrete ceiling with **1x suitable steel dowels** at centre (observe the anchoring length)
Nonius Hanger Bottom For CD 60/27	 Screw tabs to CD 60/27 (2x metal screws LN 3.5 x 11) in case of: ■ Fire protection from above (plenum) **and/or** ■ Total ceiling load ≥ 0.5 kN/m² (Knauf recommendation: Screw fasten in case of total ceiling load ≥ 0.4 kN/m² to increase the installation safety)	Suspended with  **Nonius Hanger Top** ***or***  **Nonius Swing Top** and 1x  **Nonius Pin** ***or*** 2x  **Nonius clip** (secure against slide out) If required use additional  **Nonius connector**	**Nonius Hanger Top** Anchoring to the reinforced concrete ceiling with **1x Knauf Ceiling Steel Dowel** **Nonius Swing Top** Anchoring to the reinforced concrete ceiling with **1x suitable steel dowels** (observe the anchoring length)
Nonius stirrup For CD 60/27	 Bend Nonius stirrup around channel and fit together until it snaps in		

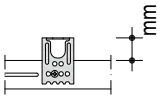
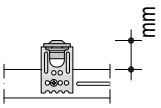
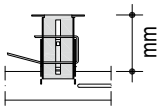
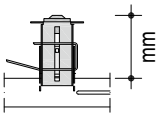
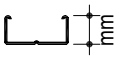
Notes Anchoring to basic ceilings made of other building materials with specially approved or standardized anchoring elements.

K112.de
K115.de

Total construction height

The total construction height of the ceiling results from the sum of suspenders, height of the grid and cladding thickness

System	Suspended with Nonius Top with Nonius stirrup	Nonius suspender	Nonius Swing Top with Nonius stirrup	Nonius suspender	Substructure Profile	Total height metal grid
						
K112.de	130	130	140	140	CD 60/27 + CD 60/27	54
K115.de	130	130	140	140	CD 60/27 + CD 60/27	54

System	Direct suspension Universal bracket	Damping Universal Bracket	Adjustable Universal Bracket	Adjustable Damping Universal Bracket	Grid Profile	Total height metal grid
						
K112.de	15 – 180	15 – 190	35 – 85	40 – 90	CD 60/27 + CD 60/27	54
K115.de	15 – 180	15 – 190	–	–	CD 60/27 + CD 60/27	54

Calculation example – determination of total construction height

K112.de Knauf X-Ray Shielding Ceiling Safeboard

Steps		Dimensions in mm
1	**Upper grid level** With Nonius suspender	130
2	**Height of grid** Carrying channel CD and furring channel CD	+ 54
3	**Cladding thickness** 2x 12.5 mm Safeboard	+ 25
4	**Sum**	= 209

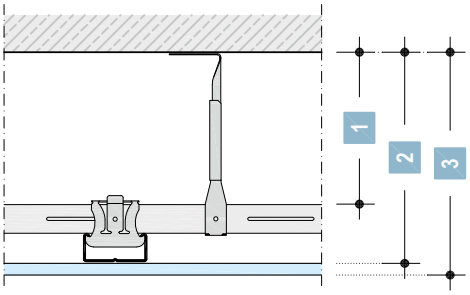
Approx. 210 mm required total construction height the suspended ceiling

K115.de Knauf X-Ray Shielding Ceiling lead sheet

Steps		Dimensions in mm
1	**Upper grid level** With Nonius suspender	130
2	**Height of grid** Carrying channel CD and furring channel CD	+ 54
3	**Lead sheet strip**	+ 1
4	**Cladding thickness** 12.5 mm X-Ray Shielding Board GKF with lead sheet lining	+ 12.5 + 1
5	**Sum**	= 198.5

Approx. 199 mm required total construction height the suspended ceiling

Term definition



1 Upper grid level (height of the hanger / installation height)

2 Suspended height (height off the plenum)

3 Total height (construction height / total height / construction depth)

Attachment of loads to Knauf X-Ray Shielding Ceiling

Additional loads, e.g. lighting fixtures, curtain rails and similar can be fixed to Knauf board ceilings using universal dowels or Knauf Hartmut Hohlraumdübel cavity dowels. Additional loads must be considered when determining the load class.

Note	Heavy loads must be anchored directly on load-bearing building elements (basic ceiling) or on auxiliary constructions.

Each load introduction surface of the Knauf X-Ray Shielding ceiling may not exceed the weight threshold values with the fastened components:

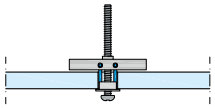
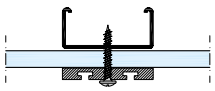
Permissible weight per ceiling surface in kg/m²	
Without fire resistance	With fire resistance[1)]
15	6

1) In case of application as a fire resistance ceiling with exposed ceiling (multi-level ceiling system), 15 kg/m² as a total weight is permissible for the exposed ceiling (including insulation layer and attached loads) attached to the fire resistance ceiling.

Furthermore, the following conditions apply:

For every anchoring point, the following weights of components attached to the Knauf X-Ray Shielding Ceiling may not be exceeded:

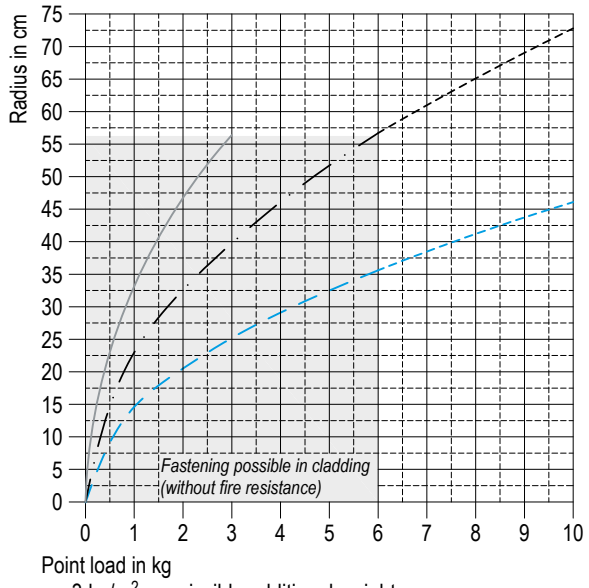
Fastening method	**Permissible weight per anchoring point in kg**	
	Without fire resistance	With fire resistance
Fastening in the cladding	6	0.5
Fastening to the grid	10	10

Fastening in the cladding	
	Knauf Hartmut Hohlraumdübel cavity dowel M5 screw
Fastening to the grid	
	Knauf Universalschraube FN multi-purpose screw e.g. curtain rail

Caution	On the X-Ray Shielding Board GKF, the drill holes must be covered by lead circular blanks or suitable measures

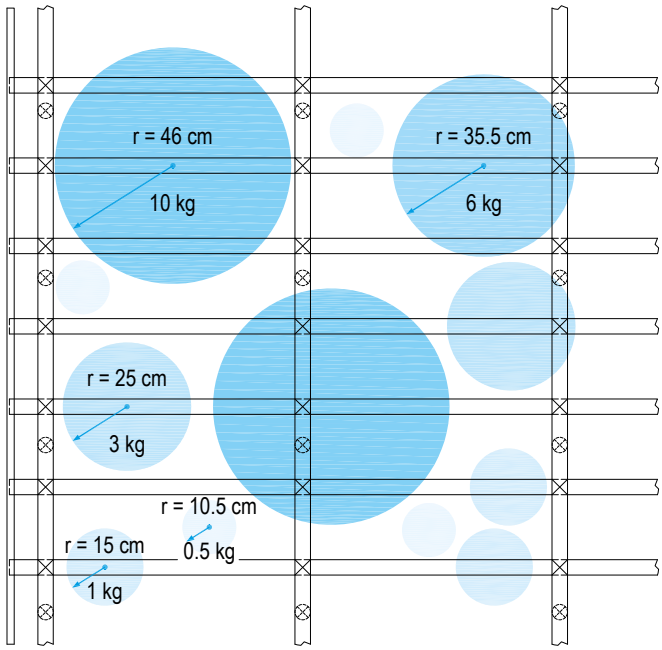
In order to avoid a local overload of the ceiling, it is necessary to comply with the minimum spacings between the individual fastened loads. The minimum spacing between two anchoring points is dependent on both effective radii of the individual loads.

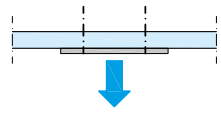
The effective radius of the individual load can be taken from the following diagram in dependence on the permissible weight per unit area for additional loads:



3 kg/m² permissible additional weight
6 kg/m² permissible additional weight (with fire resistance)
15 kg/m² permissible additional weight (without fire resistance)

Example fastening scheme at 15 kg/m²



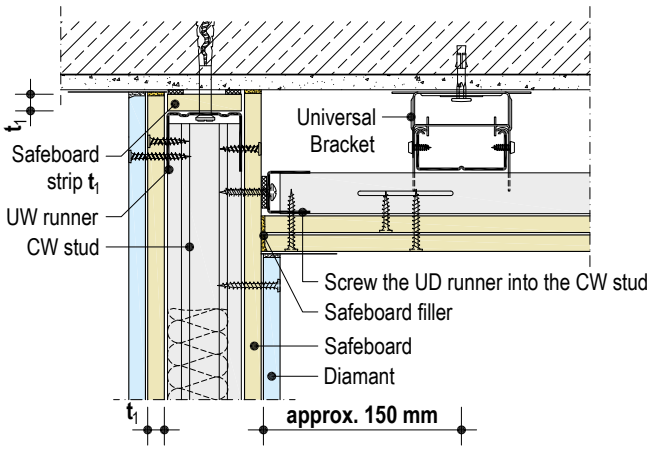
Note	 The anchored loads can be transferred using several anchoring elements.

Details

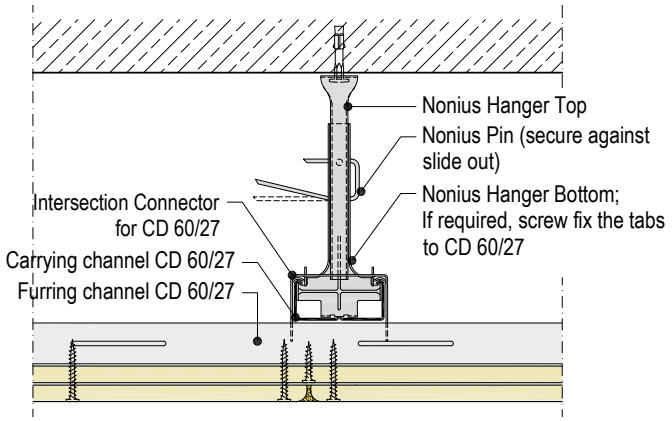
Scale 1:5

K112.de-A100 Connection to X-Ray shielding partition

Without fire resistance

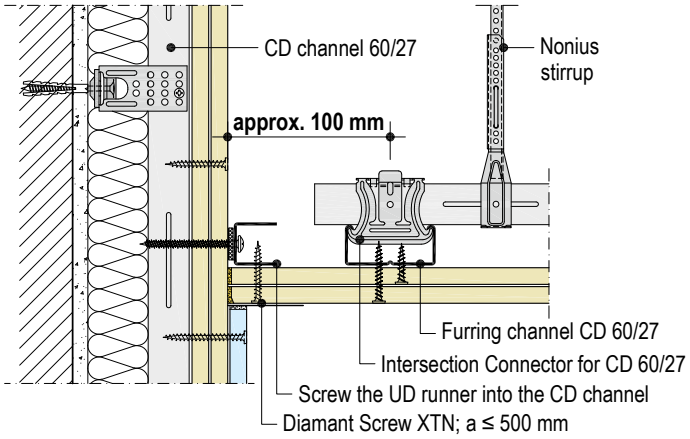


K112.de-B100 Long edge joint

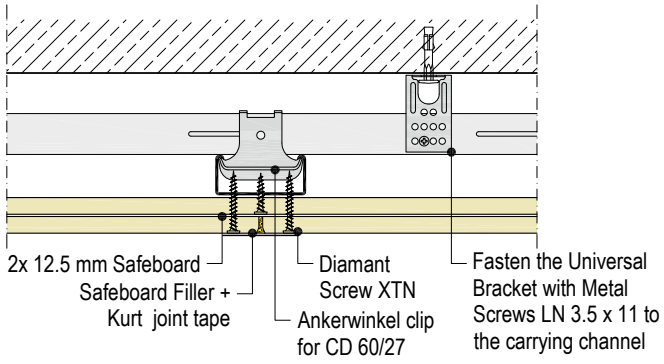


K112.de-D100 Connection to X-Ray shielding furring / lining

Without fire resistance



K112.de-C100 Front edge joint



Notes	
	Nonius Hanger Bottom: If required, screw fix the tabs to CD 60/27 (observe the note on page 18).
	The system shown is a preferred variant. Planning of individual solutions for X-Ray shielding is possible with the assistance of the lead equivalence table on page 8 .

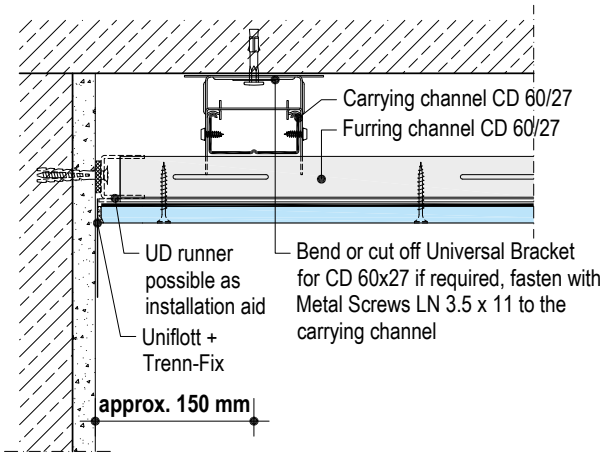
K115.de X-Ray Shielding Ceiling lead sheet with CD channel metal grid

Details

Scale 1:5

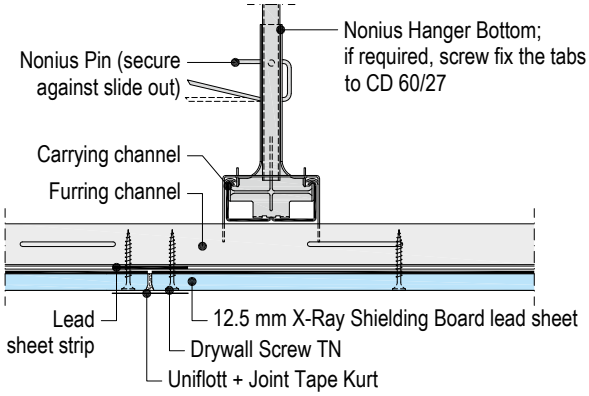
K115.de-A1 Connection to solid wall

Without fire resistance



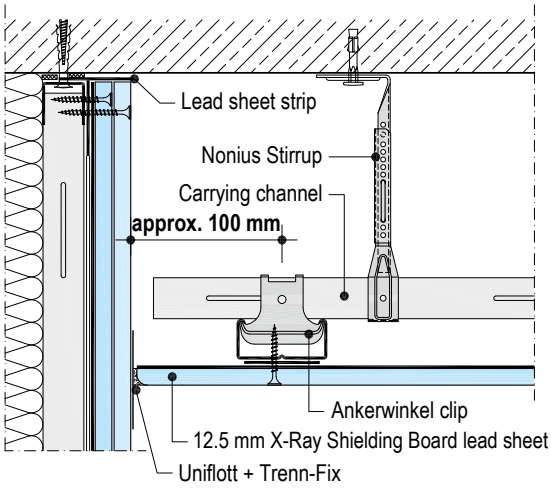
K115.de-B1 Front edge joint

Without fire resistance



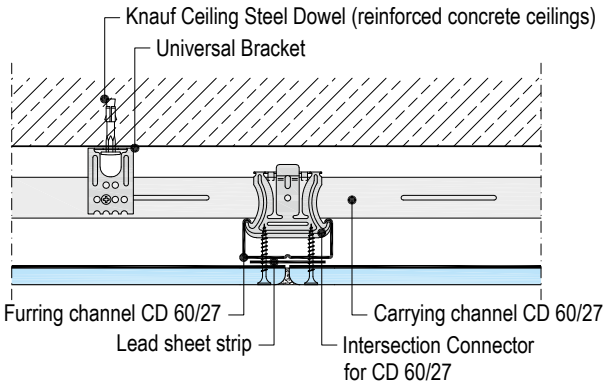
K115.de-D1 Connection to X-Ray shielding furring / lining

Without fire resistance



K115.de-C1 Long edge joint

Without fire resistance



Notes	Nonius Hanger Bottom: If required, screw fix the tabs to CD 60/27 (observe the note on page 18). Glue lead sheet strip to all profiles on the grid. Self-adhesive lead sheet strip, 50 mm wide, thickness depending on the lead lamination of the Knauf X-Ray Shielding Boards, see page 10.

Installation of the grid

Anchoring to basic ceilings

Anchoring of the suspension must be undertaken using anchors suitable for the substrate:

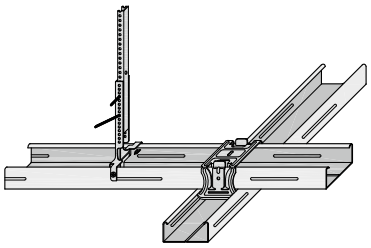
- Made of reinforced concrete: Knauf Deckennagel ceiling steel dowels / suitable steel dowels
- Made of other building materials: Specially approved or standardized anchoring elements for the building material.

With fire resistance from above use fire protection approved anchor (Knauf Deckennagel ceiling steel dowel).

Note	The dampening rubbers may only be slightly compressed when the swing suspenders are anchored.

Suspension

Suspend the carrying channel exclusively with suspenders acc. to page 13.
Refer to the system tables in the "Data for planning" section for the anchoring spacings on ceilings and profiles.
In case of fire protection from above (plenum) or total ceiling load ≥ 0.5 kN/m^2, screw fasten the tabs of the Nonius hanger bottom with CD 60/27 (2x Metal Screws LN 3.5 x 11).
Knauf recommendation: Screw fasten in case of existing total ceiling load ≥ 0.4 kN/m² to increase the installation safety



Connection to wall

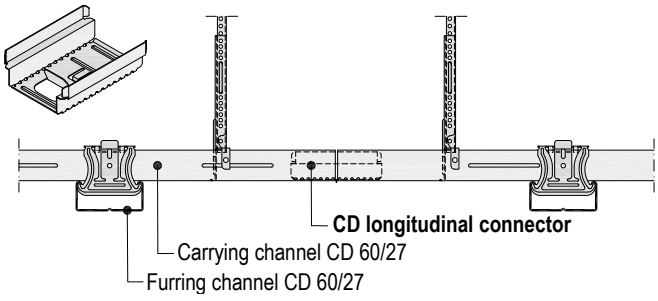
- With UD Runner 28/27 as a load-bearing connection, installation aid or with fire resistance:
  Anchoring to the construction material with suitable fasteners/anchors, spacing max. 1 m (non-load-bearing) or 625 mm (load-bearing).
  Further information for application as a load-bearing or non-load bearing connection, see page 12 or system data sheet Knauf Board Ceilings D11.de.
- In case of sound insulation requirements, seal carefully with Trennwandkitt acoustical sealant in acc. to DIN 4109, supplement 1, section 5.2. Porous sealing strips, such as sealing tape are usually not suitable in this case.

Profiles

Always commence attachment of the carrying channels at one wall side using the factory made edge.

Profile extensions

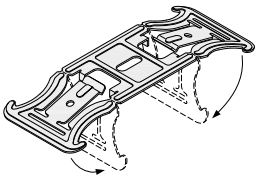
Profile extensions of the carrying channel CD with CD longitudinal connector – arranged alternately.



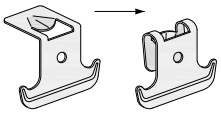
Connection carrying channel and furring channel

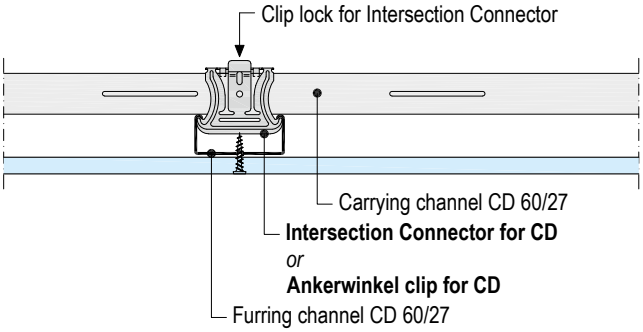
Connection of the carrying channel and furring channel in the intersection points with:

- Intersection connectors for CD 60/27:
  Before the installation, bend to 90° and after installation close the clip lock to ensure a secure hold



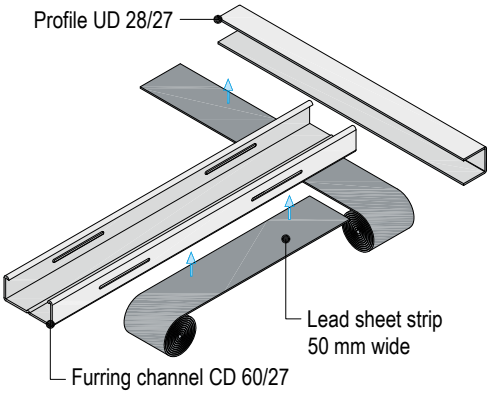
- 2x Ankerwinkel clips for CD 60/27 (alternative)
  Bend with assembly.





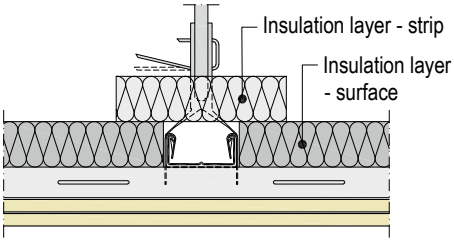
K115.de Knauf X-Ray Shielding Ceiling lead sheet

Glue lead sheet strip to all profiles on the grid. Self-adhesive lead sheet strip, 50 mm wide, thickness depending on the lead lamination of the Knauf X-Ray Shielding Boards



Insulation layer

With fire resistance requirement from below and from above



Type, thickness and density of the insulation layer in acc. to specifications of the system variants.

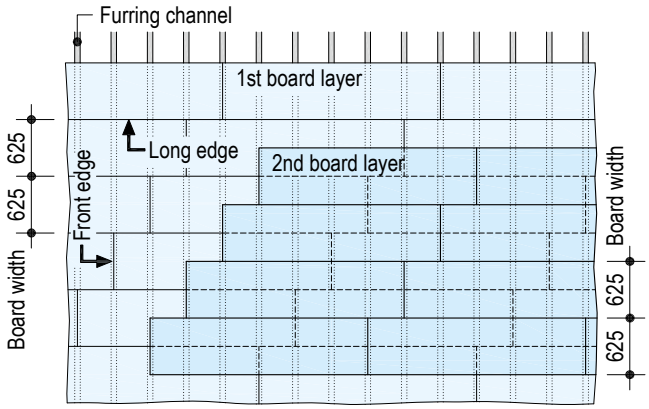
Cladding installation

- Commence with the fixing of the boards in the board centre or on the board corner to avoid buckling.
- Every board layer should be pushed firmly onto the grid and attached as an independent layer.

Installation schemes

Scheme drawings I Dimensions in mm

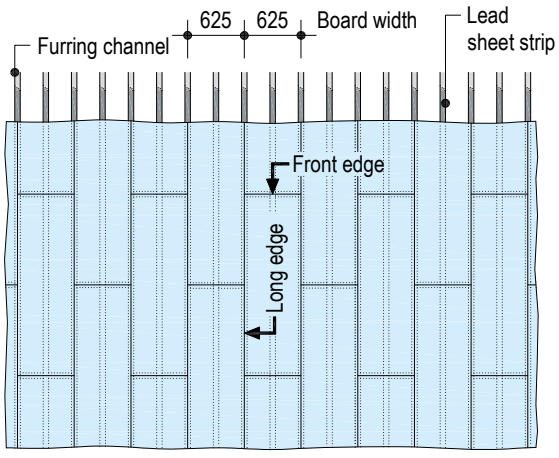
K112.de Knauf X-Ray Shielding Ceiling Safeboard – cross mounting
Board width
1st layer: **625 mm** Safeboard
2nd layer: **625 mm** Safeboard



- Install Safeboard lateral to the furring channels.
- Arrange the board joints on the furring channels (stagger by at least 1 furring channel axial spacing).
- Stagger the front edge joints between board layers.
- Stagger the long joints between the cladding layers by at least half a board width.

Notes	In order to avoid dust formation, it is preferable to break the boards (score board liner with knife and break board along the edge, cut rear side board). Rework and bevel the edges with a rasp. When working with Knauf Safeboard, particularly when sanding and sawing (e.g. using a keyhole saw), a dust mask (P2 respiratory filter rating) must be worn.

K115.de Knauf X-Ray Shielding Ceiling lead sheet – longitudinal cladding
Board width
1st layer: **625 mm** X-Ray Shielding Board lead sheet



- Lay the X-Ray Shielding Board lead sheet longitudinally to the furring channels.
- Stagger the front side board joints (minimum 400 mm) and back them with lead sheet strip.

Fastening of the cladding to the stud frame with Knauf drywall screws

Fasteners to be used

Dimensions in mm

Cladding Thickness mm	Metal stud frame (penetration ≥ 10 mm) Metal gauge **s ≤ 0.7 mm** Drywall screws **TN**	 Diamant screws **XTN**
K112.de Safeboard		
12.5	–	XTN 3.9 x 23
2x 12.5	–	XTN 3.9 x 23 + 3.9 x 38
3x 12.5	–	XTN 3.9 x 23 + 3.9 x 38 + 3.9 x 55
K115.de X-Ray Shielding Board lead sheet		
12.5 + lead sheet	TN 3.5 x 35	–

Maximum fastener spacings – Knauf board cladding

Cladding	1st layer Board width 625	2nd layer Board width 625	3rd layer Board width 625
1-layer	150	–	–
2-layer	300 [1]	150	–
3-layer	300 [1]	300 [1]	150

1) *Fasten the second / third board layer within a working day, otherwise the spacing for fastening of single-layer cladding must be used.*

Note	In case of Safeboard cladding, observe the number of screws per board width and furring channel. At least 3 with lower layers or 5 with cover layer and single-layer cladding.

Jointing

Jointing of the boards in the required quality level Q1 to Q4 in ccordance with Code of Practice no. 2 “Verspachtelung von Gipsplatten, Oberflächengüten” [1].

Fill in visible screw heads.

Suitable jointing materials

Safeboards

- Safeboard Filler
  (Powder jointing compound pigmented in yellow for purposes of easy identification)
  Hand filling without joint tape strips in the long joint edges

Caution	Wear a dust mask (P2 respiratory filter rating) when sprinkling the powder compound.

Gypsum boards

- Uniflott
  Hand filling without joint tape strips in the long joint edges
- Fugenfüller Leicht
  Hand filling with joint tape, preferably with Knauf Fugendeckstreifen Kurt joint tape

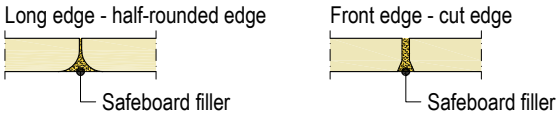
Suitable finish filling compounds

- Q2, application by hand
  Uniflott, Fill & Finish Light, Super Finish
- Q3/Q4, application by hand
  Spritzspachtel Plus, Super Finish, Fill & Finish Light
- Q3/Q4, machine application
  Spritzspachtel Plus

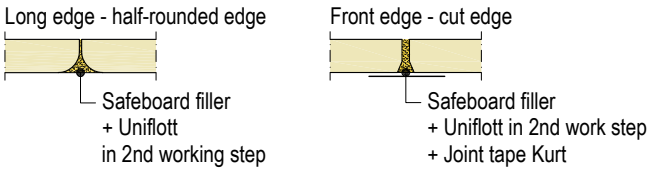
Safeboard jointing

- Fill all joints (board joints and connections) fully, i.e. uniformly and over the entire cladding thickness of all Safeboard layers with Safeboard filler.
- With visible cladding layers for manufacture of surface quality Q2, create a level transition to the board surface in the second step with Knauf Uniflott.

Board joints – hidden cladding layers



Board joints – visible cladding layers



Jointing of the gypsum board joints

For multi-layer cladding, fill the lower layers with filler; fill the joints of the visible layer. Filling the joints of covered cladding layers with multi-layer cladding is necessary to ensure technical X-ray shielding, fire protection and sound insulation properties as well as the structural properties.

Recommended

Front edge and cut edge joints as well as mixed joints (e.g. HRK half-rounded edge + cut edge) of the visible cladding layers filled using Uniflott or Knauf Safeboard-Spachtel filler with Fugendeckstreifen Kurt joint tape as well.

Joint filling of the connection joints

Apply Trenn-Fix or Fugendeckstreifen Kurt joint tape when filling joints to adjacent drywall constructions, taking into consideration the conditions and requirements for crack resistance.

Observe code of practice no. 3 “Gipsplattenkonstruktionen - Fugen und Anschlüsse” (German only)” [1] .

Apply Trenn-Fix when filling joints to adjacent solid construction components.

Sanding

Lightly sand visible surfaces after drying of the filler material, if required.

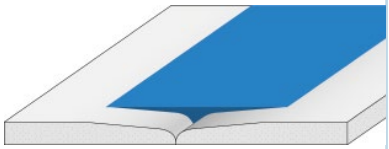
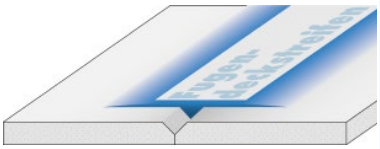
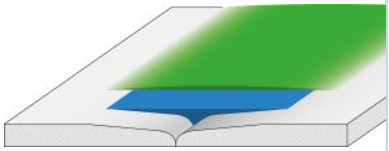
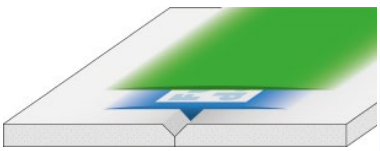
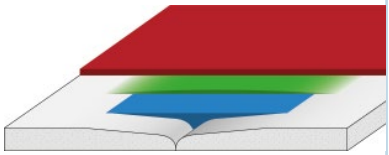
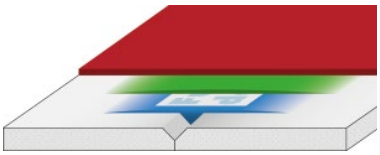
Caution	Wear a dust mask (P2 respiratory filter rating) when sanding Safeboard Filler.

Application temperature/climate

Filling and covering of joints should only take place when no more longitudinal changes can be expected, i.e. expansion or contraction due to humidity or temperature changes.
Do not apply filling at room or substrate temperatures below approx. +10 °C.
In case of mastic asphalt screed, cementitious screed and self-levelling screed, fill board joints only after screed has been applied.
Observe code of practice no. 1 “Baustellenbedingungen” [1] .

1) Issued by the German Bundesverband der Gipsindustrie e. V.

Jointing continued

Quality levels	Joint implementation Long edges half-rounded tapered edge /half-rounded edge	Joint implementation Front edge bevelled cut edge	Description Working steps
Q1			■ Fill the Safeboard joints with Safeboard Filler or gypsum board joints with Uniflott ■ Fill the visible parts of the fasteners for Safeboard with Safeboard Filler or those for gypsum boards with Uniflott
Q2			■ Preliminary jointing in acc. with quality level Q1 ■ Finish (fine finish compound) to achieve a smooth transition to the board surface e.g. with Uniflott, Spritzspachtel Plus, Fill & Finish Light or Super Finish No application marks or ridges may remain visible. Sand off the areas concerned if necessary.
Q3			■ Jointing in acc. with quality level Q2 ■ Wide jointing of the joints as well as clean and accurate removal of the remaining board liner filling the pores, e.g. with Fill & Finish Light, Super Finish or Spritzspachtel Plus If necessary, i.e. physical ridges and grooves are not acceptable and must be sanded.
Q4			■ Jointing in acc. with quality level Q2 ■ Complete surface covering of skim coat with a layer thickness of at least 1 mm, e.g. with Fill & Finish Light, Super Finish or Spritzspachtel Plus

Coatings and linings

Coating / lining	Recommended finish Gypsum boards EN 520[1)]
Coarsely structured wallpaper (e.g. wood-chip wallpaper)	Q2
Finely structured wallpaper	Q3/Q4
Matt textured coats	Q3/Q4
Glossy, smooth coats	Q4
Plasters (grain size < 1 mm)	Q3/Q4
Plasters (grain size ≥ 1 mm)	Q2

Pretreatment

Before a further coating or lining is applied, the filled surface must be free of dust. Prime acc. to code of practice no. 6 of the BVG "Vorbehandlung von Trockenbauflächen aus Gipsplatten zur weitergehenden Oberflächenbeschichtung bzw -bekleidung" [2)] .

The primer must suit the subsequent coating compound/coatings/linings.

In order to compensate for the differences in absorption of surfaces, coatings of primer such as Knauf Tiefengrund primer is suitable.

Where a wallpaper lining is used, a primer that facilitates easier removal of wallpaper for redecoration is recommended.

Note	Gypsum board surfaces that have constantly been exposed to light without any protection can result in yellowing. Therefore, a trial coat is recommended that will extend across several boards including all joints. Yellowing can, however, be successfully avoided only by using a special primer, e.g. Aton Sperrgrund for finishing plasters, Knauf Sperrgrund for coatings.

Suitable coatings and linings

The following coatings/linings can be applied to Knauf boards:

- Wallpapers
  - Paper, fleece, textile and synthetic wallpapers
    Use only adhesives made of methyl cellulose according to Code of Practice no. 16 "Technische Richtlinien für Tapezier- und Spannarbeiten innen" [3)] released by the Bundesausschuss Farbe und Sachwertschutz.
- Plaster and filler materials
  - Top coats (e.g. Noblo, Raumklima Spritzputz spray plaster, Rotkalk Filz)
  - Full surface plaster (e.g. Spritzspachtel Plus).
    Application of plaster layers only in conjunction with Fugendeckstreifen Kurt joint tape.
- Coatings
  - Dispersion paint (e.g. Intol E.L.F., Malerweiss E.L.F.)
  - Silicate-based emulsion paints with suitable primer.
  - Others on request

Unsuitable coatings and linings

- Alkaline coats such as lime, water glass paints and silicate-based paints.

Notes	After wallpapering or after application of plasters, quick drying must be ensured through adequate airing. Other coatings or layers and vapour barriers up to about 0.5 mm thickness as well as claddings (with the exception of sheet steel), do not have any influence on the technical fire resistance classification of the Knauf X-Ray Shielding Ceiling Systems.

1) *In accordance with Code of Practice No. 2 "Verspacheltung von Gipsplatten, Oberflächengüten" (German only), Issued by the German Bundesverband der Gipsindustrie e. V.*
2) *Issued by the German Bundesverband der Gipsindustrie e. V.*
3) *Issued by the German Bundesausschuss Farbe und Sachwertschutz*

Information on sustainability

Knauf X-Ray Shielding Ceiling Systems

Information on sustainability of Knauf X-Ray Shielding ceiling systems

Building assessment systems ensure the sustainable quality of buildings and constructional structures by a detailed assessment of ecological, economic, social, functional and technical aspects.

In Germany, the following certification systems are of particular relevance:

- DGNB System
  Deutsches Gütesiegel Nachhaltiges Bauen
- BNB
  Bewertungssystem Nachhaltiges Bauen - Quality rating system for environmentally sustainable building)
- LEED
  Leadership in Energy and Environmental Design

Knauf products and Knauf X-Ray Shielding Ceiling Systems can positively influence many of these criteria.

DGNB/BNB

Ecological quality

- Ecological performance evaluation of the building:
  Relevant environmental data are contained in the EPD for Safeboard gypsum boards and filler
- Risks for the local environment:
  - Safeboard is a lead-free X-Ray Shielding Board
  - Gypsum as an ecological material
  - Profiles are hot-dip galvanized and free of Chromium VI

Economic quality

- Building related life-cycle costs:
  Cost-effective Knauf Drywalling
- Flexibility and suitability for conversion:
  Flexible Knauf Drywalling

Technical quality

- Sound insulation
  Exceeding the demands of the standard with Knauf sound protection
- Ease of dismantling and recycling:
  Knauf Drywalling is fully compliant

LEED

Materials and Resources

- Building Life-Cycle Impact Reduction:
  Relevant ecological performance evaluation data are contained in the EPDs for Safeboard, gypsum boards and filler
- Environmental Product Declarations:
  Relevant environmental data are contained in the EPD for Safeboard, gypsum boards and filler
- Sourcing of Raw Materials
  Recycling share in Knauf gypsum boards, e.g. board liner

Indoor Environmental Quality

- Low-Emitting Materials:
  Knauf products are regularly subject to VOC measurement

Videos for Knauf systems and products can be found under the following link:
youtube.com/knauf

Find the right system for your requirements!
knauf.de/systemfinder

The Knauf Infothek App now provides all the current information and documents from Knauf Gips KG at any time and in every location in a clear and comfortable way.
knauf.de/infothek

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The stated constructional and structural design specifications and characteristics of building physics of Knauf systems can only be ensured with the exclusive use of Knauf system components, or other products expressly recommended by Knauf.