KNAUF JOINTING COMPETENCE

The Reference Guide

Knauf Jointing Competence

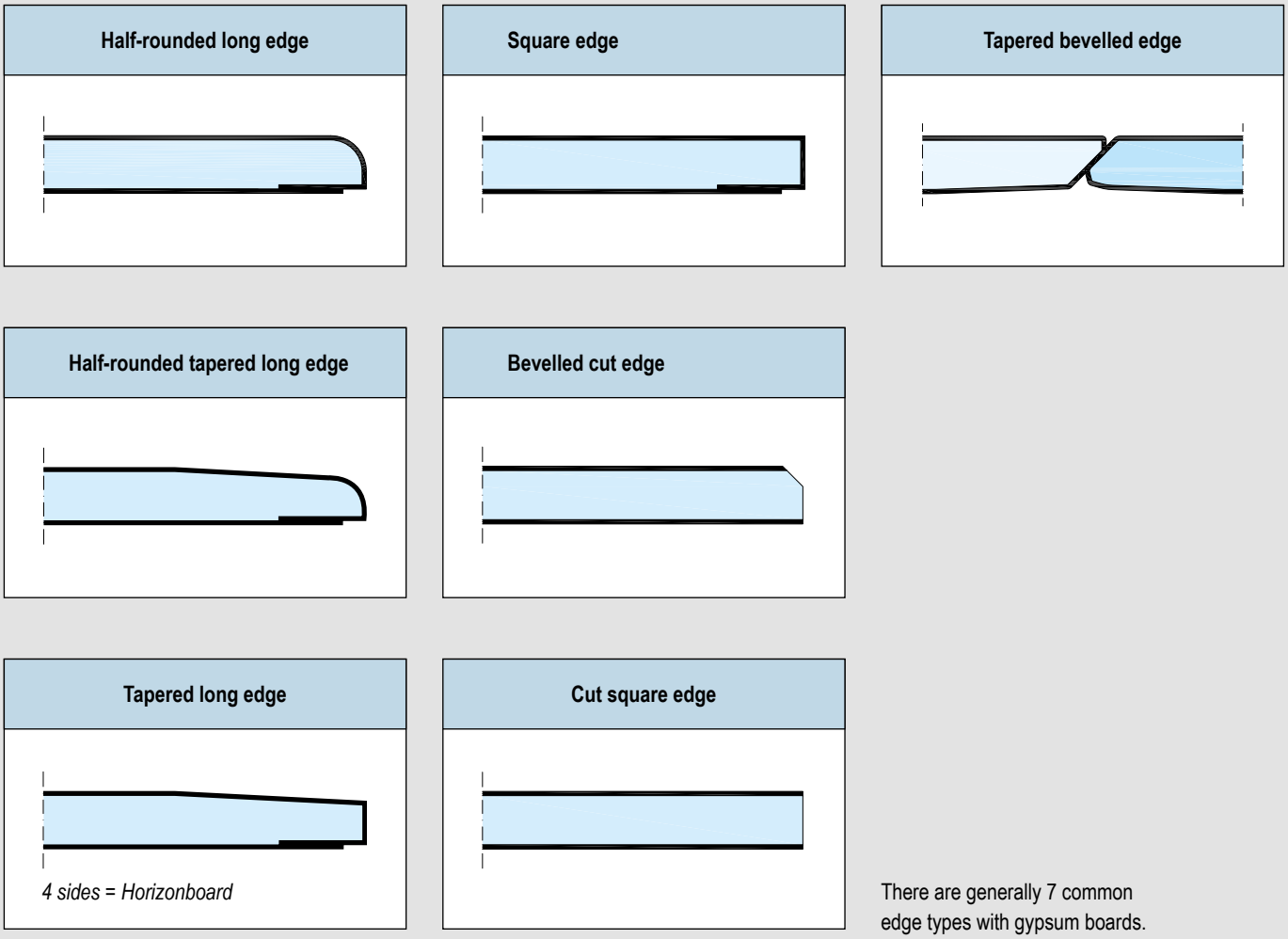
The drywalling reference guide

About 1/3 of the total time required in drywalling is for the jointing of gypsum boards, but this factor also depends on the design of the drywall surface and the required quality levels. Often, jointing is simply viewed as a necessary evil. However, the demands have increased in sophistication in recent years with the increased demands of the clients. Surface quality levels Q1 to Q4 – which must be specified in the tender documentation – have been introduced, but it must also be possible to manufacture and provide them.

This reference guide is intended to provide the required theoretical and practical fundamental principles for the manufacture of high-quality gypsum board surfaces, and to demonstrate how efficient and professional work is assured using the Knauf components that are ideally matched and coordinated to one another.

And importantly, practical hints and technical tips are presented, which our Knauf jointing specialists have compiled for you. Ultimately, all of the necessary codes of practice and standards, which the specialist for professional planning and application must know, can be found in the Knauf Jointing Competence.

Contents



There are generally 7 common edge types with gypsum boards.

Edge types with gypsum board joints

Common types

The continuous production process for gypsum boards on the conveyor line provides gypsum boards manufactured with a factory-ready "endless" long edge and cut edges on the short side of the board. The factory-ready long edge is always a square edge, half-rounded edge, half-rounded tapered edge, tapered bevelled edge or a tapered edge. The front edge is available as an edge with open gypsum core in a cut square edge or bevelled cut edge.

The half-rounded tapered edge/bevelled cut edge types are the most prevalent edge types on the German drywalling market. When Knauf Uniflott is used, the pure half-rounded tapered edge joint can be used without joint tape. (With the exception of timber construction, see page 9)

All other pure edge types always require the use of a joint tape, such as Knauf Kurt, irrespective of the jointing compound used.

For the mixed joints found frequently on the building site, which result when cut-to-fit sections are manufactured, use of a reinforcement strip is necessary. Mixed joints are joints resulting from two different edge types, such as half-rounded tapered edges combined with a square edge or bevelled cut edge.

Four-sided tapered edge board (Horizonboard) has been developed to meet the challenges associated with the increasing demands for premium surface qualities offering the highest possible crack-resistance. Both short side cut edges of the board are provided with a tapered edge by an additional factory manufacturing process. Thus, the Horizonboard features a tapered edge on all four sides. This allows joint tape to be easily bedded below the surface level of the boards, avoiding the otherwise common “joint hump” in the joint area of a cut square edge joint. The surface will be more even and the four-sided reinforcement ensures crack resistance. In contrast to normal gypsum boards, the Horizonboards can and should be applied to the cross joint on the ceiling, which considerably reduces the application and jointing times.

► Good to know!

The system Knauf Horizon is ideal for sophisticated surface qualities. With Knauf Horizonboard, the Knauf jointing compound and Knauf Fugendeckstreifen Kurt joint tape produce a level surface such as that required for shop ceilings with side lighting.

A further “special edge” is the tapered bevelled edge, which may also be referred to as a panel edge. It is used preferentially in the area of attic extensions as well as in one man application processes.

The special feature of the tapered bevelled edge (panel edge) is the “hooking in” of the pressed on loose boards onto the board that has already been screw fastened. Benefit: During application, the loose board to be applied must only be held on the free edge using one hand and the other hand is free for screw fastening.

Jointing compounds

Different types

The term jointing compounds encompasses many products, which have differing fields of application. In accordance with the EN 13963, a differentiation is made between bedding compound, jointing compound and finishing compound:

- Bedding compounds are intended for filling the joints with joint tape strips
- Jointing compounds are intended for filling the joints of suitable gypsum board edges without joint tape strips
- Finishing compounds (often referred to as “finish”) are intended for layering the bedding compound or jointing compound in one or several thin layers and make up the finished surface of the joint

Types of jointing compounds

Jointing compounds are materials that can be applied in a layer thickness of a maximum of 0 to 3 mm on gypsum boards or cement boards. Materials for greater layer thicknesses are designated as thin plaster or parge (such as Knauf Multi-Finish). In principle, there are three different types of jointing compounds:

- Air drying, synthetically based jointing compounds
- Setting, gypsum-based jointing compounds
- Cementitious jointing compounds

Setting-action powdery jointing compounds

Setting-action powdery jointing compounds consist of special fine-particle gypsum (special calcium sulphate hemihydrates) used as a binder, when necessary with synthetic aggregates, and fine particle, mineral-based fillers. These materials are available in powder form in bags, which have to be mixed with water on the building site. When water is added, a chemical reaction, referred to as setting, occurs after a pre-set time. The gypsum commences with the formation of a compact crystalline structure and hardens. Different setting times are possible within gypsum-based jointing compounds depending on the aggregates. Knauf gypsum jointing compounds generally have a setting time of approx. 45 minutes. The compact crystalline structure of setting jointing compounds achieves excellent joint adhesion. Hardening occurs independently of the layer thickness throughout the material according to the pre-set setting time. The chemical bonding of water in

► **Good to know!**

Extremely cold water and dirty tools or contaminated mixing buckets can considerably reduce the setting time of gypsum filler materials. On the other hand, very warm water or high ambient temperatures will extend the setting time.

gypsum ensures that jointing compounds of this type are generally fully dry after just a few hours under normal ambient conditions.

Main areas of application

- Jointing of gypsum boards (Q1 and Q2)
- Full surface filling in higher layer thicknesses, e.g. on uneven, rough old plaster surfaces or in-situ concrete surfaces

The setting cement-based jointing compounds consist of white or grey special cements with aggregates and are available as powdery materials in paper bags (e.g. Knauf Aquapanel Fugenspachtel jointing compound in grey or white). The cement based jointing compounds are used for jointing cement boards (such as Knauf Aquapanel).

Air drying, paste-like jointing and filling compounds

Air drying, paste-like jointing and filling compounds are synthetically bonded, i.e. when drying in the air the synthetic particles “bond” the fillers, which mainly consist of calcium carbonates or calcium sulphates. The drying time is dependent on the ambient air temperature and air humidity as well as the substrate temperature and substrate moisture level. At common ambient conditions of approx. 10-20°C and 40-80% relative air humidity on a gypsum board substrate, you can assume at approx. 1 mm material thickness that about 1 day is required for the material to be fully dry.

Main areas of application

- Full surface levelling of gypsum board surfaces (Q3 and Q4)
- Application of a thin layer to the entire surface, e.g. concrete, old plaster or precision block surfaces

As paste-like materials cannot set in sealed containers, they are ideal for efficient application by machine, e.g. piston pumps or filler pans.

The effect of the substrate on jointing

Screw fastening, and other factors, have a large influence on the jointing work. When the boards are screw fastened, the minimum clearance to the edge (machined edge 1 cm, cut edge 1.5 cm) and the distance between screw centres to one another must be observed (partition: 25 cm; ceiling: 17 cm). Otherwise. the mechanical and the building physics properties of the construction may deteriorate.

Selection of the right tool is also important: For drywalling, the use of high-speed screwdrivers (e.g. fine) is essential. These feature high rotational speeds for straight and fast screw fastening as well as an adjustable depth control stop for flush screw insertion. If the screws are inserted at an incline or too deep, they will need to be reinserted before filling or filled several times.

If the screws are inserted so deep that the screw head no longer engages the board liner and only the gypsum core of the board, the required fastening of the board is no longer provided.

When attaching to the ceiling, it is necessary to ensure that the carrying channel and furring channel are attached using suitable intersection connectors, so that the ceiling does not subsequently move when sanded or painted and does not rattle when subject to draughts. Every subsequent movement also increases the risk of cracking.

Photo: Knauf intersection connectors and Knauf CD profiles guarantee a secure connection.

► **Good to know!**

Timber frame house construction makes the highest demands on joints. The high levels of stress in timber building materials that occur due to the relative air humidity with the normal summer-winter seasonal changes, require the use of type 4B jointing compounds in accordance with EN 13963 featuring high levels of crack resistance, such as Uniflott in conjunction with Fugendeckstreifen Kurt joint tape.

Specific features for timber construction

The installation of the boards has a large influence on the final result of jointing. It is important, for example, to ensure that the boards are flush mounted with one another. Otherwise, the substrates of wood frame partitions or wooden composite boards (e.g. OSB boards) will connect the jointing compound to the substrate, and the stresses from the substrate will act directly on the joints. This increases the chance of cracking. If it is not possible to eliminate this possibility, the joint should have a backing of Trennfix applied to it (see pages 32/33).

In timber construction, in particular, Knauf Kurt joint tape must be used due to the high level of hygrothermal stress (see pages 20/21). Using single-layer (boards) cladding, it is necessary to ensure that board joints shall not coincide with the extension of the door jambs (DIN 18183). For partitions with multi-layer cladding, joints in the layers shall be staggered relative to each other to avoid cracks.

To avoid drying-related stresses, ensure that you use timber with a low level of residual moisture (≤ 15%). Ideal is the application of an installation level using furrings installed beforehand with metal profiles.

Ideally, the inside corners and building elements in timber construction should be separated, for example, with Knauf Trennfix, and applied as a “quasi movement joint” (see page 33). A rigid connection (e.g. filled with jointing compound, jointed using acrylate or glued on rigid corner trims) cannot permanently withstand the stresses that occur in timber construction.

If the building element connection joint cannot be executed with Trennfix, the folded and joint over the corner joint tape Knauf Kurt offers significantly better protection against cracking than a rigid corner trim or acrylate. However, every type of corner connection of building element reaches its limits with certain levels of stress as far as its cracking performance is concerned. The most significant effect on the level of stress that occurs in corners is the constructional design in timber construction. The deeper the wooden studs of the partition constructions, the greater the stresses that occur.

Product	Short description	Field of application
	**Knauf Uniflott** – Jointing compound – Powder – Gypsum-based – For Q1 to Q2 surfaces	– Basic filling and finish of half-rounded edge and half-rounded tapered edge gypsum boards without joint reinforcement tape (other joints with Knauf Fugendeckstreifen Kurt joint tape)
	**Knauf Uniflott impregnated** – Jointing compound – Powder – Gypsum-based – Hydrophobised – For Q1 to Q2 surfaces	– Basic jointing of half-rounded edge and half-rounded tapered edge of impregnated green gypsum boards in domestic areas of moderate humidity without joint tape (other joints with Knauf Fugendeckstreifen Kurt joint tape)
	**Knauf Drystar Filler** – Finishing and jointing compound for Drystar-Board – Powder – Synthetically-based – Highly hydrophobic – Certified mould-resistant acc. to ASTM D3273 – For Q1 to Q4 surfaces	– Basic jointing of Knauf Drystar Board joints with Knauf Fugendeckstreifen Kurt joint tape – Surface finishing of Knauf Drystar-Board surfaces for the application of coatings and linings
	**Knauf Fugenfüller leicht** – Bedding compound – Powder – Gypsum-based – For Q1 to Q2 surfaces	– Basic jointing of all gypsum board joints with Knauf Fugendeckstreifen Kurt joint tape
	**Knauf Fireboard filler** – Bedding and finishing compound – Powder – Gypsum-based – Enhanced water retention – For Q1 to Q4 surfaces	– Basic jointing and full surface levelling of Knauf Fireboard with fibre glass reinforcement tape

	Properties	Usage
	– Hardens by setting – Very high strength – Colour: Beige	– Sprinkle by hand up to waterline – Hand application with a trowel or spatula – Application time after mixing to start of setting approx. 45 minutes
	– Hardens by setting – Water-repellent – Coloured green in GKBI/GKFI board liner colour (green colour with water contact, dry powder colour: beige)	– Sprinkle by hand up to waterline – Hand application with a trowel or spatula – Application time after mixing to start of setting approx. 45 minutes
	– Hardens by drying – Colour: Grey – Mould-resistant acc. to ASTM D3273 – Water-repellent (H1) – Particularly easy to fill with its creamy, pliable consistence – Easy to sand with Knauf Abranet® sanding mesh P120	– Fast to mix with the agitator even with larger quantities – Allow to mature for 5 min. and then mix again – Apply by hand with a trowel or spatula, with filler pan and/or jointing tool (e.g. Bazooka), spray with an airless device (e.g. PFT Swing Airless) or mixing pump (e.g. Ritmo Powercoat) – Mixed in a sealed bucket it remains workable for about one week
	– Hardens by setting – Colour: Antique white	– Sprinkle by hand up to waterline – Hand application with a trowel or spatula – Application time after mixing to start of setting approx. 45 minutes
	– Hardens by setting – Water retention set to the high suction capacity of the Knauf Fireboard – Colour: Antique white	– Sprinkle by hand up to waterline – Hand application with a trowel or spatula – Application time after mixing to start of setting approx. 45 minutes

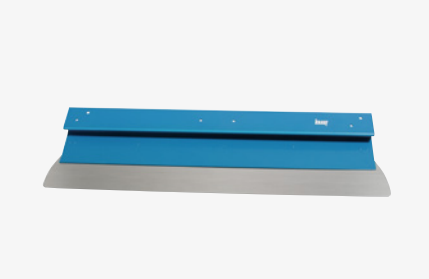
Product	Short description	Field of application
	**Knauf Safeboard filler** – Jointing compound – Powder – Gypsum-based – Attenuates X-rays – For Q1 surfaces	– Basic jointing of Knauf Safeboard without joint tape
	**Knauf Base Filler** – Filler material – Paste-like – Synthetic-based – Only for bottom layers	– Filling joints of the bottom non-visible layers – With multi-layer cladding
	**Knauf Fill&Finish Light** – Bedding and finishing compound – Paste-like – Extra light for about 35 % greater coverage – Synthetic-based – For Q1 to Q4 surfaces	– Jointing of tapered edge joints with joint tape (Q1) – Finishing of all joints for skimming to layer thickness zero (Q2) – Surface finishing of gypsum boards and common surfaces (Q3, Q4)
	**Knauf Super Finish** – Finishing and jointing compound – Paste-like – Synthetic-based – For Q2 to Q4 surfaces	– Finishing of all joints for skimming to layer thickness zero (Q2) – Surface finishing for pore sealing (Q3) of gypsum boards – Surface finishing of gypsum boards and common surfaces (Q4)
	**Knauf Spritzspachtel Plus** – Machine application – Bedding and finishing compound – Paste-like – Synthetic-based – For Q2 to Q4 surfaces	– Spritzspachtel plus area of application: – Finishing of all joints for skimming to layer thickness zero (Q2) – Surface finishing for pore sealing (Q3) of gypsum boards – Surface finishing for gypsum boards, concrete, plasters with a light to medium texture
	**Knauf Pro Spray All Purpose** – Finishing and jointing compound – Paste-like – Synthetic-based – For Q2 to Q4 surfaces	– Surface finishing for pore sealing (Q3) of gypsum boards – Surface finishing of gypsum boards and common surfaces (Q4)

	Properties	Usage
	– Hardens by setting – Pigmented yellow in Safeboard colour – Attenuates X-rays	– Sprinkle by hand up to water line and allow to bond – Hand application with a trowel or spatula – Application time after mixing to start of setting approx. 45 minutes
	– Hardens by drying – Colour: White	– Stir after opening the cover – Hand application with a trowel or spatula
	– Hardens by drying – Colour: White – Very easy to sand – Easy to smooth – Low material consumption (1.1 kg/m^2/mm)	– Stir after opening the cover – Dilute with a little water if required – Apply by hand with a trowel or spatula, or with filter pan or jointing tool (e.g. Bazooka)
	– Hardens by drying – Colour: White – Very easy to sand – Easy to smooth	– Stir after opening the cover – Dilute with a little water if required – Apply by hand with a trowel or spatula, or with filter pan or jointing tool (e.g. Bazooka) – Smooth off with a wide spatula held flat
	– Ready-mixed – No mixing or setting times – Pliable consistence – Very easy application – Ideally suited for use with airless machines – Good filling properties – Good adhesive properties – Diffusion permeable – Application by hand and machine possible	– Mixing of bucket product – Dilute with water if required – Application by hand or spray with airless machines – Smoothen by applying little pressure and hold the wide spatula very flat
	– Hardens by drying – Colour: White – Very easy to sand – Easy to smooth	– Stir after emptying the tubular bag – Spray on with an airless device – Smooth off with a wide spatula held flat

Screw handle spatula

Special finishing trowel

Trowel with curved blade



Wide spatula

Abranet® Super-Set

Beveller

Cleaneo spatula

Cleaneo trowel

Plane rasp

Tools and accessories

Tools and application machinery

The Cleaneo trowel is ideal for removing excess jointing compound from the perforated board joints after compound has been applied. It features two folded flaps on the edges of the blade. On the one hand, this prevents the sharp edges of the trowel damaging the perforated surface during removal of excess material and on the other hand ensures a clean and accurate removal. Thus, depending on the angle to the ceiling, a certain distance of the trowel edge to the joint is assured. Accordingly, even with the drying shrinkage of the material, the exact same amount of jointing compound is available for sanding off to ensure the optimum concealed joints in a single work step.

The filling of screw heads in perforated ceilings is greatly simplified by the use of the Cleaneo trowel. The trowel has two holes punched into the blade. One hole is situated in the centre of the blade for filling the screw heads on the surface, and one hole is situated at the corner for filling the screw heads in the edge area. The suitable hole is centred directly over the screw head to be filled, and the trowel is pushed onto the ceiling like a template. Now a second trowel can be used to apply the filler without unintentionally filling other perforations in the perforated ceiling. The thicker blade ensures that sufficient filling compound remains on the screw head ensuring that only one work step is necessary. After drying and sanding, the screw head is no longer visible.

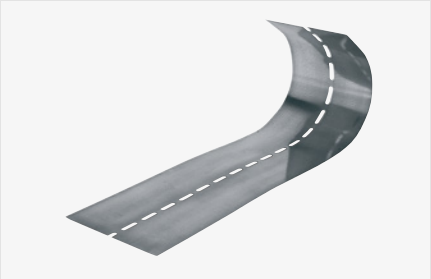
For sanding by hand, the Abranet Super Set is recommended, consisting of a hand sander with suction hose for Abranet-Klett-Schleifgewebe (hook and loop fastened sanding mesh). Thanks to its numerous holes, the mesh enables suction across the entire surface and compared to sand paper has a higher sanding capacity and a significantly longer lifespan.

Machines

If larger surfaces in quality levels Q3 or Q4 are required, application of a paste-like filling compound (e.g. Knauf Readygips or ProSpray Light) using an airless machine (e.g. PFT SWING AIRLESS) is recommended. The machine pumps the paste-like compound out of a tub or funnel and sprays the compound without using compressed air through a nozzle onto the gypsum board at a high pressure of approx. 200 bar.

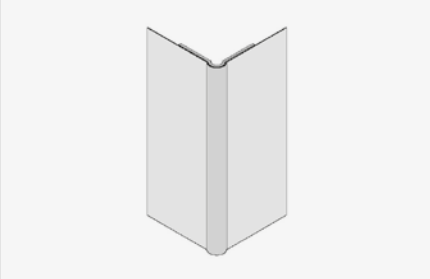
Knauf Joint Tape Kurt

Fibre glass joint tape



Flex corner profiles

Pouch gun



Corner trims

Material hopper

PFT SWING AIRLESS

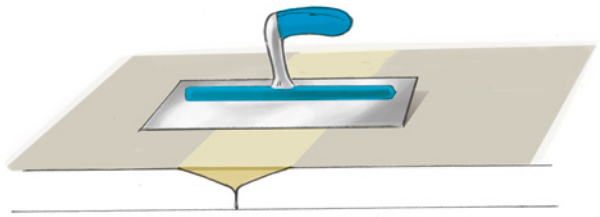
Alux edge trim

Accessories
For the connection area between, e.g., jamb wall and roof pitch, the flex profile from Knauf supplied on a roll is useful. It can be easily bent into the required position thanks to the perforation in the middle and screwed on as a backing with the gypsum boards.

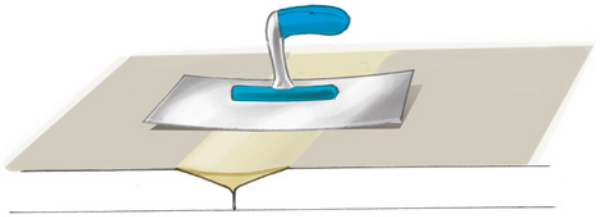
The Knauf Alux Kantenschutz (Alux Edge Trim) offers additional benefits due to its special paper-metal strip composite on a roll for reinforcement purposes, e.g. jamb corners: It is easy to cut with a plate shears, and the properties of the paper joint tape allow it to be easily bedded with the paper side upwards. The metal strip that is rigid in the unrolled state provides a clean and straight alignment at any desired angle. The special paper on the surface permanently avoids, in contrast to profiles with elastic components, removal of the paint layer in the bend area.

For 90° inside corners and outside corners, we recommend the rigid corner trims “Dallas” and “Las Vegas”. In combination with the material hopper, they can quickly and easily be coated directly with compound and fitted to the corners. The special paper on the surface provides a white edge before painting. Integrated metal angles make the corner especially resistant to impacts.

beneficial

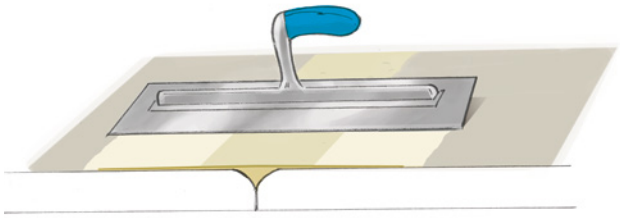


unfavourable

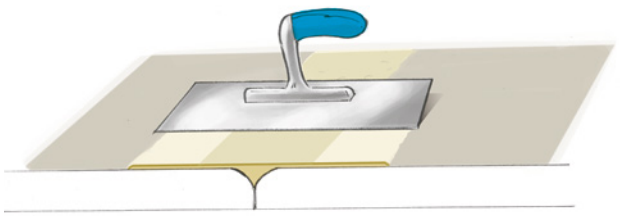


The long bar prevents the trowel from bending in the longitudinal direction and thus avoids recessed jointing.

beneficial



unfavourable



With a long blade that remains flexible regardless of the long bar, it is possible to apply a second jointing stage in a single pass - and even skim to layer thickness zero on the left and right of the joint.

Tools and accessories

Preconditions for sophisticated drywall surfaces

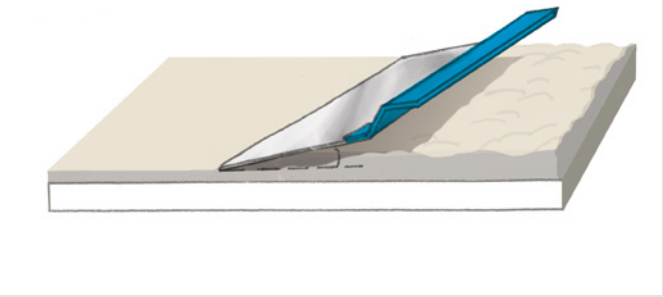
The use of professional tools is essential to efficiently fill and finish joints. It facilitates faster working (fewer work stages) with better results. To mix or stir jointing and filling compounds, either a mixer or margin trowel is required. For subsequent jointing, either a finishing trowel or a screw handle spatula of different widths can be used.

A suitable trowel such as the Knauf special finishing trowel should feature the following:

Properties of ideal finishing trowels for jointing

- **Long bar, almost the length of the blade.**
  This prevents deformation of the trowel when jointing in the longitudinal direction. It avoids recessed jointing of a joint and simplifies jointing of a cut edge in a single stroke.
- **Relatively narrow but long blade.**
  This reduces deformation of the trowel when jointing in the lateral direction and avoids the pressure of the trowel in the area of the joint (as a greater percentage of the trowel pressure is applied to the board liner rather than the joint). This avoids a string of material detaching leading to a smoother joint. In a second jointing step, the wider blade finishes the joint in a single step.
- **Blade material made of thin spring stainless steel.**
  This avoids that the blade tips will be permanently raised. This is a prerequisite for jointing level joints. The second jointing step can also be completed in a single sweep thanks to the flexibility of the blade, so that skimming to layer thickness zero on the left and right of the joint is possible.
- **Welding spot free connection between blade and bar.**
  This ensures that deformed blades due to welding spots and corrosion can be avoided.

beneficial

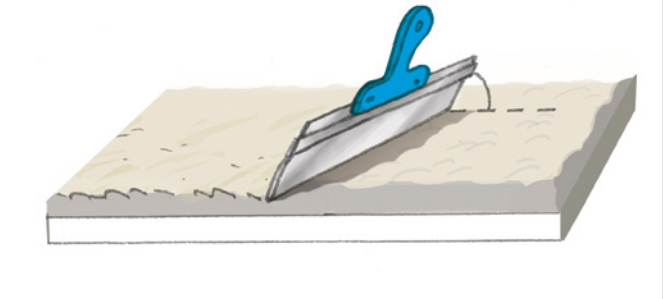


The Knauf wide spatula can be held flat with both hands. A precondition for optimally even surfaces, as the surface is levelled and very little material needs striking off.

ideal

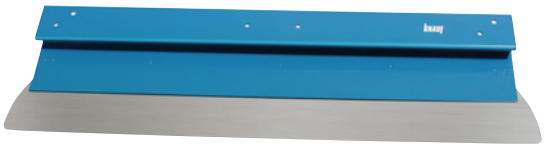
A long bar almost the length of the blade ensures the necessary stability of the special finishing trowel. Furthermore, the blade is narrow and long. The result: Perfect joints in short time.

unfavourable



More undulations are caused when the tool slope is steep.

ideal



Ergonomic and effective: The wide Knauf wide spatula with replacement blade for Q3/Q4 surfaces can be held very flat using both hands. Optimum even surfaces can be manufactured in this way.

A trowel with a curved blade is recommended for bedding of joint tape in cut square edge/bevelled cut edge or square edge joints. This automatically ensures that sufficient jointing compound remains under the tape and that the last work step can be applied in a single step.

A wide spatula is required for full surface skim plastering.

Suitable wide spatulas such as the Knauf wide spatula should feature the following properties:

Properties of ideal wide spatulas

- **The blade should be larger than ½ the board width but not too large.** In practice, a length of approx. 80 cm has proven to be a compromise for achieving ergonomic handling, low weight and few ridges on the surface.
- **The tool must be capable of being held very flat with both hands.** This will avoid undulations in the surface and allow the creation of the optimum even surface. Furthermore, very little material requires striking off. In fact the surface is levelled. Material will not drip off of the blade. An even surface results with clean application.
- **The blade should consist of flexible spring stainless steel with curved corners.** Flexible blades are more suitable to compensate for differential pressure conditions and angular ratios. The curved corners avoid excessive ridges.
- **The size should ensure that the tool is robust and easy to repair.** If the wide spatula is dropped, the plastic handle will be damaged more easily than light metal. If the blade becomes blemished or bent, the blade should be capable of replacement. This saves a lot of cost and waste. It is relatively easy to always bring spare blades to the building site.

Joint tape

Mechanical reinforcement

The function of the joint tape is to reinforce the filled joint.

There are four types of joint tape on the market that differ significantly due to their material type and mechanical properties:

- Mesh tape
- Fibre-glass tape
- Paper joint tape
- Knauf Fugendeckstreifen Kurt joint tape

Mesh tape offers the least crack protection. This type of joint tape can only tackle the forces when the mesh has been subjected to a certain pretension. Thus, the joint may already have cracked before the pretension force has been reached. Mesh tapes for joints are generally available as self-adhesive solutions designed for application in tapered long edge joints. Only in this case are they applied to the entire surface. For half-rounded tapered edges the tapes are situated on the hollow joint centre. Application errors are just waiting to happen.

Only slightly better with cracking are the fibre glass tapes. The main benefit is the easy bedding. Fibre glass tape is required when jointing Knauf Fireboard to ensure that the necessary fire protection without combustible components is achieved.

Good resistance to cracking is achieved with most paper joint tapes. Due to the moisture-related, very uneven swelling, paper tape tends to become wavy when bedded.

Knauf has further refined the paper joint tape. The highest level of resistance to cracking in combination with simple bedding is enabled by using Knauf Fugendeckstreifen Kurt joint tape. It consists of a special paper and is pre-folded.

Should cracking occur in the joint, Knauf Kurt will conceal the fine cracks due to its elasticity. With mesh or fibre glass tape, these types of crack are transferred to the surface and become immediately visible.

Knauf Joint Tape Kurt

Fibre glass joint tape

► Good to know!

As wood is subject to much larger moisture-related changes in length than gypsum boards, it is generally recommended with timber construction that Knauf Fugendeckstreifen Kurt joint tape is used to effectively avoid cracks. This also applies for cladding made of wooden composite boards or timber substrates.

	Half-rounded edge	Half-rounded tapered edge	Tapered long edge	Cut square edge	Bevelled cut edge	Tapered bevelled edge	Square edge	Combined
Uniflott/ Uniflott-Imprägniert			●	●	●	●	●	●
Fugenfüller Leicht	●	●	●	●	●	●	●	●
Fireboard Spachtel				○			○	○
Safeboard Spachtel				●	●			●

For these edge types and jointing compound combinations, Knauf Fugendeckstreifen Kurt joint tape is recommended (●) or fibre glass (○) is required.

Jointing

Preconditions

Ambient conditions
In order to avoid subsequent cracking problems, the general building site conditions acc. to BVG Code of Practice no. 1 must be observed, i.e. jointing work may only be undertaken after no more longitudinal changes can be expected, such as expansion or contraction due to humidity or temperature changes. The German standard DIN 18181 stipulates that jointing requires the room or substrate temperature to be more than 10 °C.

Material conditions
In order to avoid problems with adhesion, the edge for jointing must be free of dust and should be brushed off before jointing. On cut edges or bevelled cut edges with an exposed gypsum core, priming with Knauf Tiefengrund primer is recommended before jointing to bind any dust present and to regulate the suction properties.

Knauf Cleaneo acoustic board joints must be primed with Knauf Tiefengrund before the boards are installed.

Furthermore, the following points must be observed before jointing compound is used:

- Do not use material that is out of date
- Do not use material that is saturated with water
- Do not mix different materials
- Do not use material that has started to harden
- Mix the material to a lump-free consistence
- Do not mix the material too vigorously or too long with an agitator (reduces the viscosity or shortens the setting time)

This all has a negative influence on the strength of the material and favours cracking.

It is important to observe the manufacturer's instructions of whether a joint tape is prescribed in combination with a certain jointing compound or a particular edge type (see pages 20/21). Thus, for example, Knauf Uniflott can be used with half-rounded tapered edges and half-rounded edges without joint tape, whereas Knauf Fugenfüller Leicht must be used with Knauf Fugendeckstreifen Kurt joint tape or Knauf Fireboard joint filler with Knauf Glasfaser-Fugendeckstreifen fibre glass joint tape.

Knauf Uniflott impregnated for impregnated (green) gypsum boards

Yellow Knauf Safeboard jointing compound

Knauf Fireboard filler

System filler materials

► **Good to know!**

Cut edges should always be bevelled with a bevelling plane and primed with Tiefengrund before jointing.

System conditions

In conjunction with systems, it is necessary to ensure that the prescribed materials are used in combination with one another to retain the guaranteed properties. Usually, the systems (board and jointing compound) are matched to one another in terms of their colour or name to avoid confusion: For use in domestic areas of moderate humidity, impregnated (green) gypsum boards are necessary. Only the use of green coloured Knauf Uniflott imprägniert (impregnated) guarantees a common level of hydrophobic behaviour across the entire surface. Also compulsory for Knauf Safeboard X-ray shielding boards (yellow board core) is the use of the yellow coloured Knauf Safeboard jointing compound. For Knauf Fireboard, the Knauf Fireboard-Spachtel filler has been specially developed, as the Fireboard has an enhanced suction capacity because of the glass fibre fleece.

Effects of jointing

Frequently, the significance of correct jointing for a "functioning" construction is underestimated. The most important function assumed by jointing is the bracing effect of the gypsum board partition. Ultimately, the partition only gets its final stability and is free of distortion due to the jointing.

For multi-layer cladding, jointing of the joints on the concealed layers is compulsory according to the German standard DIN 18181, even when the joints are fully concealed later.

Using Knauf Safeboard X-ray Shielding Board, Knauf Safeboard filler ensures uninterrupted X-ray shielding. Similarly important is the Knauf Fireboard filler in constructions with Knauf Fireboard, as other fillers often do not meet the requirements in the event of a fire.

Also of great significance is the airtightness of the connection guaranteeing correct jointing. On the one hand, this aspect is important for sound insulation. The more airtight the gypsum board partition is, the more sound protection it offers. Air tightness simultaneously prevents damage to construction elements caused by the introduction of air humidity.

Sprinkling of Knauf Uniflott

Mixing Knauf Uniflott with a trowel

Practical application

Gypsum-based filling compounds

Mixing
First of all, fill a bucket (if necessary) with clean water. Then sprinkle the compound when possible lump-free and evenly onto the surface of the water. This is performed at best by hand. The powder compound sinks slowly to the base of the bucket and saturates with water. This process is referred to as wetting or bonding. Continue to sprinkle in material until the surface of the wetting material nearly touches the surface of the water.

After wetting, the compound is mixed well by hand or by using a mixer until it has a Knauf-typical creamy-stiff consistence.

The water used for mixing should be approximately at room temperature, as extremely cold water shortens the setting time and extremely warm water increases the setting time.

Application time
Gypsum-based Knauf jointing compounds have a pot life of approx. 45 minutes before they start to set.

Caution: Dirty buckets or tools considerably shorten the setting time. If the jointing compound is mixed and applied in a bucket, the bucket should be quickly washed out before more jointing compound is mixed in the bucket. Remnants of the jointing compound mixed and partly set beforehand can act as a crystallization seed and accelerate the setting process of the freshly mixed jointing compound.

When mixing powder based jointing compounds with an agitator, you must ensure that a large diameter agitator paddle at low speed is used. If the paddle is too small and the speed too high, it will reduce the strength and accelerate setting, and the consistence of the jointing compound will be too thin.

1

Using Knauf Spritzspachtel plus directly from the bucket

2

Knauf Spritzspachtel Plus is immediately ready to use

Mixing Knauf Superfinish with an agitator

Knauf Superfinish is ready-to-use after mixing

Synthetically based filling compounds

Synthetically based jointing compounds are available as a paste-like material premixed in a tub. The jointing compound may need to be stirred before use depending on the product and application.

Stirring

For jointing drywall surfaces by hand, e.g. Knauf Readygips can be used directly from the tub without stirring. Products such as Knauf Superfinish must always be stirred with an agitator (e.g. the Mixeraufsatz) and diluted with a little water if required.

For machine application of paste-like jointing/filling materials, it is generally recommended to stir the materials to make them more pliable and improve the pumping capacity. When applying the materials with airless devices, it is important to ensure that the filling/jointing compound in the hopper always has a thin film of water on it to avoid the formation of a skin that could clog the machine. Material that has already been sprayed on and scraped off should not be returned to the hopper of the machine. This material is generally contaminated and may cause blockages in the machine.

► Good to know!

The mixing method with powder-based filling compounds has a large influence on the hardness and tensile strength of a filling compound. If an agitator is used for mixing, ensure that mixing is not too long and not at high speeds, as otherwise the material will have a thinner consistence, will harden quicker and will have a lower strength due to inclusion of air.

With half-rounded edge joints

Pressing in of jointing compound perpendicular to joint

Strike off in longitudinal direction

Smoothen if required

With half-rounded tapered edge joints

Pressing in of jointing compound perpendicular to joint

Strike off in longitudinal direction

Practical application

On the wall and ceiling with Knauf Uniflott or Uniflott impregnated

For application on wall or ceiling surfaces, the first step after mixing of the jointing compound with all types of joints and jointing compounds is identical (with the exception of square joints/cut square edges). In order to fill the joints, a generous amount of the jointing compound must initially be applied laterally from both sides to the joint using a spatula or finishing trowel, so that the jointing compound has good adhesive contact to both board edges.

If Knauf Uniflott or Knauf Uniflott imprägniert is used, the following working stages must be implemented to suit with the joint types:

With half-rounded edge joints
Strike off so that there is a string in the longitudinal direction. When hardening commences, strike off the excess material and smooth immediately.

With half-rounded tapered edge joints
Only strike off smooth in the longitudinal direction.

With bevelled cut edge joints
If there are no factory-made bevelled cut edges, the cut edge should be bevelled using a beveller or the paper liner should be scuffed on the edge with a Knauf Abranet hand sander. It is recommended that a primer (e.g. Knauf Tiefengrund) is applied to the open gypsum core directly before jointing to bind the dust and regulate the suction properties. After pressing into the joint, the jointing compound should be levelled off so that a uniform approx. 10 cm wide and minimum 1 mm thick joint material film results. Directly afterwards, the Knauf Fugendeckstreifen Kurt joint tape should be inserted into the jointing compound film from the outside of the roll and pushed in evenly with the spatula or trowel and excess material should be scratched off. Subsequently, the joint with joint tape should be covered and levelled with filler compound.

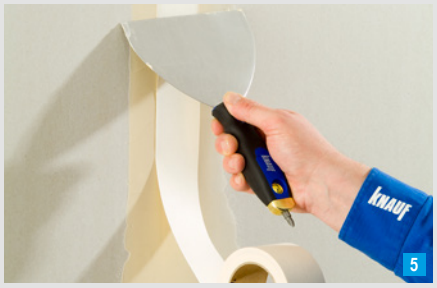
With cut square edge / bevelled cut edge joints

Bevelling of a bevelled cut edge with the beveller

Breaking with the hand sander with Knauf Cleaneo boards

Free joint from dust

Pressing in of jointing compound



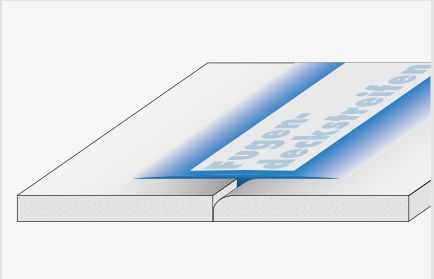
Bedding of joint tape

Covering joint tape with compound

With tapered edge joints
Level off until smooth in the longitudinal direction. Directly afterwards, the Knauf Fugendeckstreifen Kurt joint tape should be inserted into the jointing compound film from the outside of the roll and pushed in with a spatula so that the board and joint form an even surface.

With tapered bevelled edge/square edge joints
After pressing in, scrape off the jointing compound so that a uniform approx. 10 cm wide and min. 1 mm thick joint material film results. Directly afterwards, the Knauf Fugendeckstreifen Kurt joint tape should be inserted into the jointing compound film from the outside of the roll and pushed in evenly with the spatula or trowel, and excess material should be scratched off. Subsequently, the joint with the joint tape must be levelled and bedded as smoothly as possible with a curved trowel.

With mixed joint types



Typical mixed joints

Trowel with curved blade for jointing mixed joints

Pressing in of jointing compound

Bedding of joint tape

Covering the joint tape with compound using a curved trowel

Practical application

On the wall and ceiling with Knauf Fugenfüller Leicht

If Knauf Fugenfüller Leicht (light joint filler) is used, the following processing steps should be performed considering the joint type:

With cut square edge/tapered long edge joints
Strike off and smooth in the longitudinal direction. Directly afterwards, the Knauf Fugendeckstreifen Kurt joint tape should be applied from the outside of the roll and bedded using a spatula. In a second work step, cover with jointing compound until the board and joint form an even surface.

With tapered bevelled edge/bevelled cut edge/ half-rounded edg /square edge/cut edge joints
After pressing in, scrape off the jointing compound so that a uniform approx. 10 cm wide and min. 1 mm thick joint material film results. Directly afterwards, the Knauf Fugendeckstreifen Kurt joint tape should be inserted into the jointing compound film from the outside of the roll and pushed in evenly with the spatula or trowel, and excess material should be scratched off. Subsequently, the joint with the joint tape must be levelled and bedded as smoothly as possible with a curved trowel.

For all mixed joints and jointing compounds
Mixed joints are joints comprised of two different edge designs combined. In practice, these types of mixed joints result from the combination of complete boards with cut boards (e.g. half-rounded tapered edge with cut edges). For these joints, a joint tape such as Knauf Kurt should always be used.

After bedding, the jointing compound should be levelled so that the half-rounded edge/half-rounded tapered edge/tapered long edge side of the joint is filled with a generous amount of material and on the cut edge joint or bevelled cut edge, a uniform approx. 5 cm wide and min. 1 mm thick joint material film results.

► **Good to know!**

Joint tape must always be used with mixed joint types, and it is necessary to ensure that sufficient jointing compound is available under the joint tape on both sides of the joint. This ensures optimum adhesive bonding.

Directly afterwards, the Knauf Fugendeckstreifen Kurt joint tape should be bedded (with half of the filler material film on the cut edge/bevelled cut edge side and the other half on the half-rounded edge/half-rounded tapered edge/tapered long edge side) from the outside of the roll and bedded in level using a spatula or trowel, and excess material must be scraped off. Subsequently, the joint must be levelled and bedded as smoothly as possible with a curved trowel.

Caution: This classic type of damage occurs most frequently with mixed joints: The joint tape partly detaches from the substrate during or after painting and always on the cut edge/bevelled cut edge side of the joint. Cause: Too little jointing compound under the joint tape.

On joints in timber construction

Joints and boards should be decoupled from the substrate in timber construction. Use of resin covered staples instead of screws offers many benefits. If it is not possible to ensure that the boards can be joined flush without a gap, we recommend backing the joint with a separation strip, e.g. Knauf Trenn-Fix. Jointing compound connected to the substrate would possibly cause cracks in the joint because of the shrinkage and expansion behaviour of the timber.

Manual application is possible not just with a finishing trowel, but also using a long pile lambskin roller.

With Knauf Fill & Finish both tapered edge joints can be filled and surfaces finished to qualities Q3 and Q4.

Knauf Fill & Finish can also be applied with airless machines. Simply add one litre of water to a 20 kg bucket.

Machine application can achieve up to 5 times greater area coverage.

Practical application

On the wall and ceiling with paste-like compounds

Paste-like compounds are ideal for the joint finish (Q2) as well as for full surface skimming (Q3 and Q4). If paste-like Knauf compounds are used, the following application steps must be carried out in accordance with the required quality level after any stirring:

Q2 filling
Apply the compounds by hand (e.g. With the Knauf special finishing trowel) or by machine (e.g. with airless machine PFT Swing Airless) about 30 cm wide and thin over the joint. Subsequently (e.g. with Knauf Flächenspachtel 400 mm), create a transition to the gypsum board surface. Knauf Fill&Finish Light as well as Knauf Superfinish are ideal for this purpose.

Tip: Ceiling surfaces in particular benefit from machine applied Q2 jointing and skimming with enormous benefits in terms of time savings as each step can be performed quickly and easily from the ground without a ladder.

Q3 filling
Apply the compounds by hand with a long pile roller, or by machine approx. 40 – 50 cm wide on the joint, create a level transition to the board surface. Subsequently apply a thin layer of compound to the entire gypsum board surface to seal the pores and scrape skim with a wide spatula.

Tip: Long pile lambskin rollers are very well suited for quick skim application on large surfaces using paste-like compounds. To avoid excessive burrs and ridges when skimming, a large wide spatula (e.g. Knauf Wide Spatula 600 mm or 800 mm) should be used. Knauf Pro Spray Light is ideal for this purpose.

► Good to know!

Never sand between different compound layers. Sanding dust acts as a release agent and can cause adhesion problems for the following compound layer.
However, removing grooves and ridges with the trowel or spatula between skimming coats is possible.

Q4 filling
Apply the compounds by hand (e.g. with the Knauf special finishing trowel) or by machine (e.g. with airless machine PFT Swing Airless) about 1 mm thick onto the entire gypsum board surface. Subsequently use a wide spatula (e.g. Knauf Wide Spatula 600 mm or 800 mm) to smoothen.

Tip: The Wide Spatula should be kept as flat as possible in order to “rule” the material. Strike off of the material with a steeply held trowel usually results in an uneven surface.

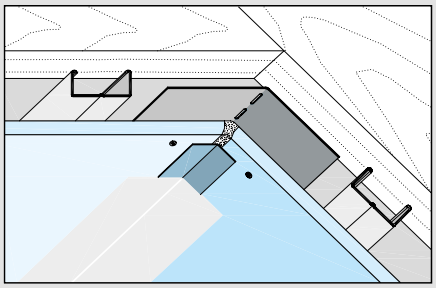
Knauf Kurt for inside corners

Apply jointing compound

Fold Knauf Kurt joint tape

Apply the Knauf Kurt joint tape

Press in (bed) Knauf Kurt joint tape


Flexible profile in the roof slope

Level material

Completed inside corner

Practical application

On inside and outside corners

Inside corner with Knauf Kurt
Corner joints between similar building elements (drywall partitions) can be rigidly connected. Connections to differing building elements must be separated (see page 32/33).

Press joint filler into the joint with a finishing trowel or spatula. On both sides of the joint, an approx. 5 cm wide and 1 mm thick film of joint filler must be applied from the corner. Bend Knauf Fugendeckstreifen Kurt joint tape along the pre-made fold and bed into the jointing compound layer, ensuring the fold is positioned as precisely as possible in the corner. Then use a spatula or trowel flat against both surfaces to the right and left of the fold to bed into the jointing compound. Remove excess material and then cover as flat as possible.

Attic
Special cases of inside corners are in the attic for the transition from the jamb wall to the roof slope and from the roof slope to the collar beam ceiling. Here it is recommended with board installation to use the angle for stabilization with the flex profile from Knauf as backing (for further important installation details see System Data Sheet D61. de). For jointing compound, a rigid composite of Knauf Uniflott (or another Knauf compound) with Knauf Fugendeckstreifen Kurt joint tape, similar to the inside corners is suitable. Elastic solutions (acrylic compounds, elastic profiles) lead to problems with the final coating. The final coating is always non-elastic (rigid). Consequence: Cracks and spalling on the final coating.

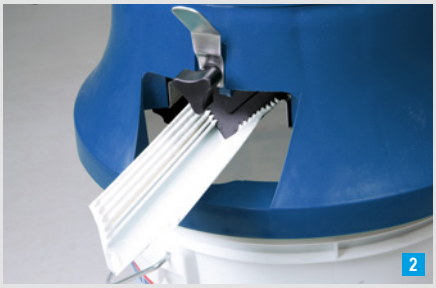
Separated inside corners
If larger movements are to be expected between building elements, connections to larger drywall areas (e.g. suspended ceilings on partitions) or connections of drywall constructions to solid constructional components, separation is necessary. The preferred solution is the use of a separation strip (Knauf Trenn-Fix). For larger ceilings, a ceiling design with shadow gap (page 48 to 49) is ideal.

Rigid inside and outside corners
Rigid corner connections can be implemented efficiently with the “Dallas” and “Las Vegas” corner trims. The paper coated metal corner trims are cut-to-length with a plate shears and pulled through the jointing compound hopper filled with

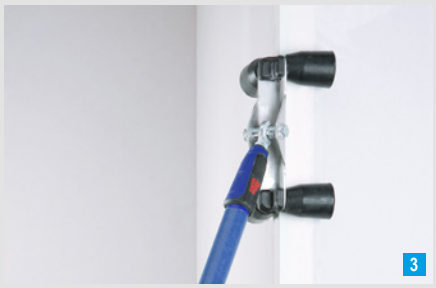
Corner trim for outside corners

Instructions at www.knauf.de/hopper

Fill the jointing compound hopper with paste-like jointing compound



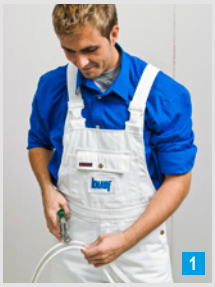
Pull through the “Dallas” corner trim



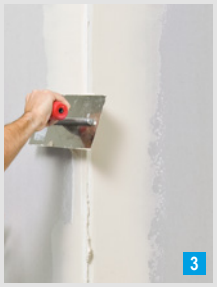
Push on of the corner trim with an outside corner roller

Filling of the transitions

Alux edge trims for outside corner



Prepare the Alux edge trim …



… and bed, then plaster over

► Good to know!

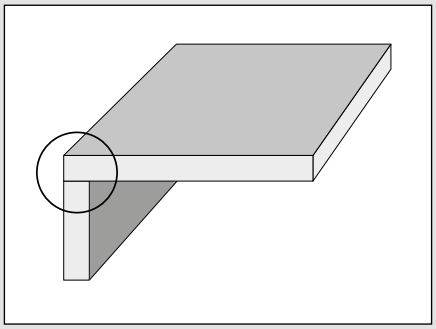
An alternative to hand filled inside and outside corners is offered by the mitering and moulding elements. Here mitered gypsum boards are glued and fitted as ready made corners.

paste-like material (e.g. Superfinish). In this way, the rails coated with filling compound are pushed firmly upwards or into the corner with the paper side upwards using the inside or outside corner roller. Excess jointing compound is then levelled using a spatula or finishing trowel.

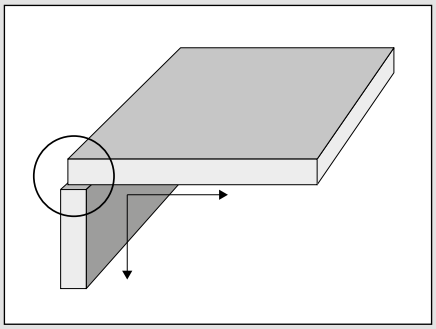
Outside corners with Alux

Alternatively, Knauf alux edge trims can also be bedded. On both sides of the joint (starting from the corner), an approx. 5 cm wide and 1 mm thick film of jointing compound must be levelled with the spatula or smoothing trowel. Bed the Knauf Alux-Kantenschutz (edge trim) with the metal coated side in the jointing compound film, so that the fold is situated as accurately as possible in the corner. Subsequently, bed into the jointing compound using a spatula or trowel on both sides of the edge and then cover as flat as possible.

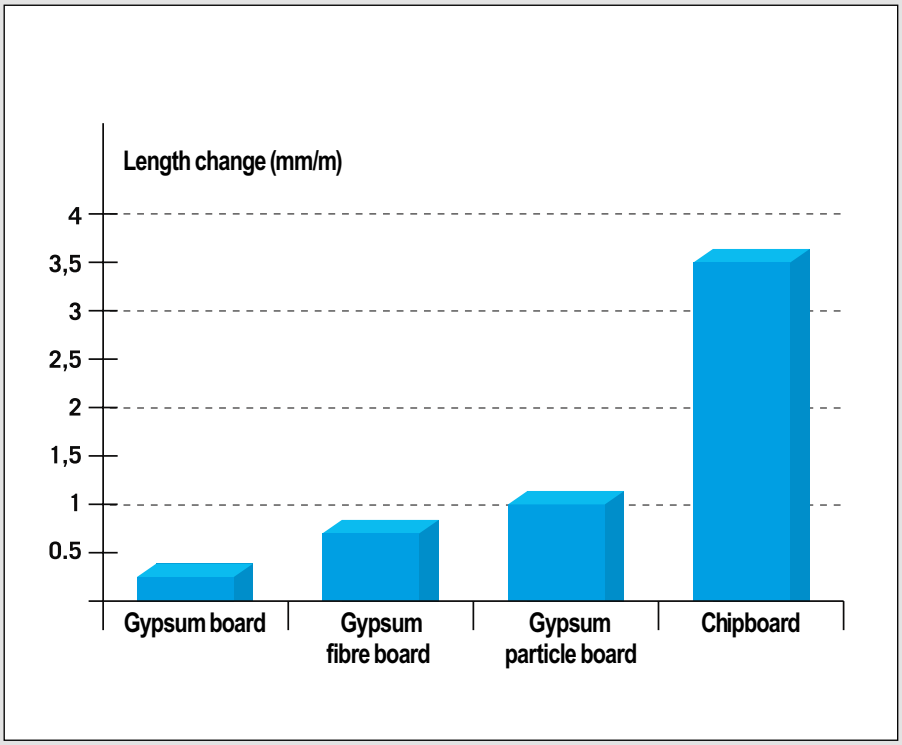
Hygrothermal performance of components



Relatively moist ambient conditions during installation



Relatively dry ambient conditions during usage



Moisture-related changes in length: Comparison with other boards used in building for interior fittings (empirical values), characteristic values with changes in the climate at 20°C / 30% rel. humidity to 20°C / 85%.

Practical application

Connections to constructional components

A connection to a constructional component generally means the contact between two elements, which have a physically different behaviour. Relevant physical properties of components are, for example, direction dependent changes in length due to changes in the temperature or relative air humidity as well as deformation due to exerted force.

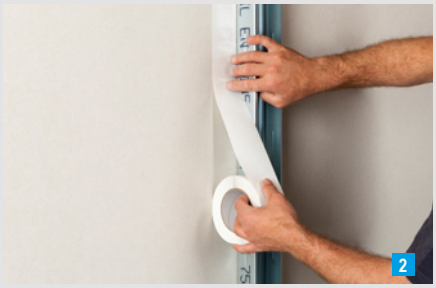
Because of the considerably larger changes in length in the board edge directions than in the board surface direction, strictly speaking the connection of a gypsum board ceiling to a gypsum board partition should be considered to be a connection to a constructional component. Air dry gypsum boards exhibit, for example, in moisture saturated air (20 °C, 95 % relative humidity) at 1 to 2 % water absorption, a length change due to swelling of about 0.35 mm/m. For example, for a 15 m long gypsum board partition (12.5 mm cladding) the thickness of the partition with these changes in the ambient conditions will only change by approx. 4 µm while the length of the partition changes by about 5 mm.

No jointing compounds can bridge these gaps and inevitably cracks will occur. This is why two different building elements must be mechanically separated. In addition to a freely moving ceiling construction shadow gap design (so-called deflection head), recommended particularly with large ceiling areas, especially with wooden joist and concrete slab ceilings, a sliding separation in the connection area using a separation strip is the only really sure functional method. If they move relative to one another, an inconspicuous defined hairline crack occurs.

Ideally suitable for this purpose is the 6.5 cm wide separation strip Knauf Trenn-Fix 65, featuring a narrow sticky zone with strong adhesive and a wide sticky zone with weak adhesive. The narrow sticky zone with strong adhesive is covered over by a gypsum board after installation. The wide sticky zone with weak adhesive remains visible as excess material after installation and protects the flanking components against soiling.

New: The innovative and patented dot adhesive technology enables the Knauf Trenn-Fix 65 to be applied even with very high levels of building

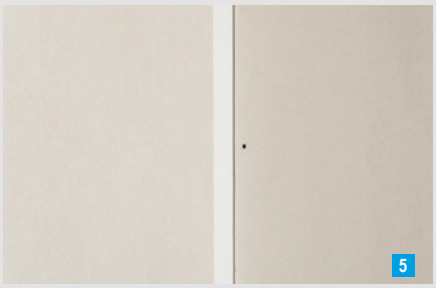
Install the profile on the flanking constructional component



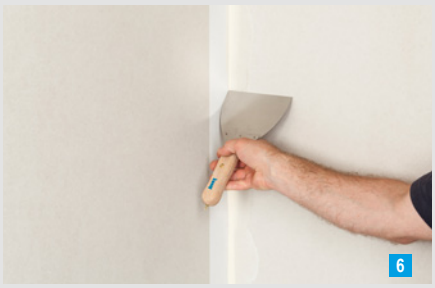
Attach Trenn-Fix beside the profile

Connect the narrow sticky zone with strong adhesive to the profile

Push on the Trenn-Fix and smooth it



Install gypsum boards with 5 mm clearance



Fill the joint

After drying and sanding cut the Trenn-Fix in the corner

Remove the excess strip

Permanently functional connection to a constructional component

► Good to know!

For wall and ceiling connections, separation of the constructional component using a separation strip is recommended, in order to provide a clean hairline gap that is practically unnoticeable. Connections using acrylate frequently result in ugly, visible cracks and are maintenance joints, which have to be renewed after a certain time.

site moisture without the well-known formation of waveform patterns. At the same time it can be removed again from common surfaces without leaving residues.

For installation, the Knauf Trenn-Fix 65 is glued onto the smooth building element (e.g. plaster, concrete, wood, drywall, etc.) in the vicinity of the constructional component so that the narrow sticky zone with strong adhesive is connected directly to the already pre-installed drywall profile.

Install Knauf boards at a spacing of approx. 5 mm to the Knauf Trenn-Fix 65. Subsequently fill the joint between Knauf Trenn-Fix 65 and board edge with jointing compound (e.g. Knauf Uniflott or Knauf Fugenfüller Leicht). After drying of the compound, cut off the excess strip directly in the corner by cutting with a sharp blade and removing it. Plaster the Trenn-Fix strips when plastering. Cut off and remove the protruding strips after setting and hardening of the plaster.

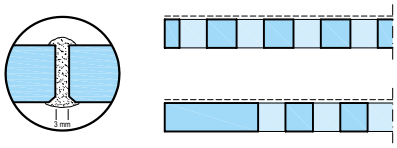
When connecting drywall or plaster surfaces to wood or fair-faced (exposed) concrete surfaces, Knauf Trenn-Fix 65 should be cut in the corner and removed after the paint coat is applied. In this way wood or concrete are protected at the connection area from soiling.

Acrylate used frequently for wall-ceiling connections is not a good solution, as the acrylate cannot guarantee optimum deformation. Acrylate is practically a rigid connection.

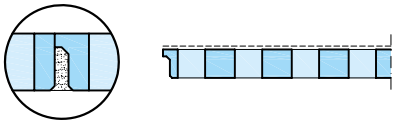
A further disadvantage of acrylate is flaking of applied coatings. Coating material may adhere well to acrylate, but as soon as deformation occurs, the relatively rigid (as they do not deform) paint coats flake off or wrinkles will form in the wallpaper. Further disadvantages: If the acrylate is not coated, it will quickly become unsightly due to the deposited dust layers and ageing processes.

Edge types of perforated boards

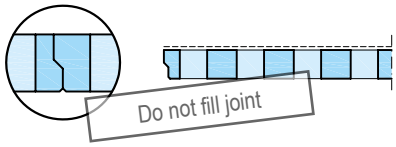
Four-sided square edge



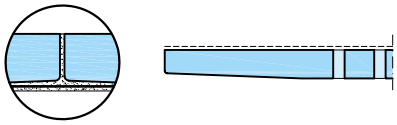
One front edge and one long edge



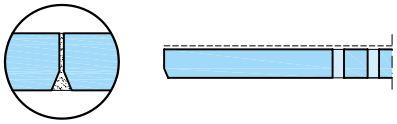
linear: Circumferential rebated edges



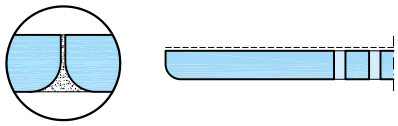
4-side tapered edge



Bevelled cut edge:
Front edge bevelled



Half-rounded edge:
Long edge - half rounded



Practical application

Knauf Cleaneo Acoustic – perforated ceilings

For perforated boards such as Knauf Cleaneo Acoustic Board, a completely different jointing technique is required due to the holes that may not be filled and the desired optical appearance.

With 4-side square edge types, before the installation the edges on the visible side can be lightly scuffed with a sanding mesh, the dust removed and primed with Knauf Tiefengrund.

Knauf Cleaneo Acoustic Boards with cut edges are marked in red or blue. The boards should be installed so that the red marking of a board is beside the blue marking of a neighbouring board. All Knauf Cleaneo FF Acoustic Boards square joint edges are factory primed and are butt joined, i.e. they are simply butt joined without a clearance. The rebate acts as a spacer. Before screw fastening, inspection of exact alignment of the perforation row is performed via the diagonals. If necessary, the board will need to be minimally readjusted and screw fastened.

Only with the 4-side square edge is it necessary to maintain a distance of 3 – 4 mm between the boards, so that the perforation pattern is aligned and sufficient jointing compound can penetrate the joints. The perforation pattern can be inspected using the Knauf board alignment installation aid that fits almost all perforation designs.

Ideally, the boards are fastened to the grid by a three man team using Drywall Screws SN 3.5 x 30 at screw centres of 170 mm. Screw fastening commences from the corner always adjacent to the boards already fastened.

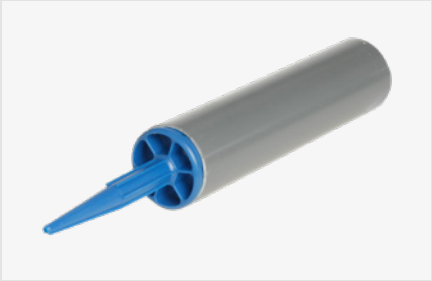
After completion of the installation on the ceiling the dust deposits in the joint are removed using a brush.

Butt joined square joint

4-side square edge with 3 – 4 mm clearance

Side view when filling the joint with Knauf Uniflott

Removal of excessive Knauf Uniflott after drying using the Cleaneo trowel



Cartridge with nozzle for joint filling

Cleaneo trowel for filling screw heads

► Good to know!

A special joint filling tool is recommended for filling screw heads to prevent the surrounding perforations from being filled with jointing/filling compound. Position the Knauf Cleaneo trowel with the hole precisely and level over the screw head. Subsequently fill and level the hole in the trowel with Knauf filler or Knauf Uniflott and then lift the Cleaneo trowel vertically from the surface. Allow the protruding "filler disc" to harden and sand until level.

Square joint edge

Mix Knauf Uniflott to a stable consistence and fill into cartridges, attach an injection nozzle and insert into the cartridge gun. Use of a compressed-air operated or electrically operated cartridge gun is not just more comfortable, it ensures more uniform metering of the material and thus optimum filling of the joint.

Insert the injection nozzle at an incline into the joint and with a backwards movement at a constant speed, fill the joint completely until an approx. 3 to 4 mm thick string of material protrudes out of the joint. After hardening of the jointing compound has commenced (approx. 45 min. after mixing), the string is removed using the Cleaneo trowel to approx. 1 to 2 mm above the board surface. After the jointing compound has hardened, and on the following day at the very latest, the joint is smoothed until level using the Abranet® Schleifgitter sanding mesh. If minor unevenness (voids) exists, it can be touched up and finished locally.

If necessary, the joints and screw heads are filled in a second work step, for example, using Knauf Readygips or Snowboard filler. Subsequently, the dried filled surfaces are sanded until level.

Four-sided square edge

The jointing is undertaken in a similar way to the square joint edge. In order to optimally fill the joint, as the joint is open upwards, inject the filler material so that it forms a “mushroom-type” shape above the joint. (see photo above).

Knauf Abranet® Handschleifer (hand sander) with vacuum extraction

Sanding

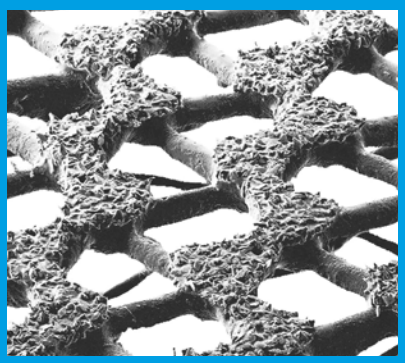
Soft transition between joint and gypsum board

After setting and drying, the joint is sanded by hand with the Abranet® Handschleifer hand sander or by machine with the long handle sander (Giraffe), to remove fine unevenness in the jointing compound, e.g. coarse burrs, and to achieve a uniform and smooth transition between the joint and gypsum board.

For Q4 quality level surfaces, after the final filling stage (full surface treatment) the entire surface is once again lightly sanded without pressure to obtain a fully even and smooth premium quality surface.

Jointing compounds can be sanded most easily directly after the joint has dried. Should you wait for a few days before sanding, the jointing compounds will harden further and are more difficult to sand.

Generally, a 120 grain sanding mesh is used for jointing compounds. It is recommended that a long handle sander and hand sander with suction are used. This reduces the cleaning work and the dust content in the air. Ideally suited for the purpose are sanding meshes such as Knauf Abranet®, which in contrast to sanding papers provide an efficient full surface vacuum extraction through the entire mesh surface and have a significantly longer service life.



► Good to know!

The sanding dust that results can be efficiently and cleanly vacuum extracted through the more than 24,000 holes in the Knauf Abranet® sanding mesh. Particularly when sanding off jointing compound, Knauf Abranet® Schleifgitter sanding mesh comes into its own and demonstrates its strengths.

Priming

Precondition for more extensive surface coatings

After sanding the jointed areas, the drywall surfaces should generally be pretreated with a suitable primer such as Knauf Tiefengrund, in accordance with code of practice no. 6 of the Bundesverband der Gipsindustrie. Diluting the primer or mixing primer to the paint is not a suitable pretreatment method and leads to problems with the final coatings.

Priming the entire surface binds dust on the surface and also sets common suction properties. Not only does it assure good adhesion of coatings and linings, it also guarantees lower consumption and better coverage of paint coats.

► Good to know!

For thin layers (Q3), paste-like compounds such as Knauf Readygips should be used. However, in practice gypsum-based jointing compounds are frequently used for this purpose. To ensure that you obtain substrates that are durable, it is important here to only use premium branded products for jointing compounds and primers. Supposedly attractively-priced products are generally not sufficiently synthetically enhanced and may cause adhesion problems for wallpapers or paint coatings.

Surface qualities and coatings

Q1 and Q2

To suit the optical appearance requirements placed on the surface finish, the Bundesverband der Gipsindustrie e. V. as well as Eurogypsum, the European Gypsum Industry federation, introduced four quality levels:

Quality level 1 (Q1)
For surfaces *that do not have any decorative finish requirements*.

Jointing in accordance with quality level Q1 includes the filling of the joints between the gypsum wallboards and the covering of the visible parts of the fixings.

Practically this means, for example, application of Knauf Uniflott or Knauf filler or alternately Knauf Fugenfüller Leicht and Fugendeckstreifen joint tape with half-rounded edge/half-rounded tapered edge joints.

Surfaces manufactured to this specification are suitable for covering with tiles, panels or thick-layer plaster.

Quality level 2 (Q2)
For surfaces that *"fulfil the basic requirements"* for wall and ceiling surfaces. The main objective of this quality level is to align the joint area, inside corner and outside corner as well as the fixings as a continuous transition to the board surface.

Jointing and finishing in accordance with quality level Q2 includes basic filling (Q1) as well as finishing in order to achieve a continuous transition to the board surface. No application marks or ridges may remain visible. Sand the affected areas if necessary.

In practice, this means two work steps (if work is precise) with subsequent sanding of the transition areas. The result will be lighter and of a superior quality if the particularly pliable and easy to sand Knauf Fill & Finish or Spritzspachtel plus is finished to approx. 30 cm wide with the second work step.

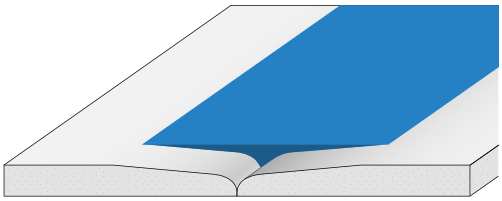
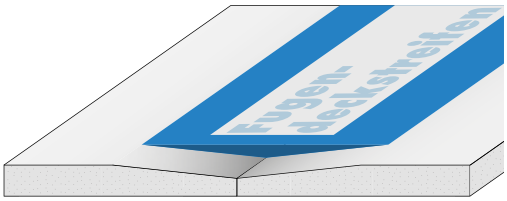
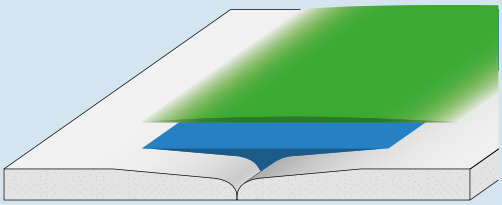
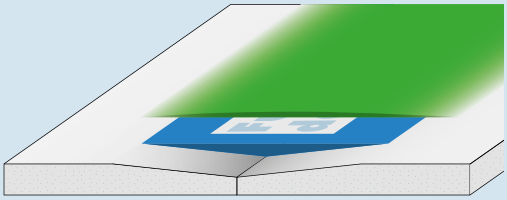
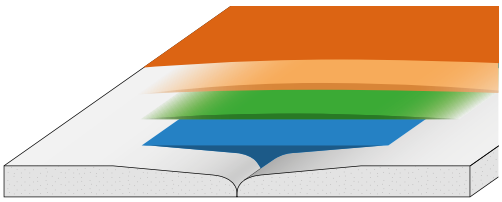
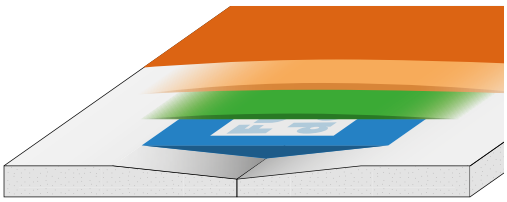
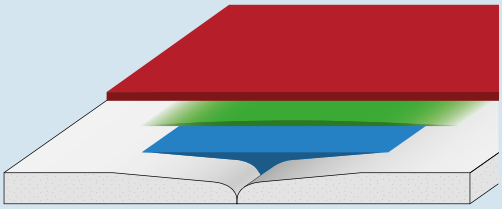
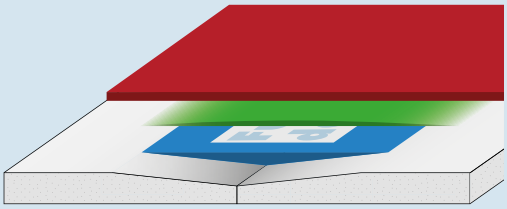
Frequently, jointing marks will appear after paint is applied regardless of the correct implementation of quality level Q2. Often responsible is an insufficient or absent primer coat, e.g. with Knauf Tiefengrund. The large differences in suction properties of

Q1	Q2	Q3	Q4
Suitable for ■ Surfaces, with linings and coverings of tiles and boards or where thick-layer plasters are applied.	**Suitable for** ■ Medium and coarse structured wall coverings ■ Matt, filling, medium and coarse structured paint coatings/coats ■ Top coats with grain size > 1 mm Marks and imperfections – particularly with side lighting cannot be excluded.	**Suitable for** ■ Finely textured wall linings ■ Matt, finely textured paint coats/coatings ■ Top coats with grain size > 1 mm Imperfections – particularly under the effect of shallow lighting cannot be fully excluded.	**Suitable for** ■ Smooth or fine textured wall coverings with gloss finish, e.g. metal or vinyl wallpapers ■ Varnishes or paint coats/ coatings up to medium gloss ■ Stucco marble or similar specialist decorative finishes The undesirable effects of shallow lighting on the appearance of the finished surface (e.g. noticeable shadows on the surface, or local markings), will be avoided to a large extent.
For surfaces that do not have any decorative finish requirements	For common optical requirements on wall and ceiling surfaces	For enhanced optical demands on the finished surface	For superior visual requirements
Manufacture ■ Filling of the joints ■ Covering the visible parts of the fixings	**Manufacture** ■ Quality level (Q1) ■ Finishing (finishing compound) to achieve a smooth transition to the board surface	**Manufacture** ■ Quality level (Q2) ■ Wider finishing of the joint and a tight coat of joint compound to the entire plasterboard surface, filling the pores	**Manufacture** ■ Quality level (Q2) ■ Full surface levelling with at least 1 mm layer thickness

jointing compounds and board liner lead to texture and layer thickness differences in the colour and thus to significant jointing marks. Application of a primer is always necessary (BVG code or practice no. 6).

The surfaces manufactured in this way are suitable for medium and coarse structured wall coverings, (textured wallpaper) matt, filling, medium and coarse structured paint coatings/coats and top coats grain size > 1 mm.)

Be careful: When quality level 2 is used as the basis for wall linings and coatings, marks cannot be totally avoided, particularly under the effect of shallow light.

	Jointing half-rounded tapered edge or alternatively half-rounded edge with Uniflott, Uniflott imprägniert or Spritzspachtel plus	Jointing for tapered long edge
Q1		
Q2		
Q3		
Q4		

Surface qualities and coatings

Q3 and Q4

Quality level 3 (Q3)
For surfaces with *enhanced optical requirements* exceeding Q2.

Jointing and finishing to Q3 incorporates jointing and finishing to Q2, plus wider finishing of the joint and a tight coat of joint compound to the entire plasterboard surface, filling the pores. Physical ridges and grooves are not acceptable and must be sanded if necessary.

Practically, this means a tight coat of jointing compound to the entire plasterboard surface, for example, using Knauf Spritzspachtel plus as it is very easy to apply and sand and can be applied efficiently with an airless device.

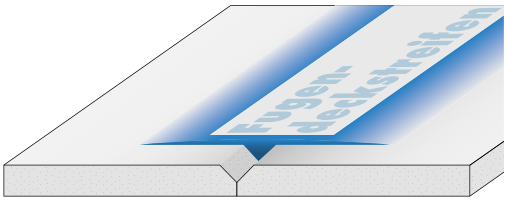
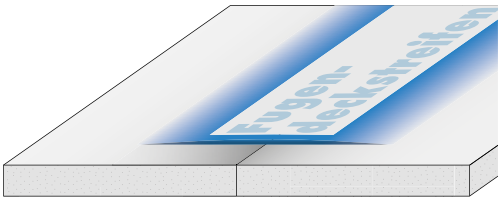
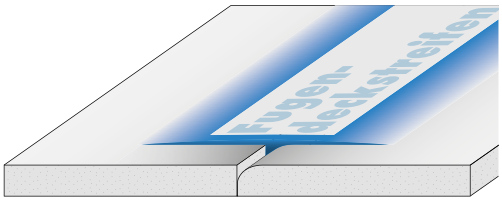
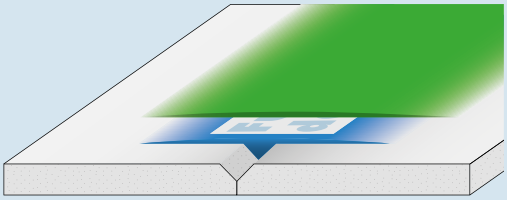
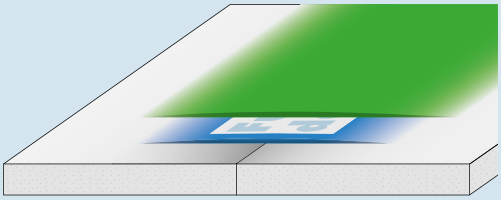
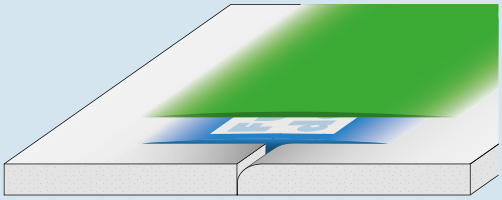
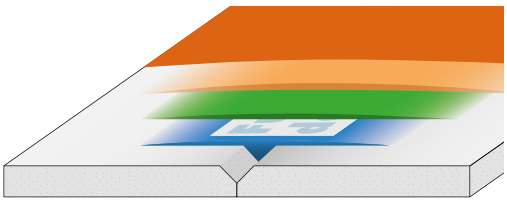
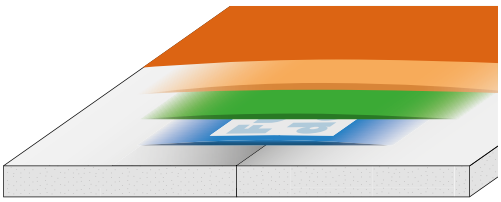
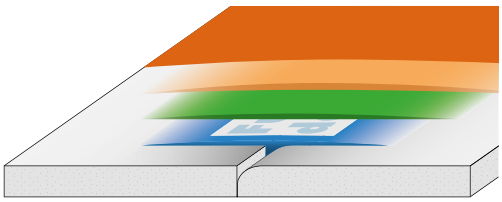
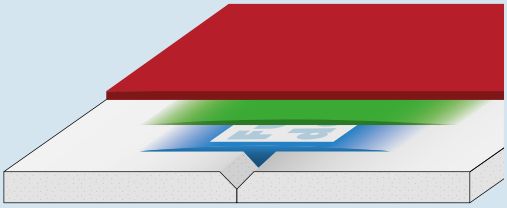
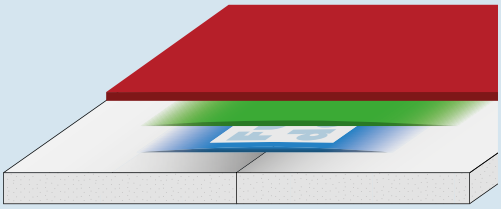
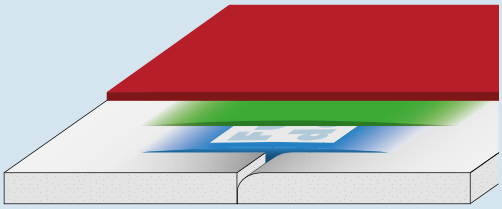
The surfaces manufactured in this way are suitable for fine structured wall coverings, matt and fine structured paint coatings (e.g. emulsion paint with lambskin roller) and top coats with a grain size < 1 mm.

Even with this jointing, visible marks cannot be totally eliminated under the effect of shallow light. The level and extent of such marks is considerably lower than in the case of Q2 jointing.

Quality level 4 (Q4)
For surfaces subject to the *highest optical requirements*.

This includes jointing and finishing to Q2 plus a complete surface covering of skim coat with a suitable material and levelled with a layer thickness to at least 1 mm.

Practically, this means a complete surface covering of skim coat with a low-shrinkage paste-like compound such as Spritzspachtel plus. It is applied by hand or with an airless device in a 1 to 2 mm thick layer and smoothed. If necessary, a second, very thin layer is applied. After sanding, a premium level surface is achieved. Surfaces created in this way are suitable for smooth, glossy or textured wall

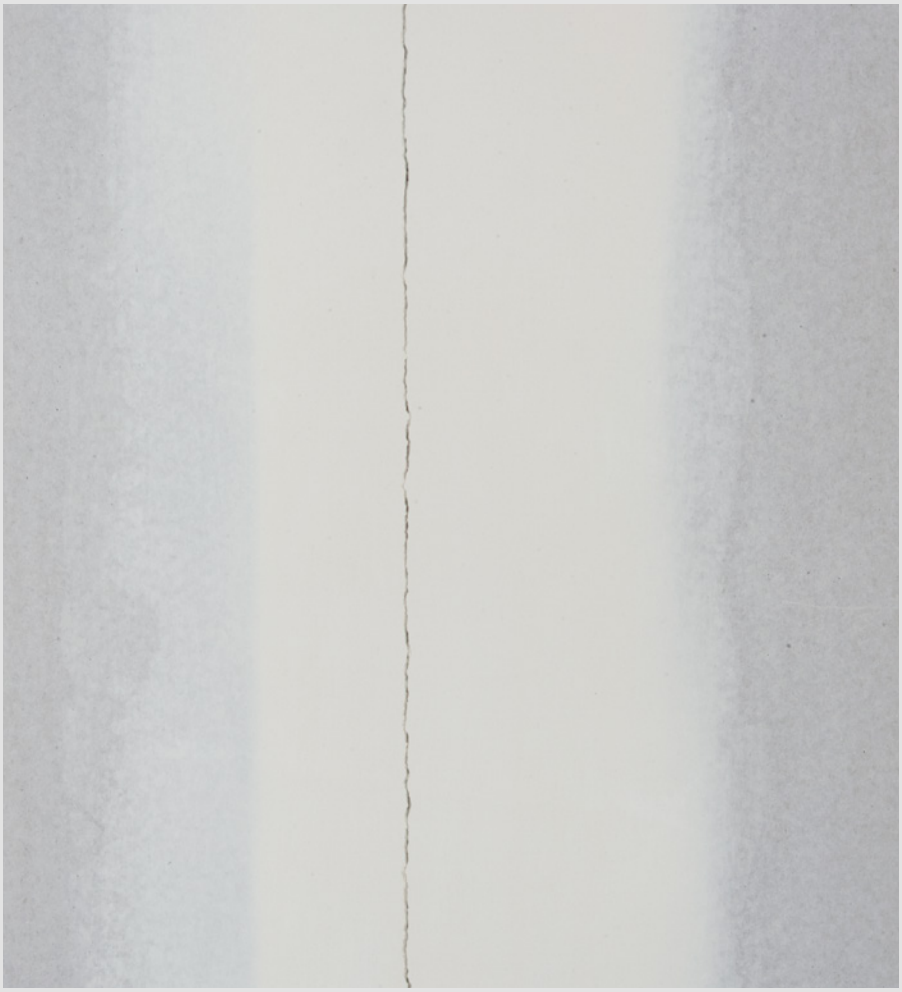
Jointing for bevelled cut edge	Jointing for square edge joints (also applies for cut edge and tapered bevelled edge)	Jointing square edge to half-rounded edge (also applies for all mixed edges types)
		
		
		
		

► Good to know!

The undesirable effects of shallow lighting on the appearance of the finished surface with Q4 will only be avoided to a large extent if the lighting conditions expected in use should be known and replicated. If this is not the case, make your concerns known to the client.

coverings (e.g. metal or vinyl wallpaper), varnishes of high-quality filling and smoothing techniques.

Surface treatment to quality level Q4 minimises the appearance of marks on flat surfaces or joints. Undesirable effects of shallow lighting will be avoided to a large extent, however, such effects cannot be avoided completely, because natural light in particular can vary and is difficult to predict. Skimmed surfaces which are perfectly even and free of any shading cannot be achieved with shallow lighting.



Example of a smooth crack

Application of Knauf Tiefengrund

Cracks

The smooth crack

The most frequent cause for complaint with drywalling is the formation of visible cracks in the area of the joint. For a purely optical point of view, the cracks can be divided into two classes: Smooth cracks and angular cracks.

The smooth crack
A smooth crack in the joint on one or both sides between the board liner and filling compound is generally caused by adhesion problems.

There are generally three reasons for poor adhesion of the jointing compound to the gypsum board edge:

Option 1: Dust on the board edges.
This allows the formation of a separation layer between the jointing compound and edge, and the connection of both elements is made practically impossible.

This problem can be avoided by priming the cut edges, e.g. with Knauf Tiefengrund or alternatively by using compressed air to blast remove the dust from the board edges. Simply “binding” the dust by wetting the cut edges with a wet brush will not avoid the problems. On the contrary. By “wetting” the dust, a sludge will form allowing a separation layer to form between the jointing compound and the edge, and after drying it will return to a loose dust form. Only with Knauf Tiefengrund is it possible to effectively bond the dust particles to one another and with the board edge.

Option 2: Absorbency of the jointing compound with open cut edges. This means that the hygroscopic properties of the gypsum core will extract too much water too quickly from the jointing compound. Therefore, the water necessary for setting is missing at the connection interface, i.e. the jointing compound cannot harden, but simply dries and does not form a sufficient connection with the edge.

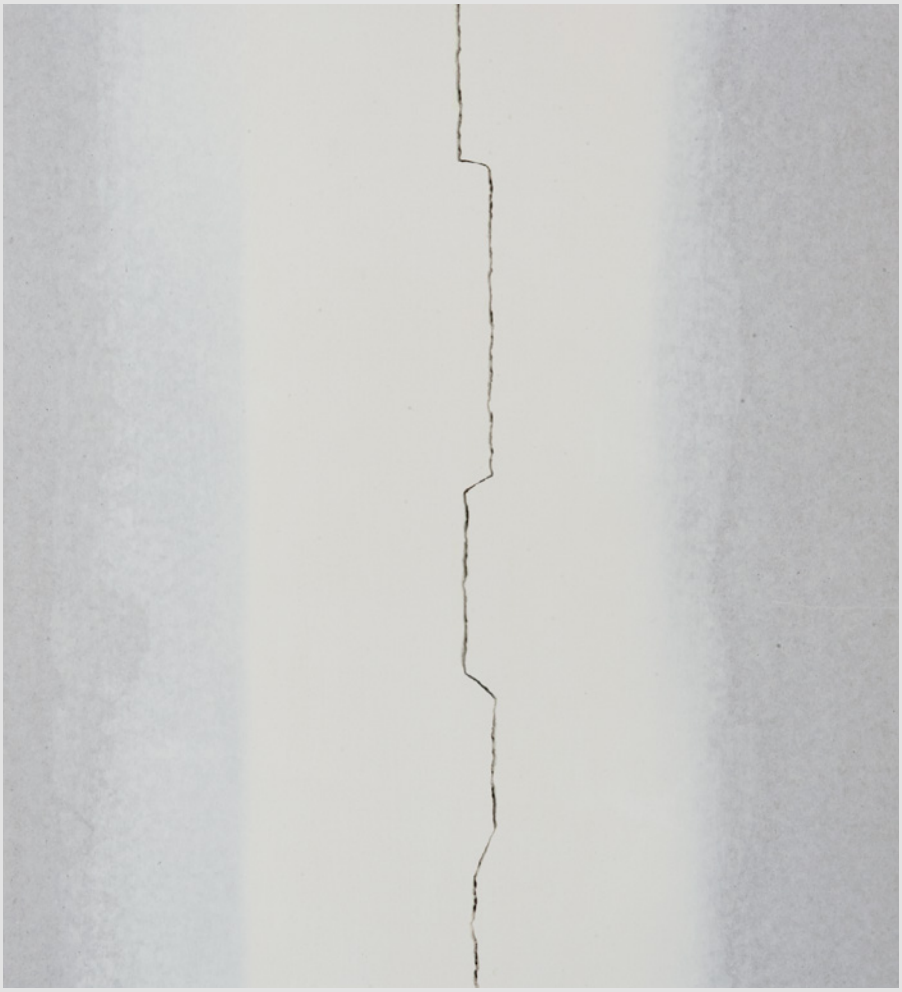
The “Absorbency” problem can be avoided, e.g. by pretreatment of the cut edges, for example, with Knauf Tiefengrund. Simply wetting the cut edge with a brush is not sufficient. The gypsum core would simply absorb this minor quantity of water. Only Knauf Tiefengrund seals the pores at the cut edge and thus reduces the absorbency properties.

Fill cracks with ease with Knauf filling and jointing compounds

Option 3: Yellowing of the board liner. If gypsum board edges are exposed for a long time to direct sunshine, the lignins which they contain degrade. The degradation products of the lignins form a separation layer and act like a retardant, which delays the setting of the filling compound for so long until the board liner has absorbed the water necessary for setting. In this case, the problem is also due to the suction properties of the filling/ jointing compound on the board liner.

The yellowing of the board liner can be easily avoided by correct storage of the gypsum boards. If yellowing of the board edges is discovered before installation, the boards should no longer be installed.

Repair of a smooth crack is undertaken by removal of the jointing compound that is already loose from the joint using a knife or small trowel. The edges must then be primed. If the board liner has yellowed, priming with a primer (Putzgrund) or with a filled barrier coating such as Knauf Aton is necessary, to avoid appearance of brown lignin spots coming through right up to the finished surface. To repair dust-related or absorption property related cracks, it is sufficient to pretreat the joint freed from old jointing compound remnants with products such as Knauf Tiefengrund, Knauf Spezialgrund or alternately with a barrier coating and to reapply the joint when dry.



Example of an angular crack

Cracks

The angular crack in the joint

The most frequent cause of an angular crack is **accelerated drying.** With quick drying and heating of the ambient air within a few days to under 40 % relative air humidity (as is frequently the case when the heating installers are testing their installed systems) the gypsum boards will shrink. This results in very large stresses which facilitates the formation of angular cracks in the jointing compound.

These cracks can be easily avoided by slow and controlled heating or drying. Adequately slow changes in the air humidity allow the gypsum board joint to exhibit plastic behaviour and dissipate the stresses that occur.

The second most frequent cause is the **omission of a joint tape**. It is only possible to omit use of a joint tape with Knauf Uniflott, Knauf Uniflott imprägniert (impregnated) or Knauf filler, due to their unique strength in conjunction with a half-rounded edge or half-rounded tapered edge.

For timber constructions and attic extensions, the use of a joint tape such as Knauf Kurt is recommended due to the relatively large movements with all jointing compounds, as relatively large stresses can occur through the drying of timber, settling as well as loads imposed by wind and snow.

A further cause is the **use of unsuitable joint tape.** Glass fibre tape can be very easily bedded, but can only withstand relatively little force and seldom prevents cracking of the joints. Knauf only recommends it for application with Knauf Fireboard.

Self-adhesive mesh tape is frequently used. This mesh tape requires a certain pretension beforehand until it is in a position to withstand tensile forces. Due to the slightly curved embedding in the empty joint, it is only possible when a crack has already occurred in the jointing compound. Furthermore, cavities often occur under the mesh strips with half-rounded tapered edges, as the jointing compound is difficult to press through the mesh onto the board. This problem can be mostly avoided by the general use of joint tapes such as Knauf Kurt.

Crack avoidance with Knauf Fugendeckstreifen Kurt joint tape on the ceiling incline

► Good to know!

A crack repair is only useful when the cause has been remedied, that is when no more large changes in the length of the gypsum boards are to be expected.

Repair of angular cracks caused by rapid drying, omission of a joint tape or use of an unsuitable joint tape is undertaken on painted surfaces by the application of paper joint tape, such as Knauf Kurt, directly on the crack with PVA glue. Subsequently, the entire surface must receive a skim coat of filler at least 1 mm thick and must then be repainted. Thus, the cracks are no longer visible and the glued on joint tape avoids the re-occurrence of cracks.

With wallpapered surfaces - when possible - the wallpaper should be fully removed. Subsequently, a paper joint tape such as Knauf Fugendeckstreifen Kurt joint tape must be glued directly onto the crack with PVA glue, and the surface must be fully skimmed with at least 1 mm of filler compound and then re-wallpapered. If a removal of the wallpaper is not possible, e.g. such as with fibre glass wallpapers, it will be necessary to check whether the wallpaper or the paint coat are firm and clean. If yes, it is possible to fully skim directly with filling compound and subsequently to wallpaper or paint over.

Angular crack due to absence of building element separation

Cracks

The angular crack on connection to constructional components

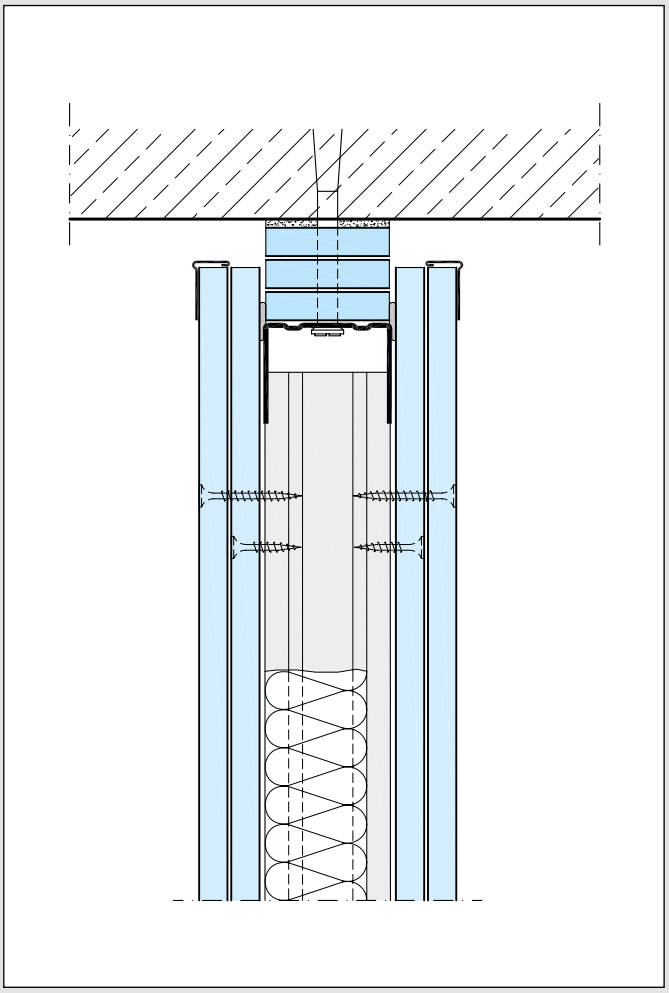
A frequent cause of cracking is the **absence of decoupling from constructional components.** This applies, for example, with connection to wood joist ceilings (see photo above) or freely spanning concrete ceilings. Cracking or even buckling of the entire wall can occur here due to the relatively high changes in deflection of up to several centimetres from imposed loads.

This can only be avoided by constructional design of the connections as deflection heads or by separation of the construction elements, for example, using Knauf Trenn-Fix. On larger gypsum board surfaces, a construction expansion joint should generally be provided every 15 m, to compensate for the normal, seasonal changes in length due to hygrothermal fluctuations.

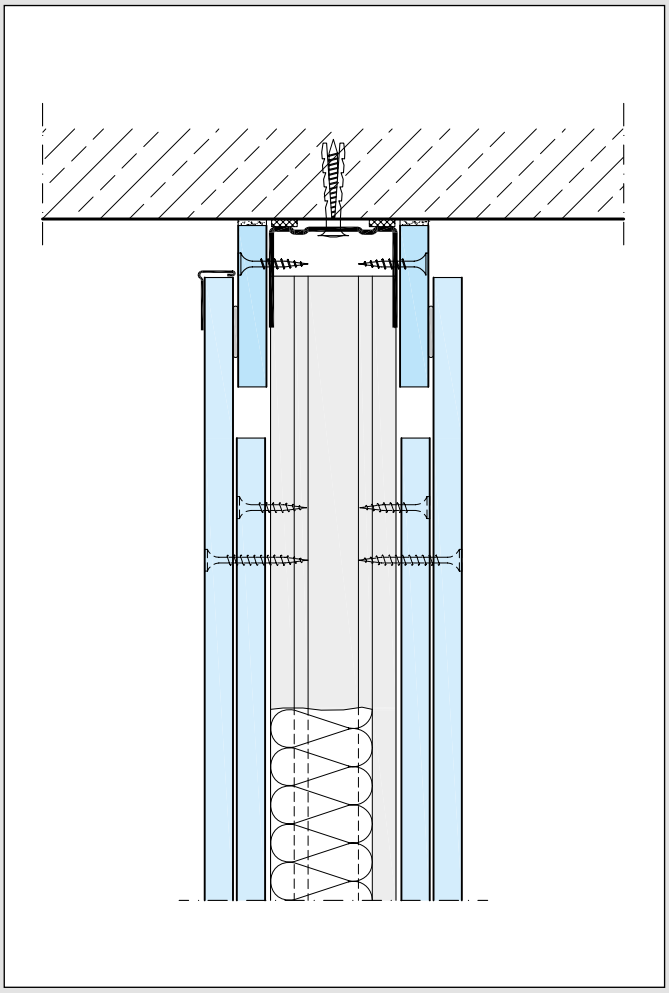
When carrying out remedial work with omitted decoupling or expansion joints, it is essential that construction design changes to the wall or ceiling are carried out to remedy the cause. Simply repairing the joint would not remedy the cause of the motion (and the crack), and the joint would crack again very quickly. In order to properly retrofit a deflection head, a section of the wall or ceiling must be opened.

Ultimately, **incorrect application of the jointing compound**, such as insufficient pressing of jointing compound into the joint, can also cause cracks. Accordingly, the joint is not fully filled with compound and cannot withstand the forces that occur. This problem can be avoided by careful pressing in or by forcing jointing compound into the joint, i.e. the compound must first of all be pushed laterally into the joint or thrown in forcefully, before it is scraped off along the longitudinal direction of the joint and smoothed.

A not unusual occurrence on the building site is the **use of filling compound starting to set**, which is remixed with water and used. Consequently, the bonds which have formed between the gypsum particles are broken with the result that the jointing compound will not fully harden. Usage of mixing buckets and trowels, already soiled with the remnants of jointing compounds mixed previously, shorten the setting times of gypsum-based jointing compounds and thus increase the risk of using material that has already started to set. The use of extremely cold water has the same effect.



Deflection head with fire protection



Deflection head without fire protection

This problem can be easily avoided by using clean mixing buckets and tools, putty water at room temperature and suitable jointing compound with respect to the required setting time.

Renovation where incorrect application of the jointing compound or use of material that was already setting together with painted surfaces generally requires the removal of the old jointing compound with a knife as well as the subsequent correct application of the jointing compound as well as paining the entire surface again.
On surfaces already wallpapered, the old wallpaper and old jointing compound must be removed. New jointing and wallpapering is subsequently required. If it is not possible to remove the wallpaper (such as with glass fleece), it will be necessary to check whether the wallpaper or the paint coat are firm and clean. If yes, it is possible to fully skim directly with Knauf Readygips and subsequently to wallpaper or paint.
With (perforated) ceiling construction, the use of furring channel spacings that are too large is also a possible cause of cracks. In this way it is possible that the ceilings will "sag" and crack in the jointing area.

Renovation when large furring channel spacings have been used is only possible by dismantling the ceiling to then install sufficient furring channels. The ceiling is reinstalled and then jointing is undertaken again.

Recessed filled joint with slight side lighting

Recessed filled joint with strong side lighting

Raised filled joint with slight side lighting

Raised filled joint with intense side lighting

Joints visible in side lighting

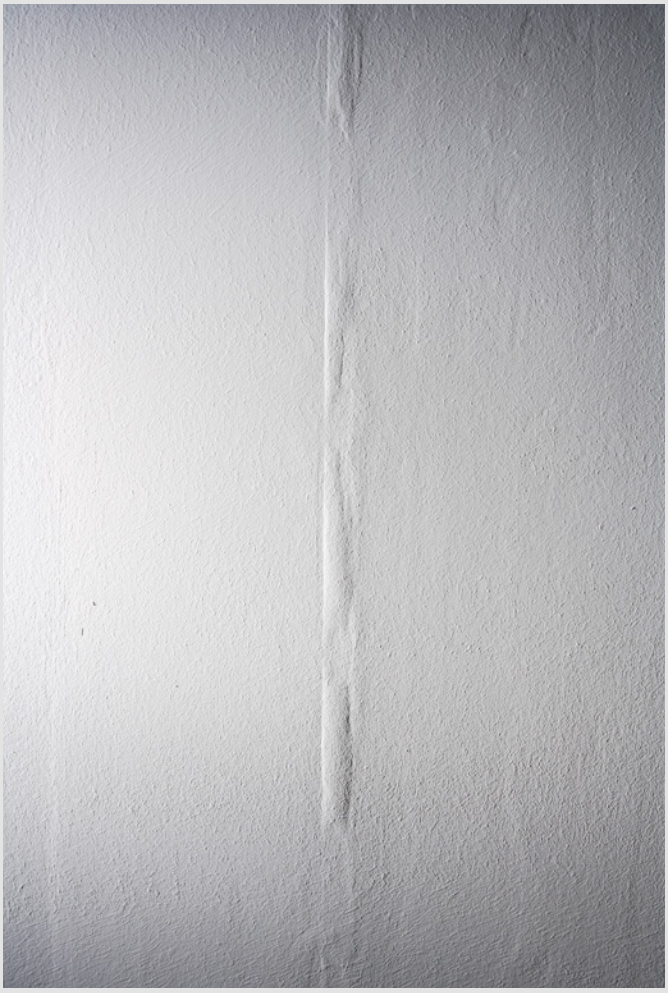
The second most prevalent cause for complaints in drywalling is the visible jointing in side lighting or shallow lighting after painting. There are two main causes for differentiation in this case.

One cause is insufficient primer or no primer application before painting. The highly different suction properties of jointing compound and gypsum board lead to texture and layer thickness differences when paint is applied and thus to visible jointing marks even though the substrate is relatively flat and even. This problem can be avoiding by applying Knauf Tiefengrund primer.

The second cause is unevenness of the joint, caused, for example, by shrinkage of the jointing compound when drying or by jointing on a joint hump. As jointing compounds always shrink when drying and small recesses always occur, this problem can only be solved by the application of several layers and subsequent sanding or by using Knauf Horizonboard.

For repairing sunken or raised joints, on painted surfaces a complete surface covering of skim coat with Knauf Fill & Finish or Spritzspachtel plus is the option for creating uniform, smooth surfaces.

On wallpapered surfaces, the wallpaper should be removed and a full surface skim, for example, with Knauf Fill & Finish applied. If removal of the wallpaper is not possible, it will be necessary to check whether the wallpaper or the paint coat are firm and clean. If yes, it is possible to fully skim directly with Knauf Readygips and subsequently to wallpaper or paint over.



One side and partial detachment of the joint tape after painting

Cause: Too little jointing compound under the joint tape on the cut edge side (left of the joint centre)

Detachment of the joint tape

An occurrence on a regular basis after application of the paint coats, for example with dispersion paint, is that the joint tape partly detaches. A possible cause is frequently a thin or non-existent jointing compound layer under the joint tape. This occurs frequently with mixed edge type combinations, where one edge (e.g. as a half-rounded tapered edge) is positioned at a lower depth than the second edge (e.g. bevelled cut edge). Frequently after pressing in the jointing compound, the material coat is too tight after removal with the finishing trowel. Thus, on the board surface flush bevelled cut edge, practically the entire jointing compound is skimmed off, so that no material or material less than 1 mm thickness remains. If the tape is now bedded, it only bonds to the half-rounded tapered edge as only there will sufficient jointing compound be available. When the paint is then applied, the moisture is sufficient so that the joint tape will detach from the substrate because of the deficient connection to the board on the cut edge/bevelled cut edge side (see the photos above).

This can be avoided by careful application of an at least 1 mm thick jointing compound layer on the board edges with cut edge/bevelled cut edge or mixed edge types, before the joint tape is bedded. This work is simplified by use of a curved trowel, that always leaves a light jointing compound ridge of at least 1 mm thickness when the material is scratched off.

Suitable repair requires the renewed adhesion of the joint with PVA glue, which can be simply applied with a brush between the tape and board. After the adhesive has dried, the joint receives a wide finish or is full surface smoothed with Knauf Fill & Finish.

Knauf Jointing Demo Vehicle

Know-how on tour

We also get involved directly on the building site: The employees in our jointing demo vehicles offer practice-relevant support to professional installers and their teams and demonstrate the performance capacity of Knauf filling and jointing compounds, demonstrate product innovations and provide help with their knowledge of the optimum materials and perfect surfaces.

Have you any other questions? Knauf Direkt can help you!

Advice and online services

Technical Advisory Service

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.knauf.de
www.youtube.com/knauf
www.twitter.com/knauf_presse
www.facebook.com/KnaufDE

CAD DESIGN DETAILS
All the design details in are available at:
www.knauf.de/profi/tools-services/dokumenten-center/cad-details-downloaden

in the formats DWG, DXF, PDF and GIF for download.

Please note that some of the services may only be available in German. Contact your regional customer services should you need assistance or advice.

The Knauf Academy

Theory and practice

KNAUF AKADEMIE

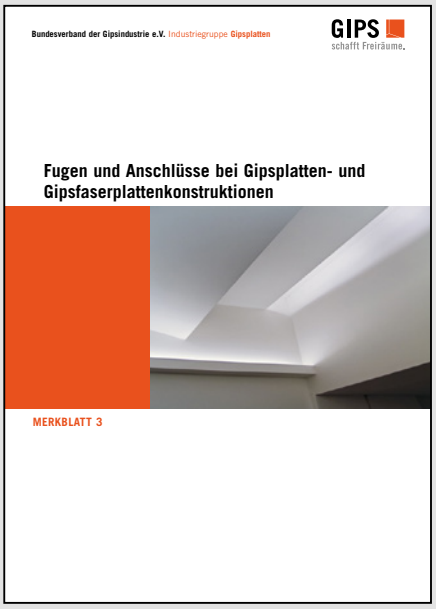
The investment in training and further education is a precondition for staying one step ahead of the competition. The Knauf Akademie programme offers both practice and theory for professionals. In the seminars, the know-how for products and systems of the German Knauf partners is imparted, and the connection is made between planning and products and their professional and building site orientated application. Over 100 seminars a year are offered on a regular basis, on the topics of attic extensions, fire resistance or jointing and surface technology.

Knauf Akademie has close contacts to training institutes, sponsors two endowed professorships and undertakes high-calibre professional events. Knowledge gained from this continuous dialogue with the target groups flows back into the product and system development and provides the impulse for innovative solutions to tomorrow's tasks.

www.knauf-akademie.de

Code of Practice 1: *Building site conditions* (German only)

Code of Practice 2: *Filling of the gypsum boards Surface qualities* (German only)



Code of Practice 3: *Joints and connections with gypsum boards and gypsum-fibre board constructions* (German only)

Standards and German codes of practice

Codes of practice of the German "Bundesverband der Gipsindustrie e.V. (Industriegruppe Gipsplatten)" as well as Eurogypsum aisbl

The codes of practice are available online for download (in German only) under www.knauf.de or are available from the German Bundesverband der Gipsindustrie e.V., Birkenweg 13, 64295 Darmstadt, Germany.

Main standards applicable for drywalling in Germany

EN 13963 Jointing materials for gypsum boards - Definitions, requirements and test methods

DIN 18181: Gypsum plasterboards for building construction - application

DIN 18340: German construction contract procedures (VOB) - Part C: General technical specifications in construction contracts - Dry lining and partitioning work

DIN 18183: Partitions and wall linings with gypsum boards on metal framing

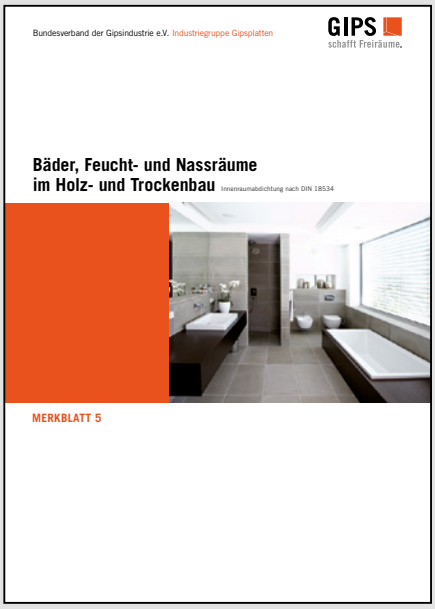
Knauf filler/jointing compound product data sheets

- Uniflott
- Uniflott imprägniert
- Fugenfüller Leicht
- Fireboard-Spachtel
- Safeboard Spachtel
- Perlfix
- Multi-Finish (M)
- BaseFiller
- Fill+Finish Light
- Superfinish
- Spritzspachtel plus
- Pro Spray All Purpose

Technical product data sheets for Knauf accessories:

- Fugendeckstreifen Kurt joint tape
- Trenn-Fix separation strip
- Tiefengrund primer
- Putzgrund primer
- Sperrgrund barier coating

Code of Practice 4: *Technical details for thermal insulation acc. to EnEV 2009; refurbishment with drywall systems* (German only)



Code of Practice 5: *Bathrooms and wet rooms in timber and drywall construction* (German only)

Code of Practice 6: *Pretreatment of drywalling surfaces made of gypsum boards for further surface finish or linings* (German only)

Installation guides and jointing instructions:

- Knauf Cleaneo Acoustic SK
- Knauf Cleaneo Acoustic FF
- www.youtube.com/knauf

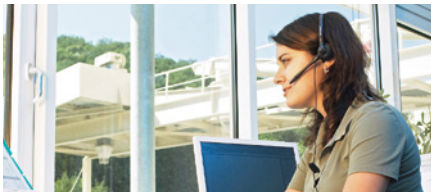
Video for application and jointing of Cleaneo perforated boards with Knauf Uniflott

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.knauf.de**
› **www.youtube.com/knauf**
› **www.twitter.com/knauf_presse**
› **www.facebook.com/KnaufDE**

Knauf Gips KG
Am Bahnhof 7
97346 Iphofen
Germany

Knauf AMF
Ceiling systems

Knauf Aquapanel
TecTem®
Loose fill insulation material

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 PFT
Machine technology and plant engineering

Marbos
Mortar systems for cobblestone paving

Sakret Bausysteme
Dry mortars for new projects and renovations

Tro89.de/eng/06.19/0/Br