Building Biology Products
and services

High+low frequency

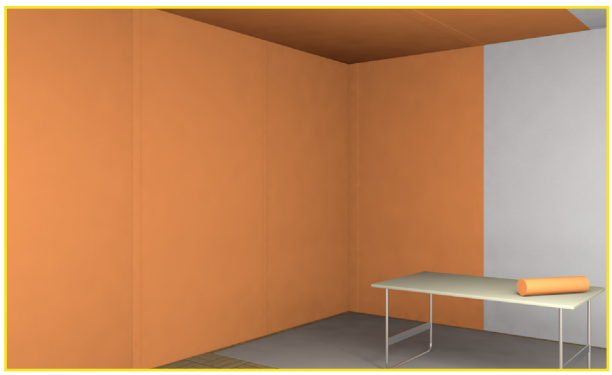
- for large-scale shielding of high-frequency electromagnetic waves, low-frequency alternating electric fields and dissipation of static charges
- Non-woven for use in dry construction
- full-surface copper-plated
- high shielding efficiency > 70 dB
- open to vapour diffusion, balanced tensile strength

Saphir Extra is a highly shielding, particularly light, corrosion-resistant, breathable and tear-resistant copper fleece for shielding high-frequency electromagnetic waves and low-frequency alternating electric fields.

Saphir Extra is used in roofs, walls, ceilings floors lining under. Special applications, e.g. as underlayment wallpaper, for processing in simple cell phone cases or for RFID shielding are also possible.

Due to the high shielding effectiveness (~ 70 dB), the non-woven meets the highest requirements.

Order-No.: 200028
Short-Desc.: Saphir Extra - 110 cm



Construction non-woven (HF+LF)

Saphir Extra

Type	MHz	dB	in %
DVB-T2	470 - 690	**68**	**> 99,9999**
LTE / 5G wide	700 - 750	**68**	**> 99,9999**
GSM, LTE	920 - 960	**68**	**> 99,9999**
GSM, LTE	1.800 - 1.880	**69**	**> 99,9999**
DECT	1.880 - 1.900	**69**	**> 99,9999**
LTE, 5G wide	2.110 - 2.170	**69**	**> 99,9999**
W-LAN 2400	2.400 - 2.500	**70**	**~ 99,99999**
5G fast	3.400 - 3.700	**71**	**> 99,99999**
W-LAN 5200	5.150 - 5.350	**69**	**> 99,9999**

Technical data

length:	by the meter (roll = 100 m / 110 m²)
width:	110 cm
thickness:	0.15 mm ± 0.02 mm
colour:	copper
grammage:	37 ± 2 g/m²
electrical conductivity:	< 0,05 - 0,1 Ω/□
composition:	PET 30 ± 2 g/m², Copper 7 ± 2 g/m²
features:	vapour diffusive, (1210 l/m2s), corrosion-resistant
temperature resistivity:	140° C / 120° C short term / long term
test norm:	IEEE Standard 299™-2006
shield attenuation:	max. 71 dB (> 99.99999 %)

Required accessories

ground strap AEB 3.0
(for the electrically conductive connection of several sheets)

grounding plate EGP
(for extensive installation in ceiling and wall areas)

Scope of application

- roof area inside
- wall, ceilings and roof area inside (behind casings)
- floor area (beneath floating floors, parquet, and wooden floorboards)
- Also suitable for shielding low-frequency alternating electric fields, e.g. from medical equipment and facilities.

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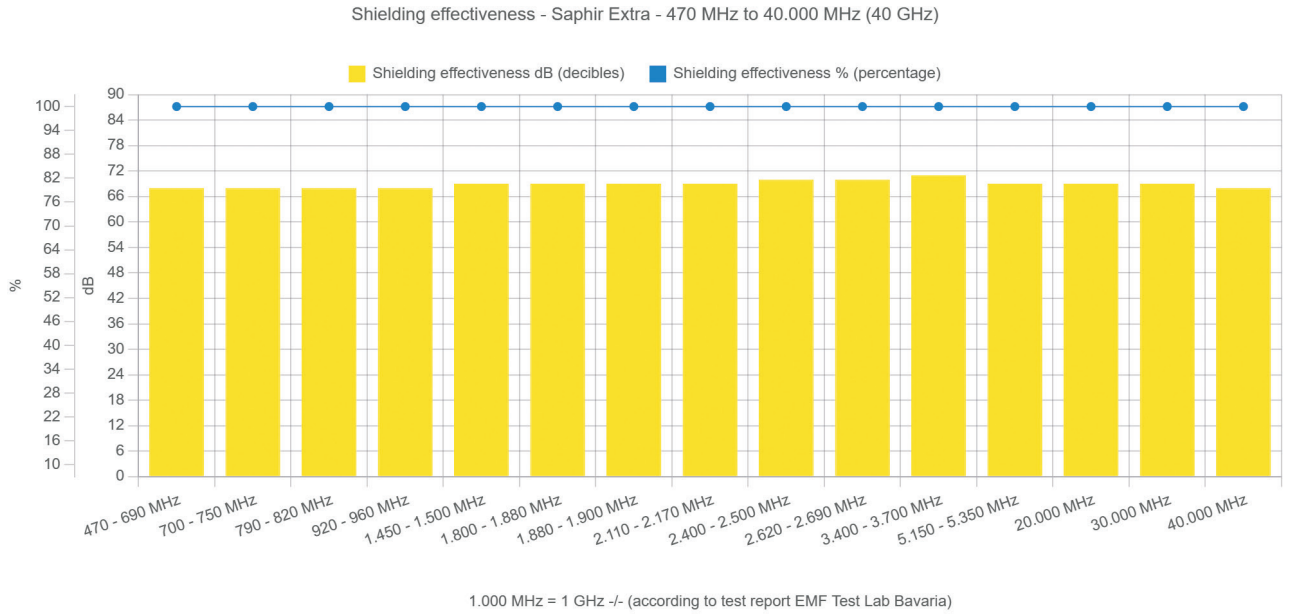
Type	MHz	Description
DVB-T2	470 - 690	digital video broadcasting – terrestrial, 2nd generation, TV via antenna
LTE / 5G wide	700 - 750	from 4G, now 5G NR without beamforming / MIMO
GSM, LTE	920 - 960	from 2G - D1, now 5G NR without beamforming / MIMO
GSM, LTE	1800 - 1880	from 2G - D2, E network, now 5G NR without beamforming / MIMO
DECT	1880 - 1900	wireless phone
LTE, 5G wide	2110 - 2170	from 3G, formerly UTMS, now 5G NR without beamforming / MIMO
W-LAN / WiFi 2400	2400 - 2500	wireless LAN
5G fast	3400 - 3700	5G NR - new frequency band with beamforming / MIMO
W-LAN / WiFi 5200	5150 - 5350	wireless LAN

Shielding values according to test report: EMF Test Lab Bavaria - Germany



1.000 MHz = 1 GHz -/- (according to test report EMF Test Lab Bavaria)

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Building Biology Products
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Saphir Extra - EMF shielding fleece (high + low frequency)

Technical data sheet - Shielding fleece Saphir Extra

Content - Possible processing

Earthing and safety regulations

The necessary installation must be carried out by a qualified electrician. A residual current circuit breaker (FI or RCD ≤ 30mA) must be present in the circuit. Your electrician will install this standard device for you if it is not available. All electrical work (work on electrical devices and systems) must be carried out and checked by a qualified electrician or under their direction and supervision! We will be pleased to give the electrician of your confidence the following information under +49 7433 955 7172 for further information.

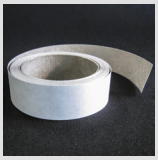
The earthing must be carried out in accordance with the applicable DIN/VDE regulations.

Safety equipotential bonding:	Functional potential equalisation:
DIN 57100/VDE 0100 Part 410 + Part 540 DIN/VDE 0100 Part 410 + Part 540 DIN/VDE 0100 Part 610 Section 4+5 VDE 0100	DIN VDE 0100-100 DIN VDE 0100-410 DIN VDE 0100-540 DIN VDE 0185-305-3

A: Safety Potential Equalisation (SPA)
Old stock and minor renovation

This type of earthing, e.g. at a socket or a heating pipe, is only recommended if the effort required to integrate the shielding surface into the functional equipotential bonding exceeds the benefit, e.g. if the shielding surfaces are located far away or if there is only one shielding surface (one room, one wall surface). The decision on where to earth is always made by your electrician, who knows the technology, your premises and the local regulations.

The earthing wire (yellow / green 2.5mm²) is inserted into the existing socket and hard-wired. Your electrician will bring this wire with him.



B: Functional potential equalisation (FPA)
New construction and major renovation

This type of earthing is to be used for larger renovations or new buildings.

Here, the earthing is provided in the sub-distribution or main distribution board with a separately installed and marked FPA rail. All earthing wires (flat earthing tape / bare, transparent insulated - 4 mm²) of the shielding surfaces and the two wires of shielded cables are connected there. Each room must be connected separately.

Further information and an information flyer for your executing electrician can be found at www.funktionspotentialausgleich.de

Important / Absolutely observe !!!

Have your electrical installation checked by a specialist / electrician. Earthing is only possible in a TN-S (3-wire) or TT system. Earthing on an existing TNC system is not possible or requires the replacement of some parts of the electrical system (fig. TN-S).
The processing examples listed here refer exclusively to products offered by Biologa. Due to various technical peculiarities of the materials, compatibility with umbrella products from other manufacturers is not given!

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Saphir Extra - EMF shielding fleece (high + low frequency)

SPA - Prepare earthing

Preparation for earthing / potential equalisation

To shield low-frequency alternating electric fields, the Saphir Extra shielding fleece must be integrated into the equipotential bonding.

If desired, the earthing wire can be hidden in the wall.
Option 1: Fig.1
A small slot is chiselled into the wall from the floor to the socket and the wire is inserted accordingly into the existing socket. The small slot can then be closed again (plaster) and the surface adjusted. In this case, the earthing plate EGP is mounted under the skirting board.
Option 2: Fig.2
The earthing plate (EGP) is placed next to the socket and the earthing wire is inserted into the existing socket from the rear. The plate can be recessed into the wall and connected with the electrically conductive earthing strap (AEB 3.0). The earthing plate can remain visible or be wallpapered over.

Open laying Fig.3
In cases where objects such as cabinets, shelves or similar are placed in front of the earth connection, the wire can also be run visibly to the box with nail clamps or a small channel. The earthing plate is mounted under the skirting board.

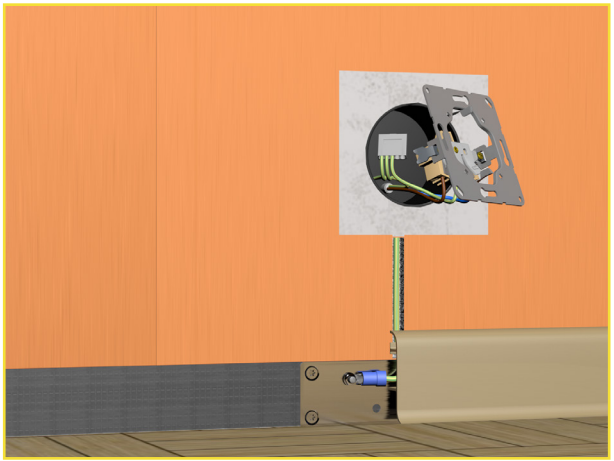


Fig.1: Slot to socket / insertion of the earthing wire into the wall socket / earthing no longer visible at termination

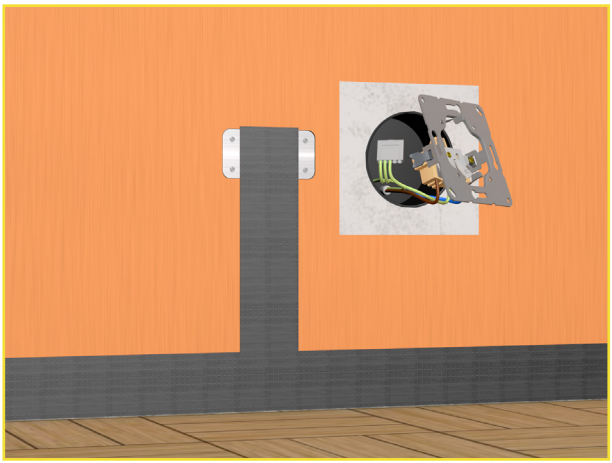


Fig.2: Earthing plate next to socket / guiding the earthing strap / inserting the earthing wire into the wall socket.

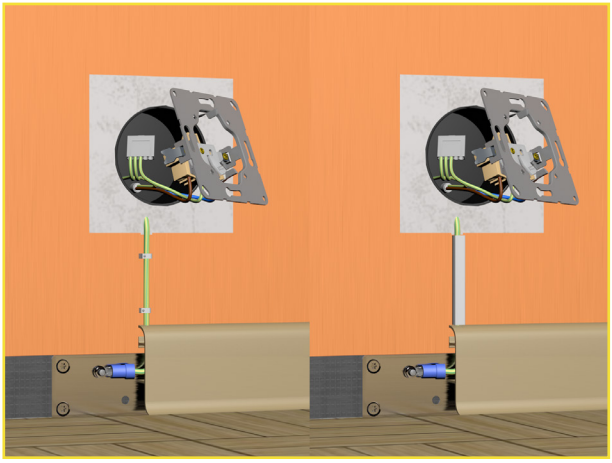
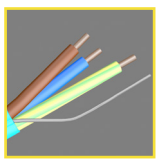


Fig.3: Earth wire visible / earth wire laid in duct / inserting the earth wire into the wall box.

Important / Absolutely observe !!!

Have your electrical installation checked by a specialist / electrician. Earthing is only possible in a TN-S (3-wire) or TT system. Earthing on a TNC system is not possible or requires the replacement of some parts of the electrical system (fig. TN-S).

No earthing wire is included in the scope of delivery of the earthing plate in order to avoid improper connection of the components. Please inform your electrician about this; he will bring this in the appropriate length.



TN-S:
Usual number of cores in usual design in buildings. Three conductors phase L1 (brown or black), neutral conductor N (blue), protective conductor PE (yellow/green) - here additionally in shielded version with shielding wire. This is not available in a conventional electrical installation.

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Saphir Extra - EMF shielding fleece (high + low frequency)

FPA - Prepare earthing

Preparation for earthing / potential equalisation (FPA)

To shield low-frequency alternating electric fields, the Saphir Extra shielding fleece must be integrated into the equipotential bonding.

In this case too, the EGP earthing plate is fitted under the skirting board.

The earthing flat cable is laid from the earthing plate to a sub-distribution board or main distribution board (fuse box) (Fig.4 Earthing flat cable).

A separate functional potential equalisation rail (yellow/green) is mounted and marked in the fuse box. This FPA rail is connected to the existing PE rail. (Fig.5)

Quality labelling

A QS marking in the distribution door signals the connection of the shielding surface to this rail, warns of removal and notes the addresses of the expert involved as well as those of the responsible electrician. QS marking (available from Biologa)

Important note

To carry out a complete room screening, provide only one earthing point for the entire room. The overlap from ceiling to wall and to floor is 5-10cm. The strips are connected in an electrically conductive way using the earthing tape AEB 3.0.

Further information on functional equipotential bonding, can also be found at: www.funktionspotentialausgleich.de

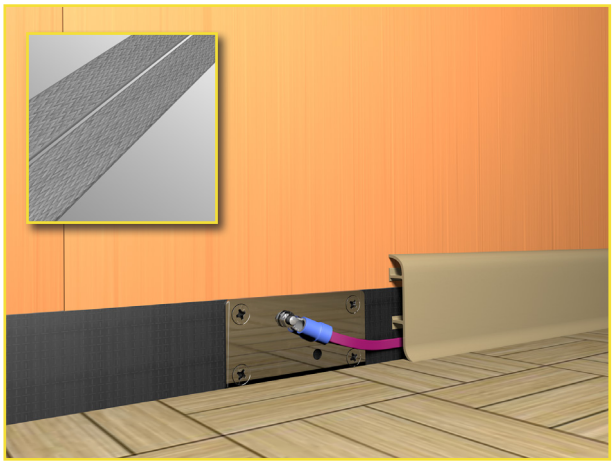


Fig. 4: Earthing plate under skirting board / guiding the earthing strap to the sub-distribution board

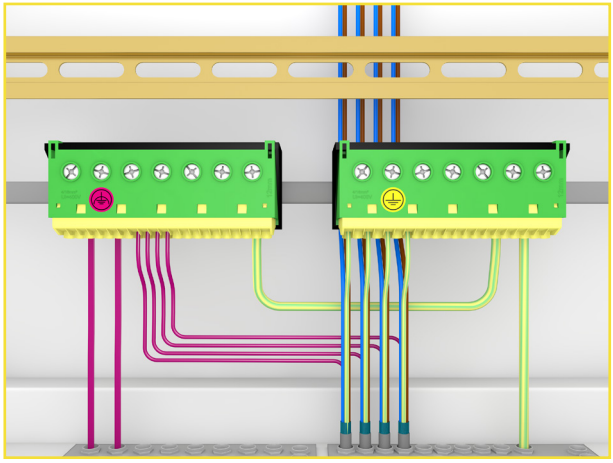
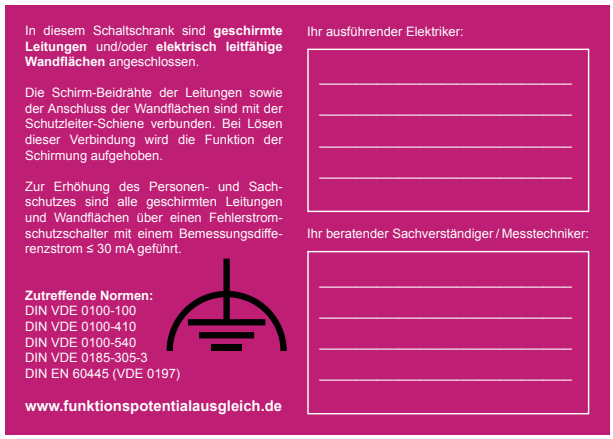


Fig. 5: Connection on the left of the functional equipotential bonding conductor in the power supply sub-distributor with the separately marked functional equipotential bonding bar.



QS labelling - enclosed with boxes and installation cables in the form of the FPA flyer. Individually on request.

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Saphir Extra - EMF shielding fleece (high + low frequency)

Wallpapering the shielding fleece

1. Substrate preparation

Sweep off, remove or repair loose parts, remove chalky, sanding substances by brushing. Remove sintered skin by sanding, release agents by washing off. If necessary, fill missing areas, holes, cracks with wall filler and sand off filler burrs, remove paste residues. Remove poorly adhering, non-adhesive, non-wetting or unsuitable old coatings completely. The shielding fleece adheres to substrates such as plasterboard or concrete. Highly absorbent substrates must be pre-treated with a primer.

2. Saphir Extra as wallpaper

Mix the wallpaper paste for heavy wallpapers according to the instructions on the pack and allow to stand.

Cut the individual strips to room height + 5 cm, as with conventional wallpapering..

Paste the wall surface of the first sheet and lay the first sheet of Saphir Extra in the adhesive bed. Roll the sheet smooth with a foam rubber roller, for example, in accordance with VOB DIN 18366.

Proceed in the same way with the other panels. Optionally, the following sheets can be glued overlapping 5-10cm.

Any protrusions can then be cut off flush with the wall and floor using a sharp cutter knife and a trimming ruler. This can also be done with sharp wallpaper scissors.

Further processing can take place after a drying time of 12-24 hours.
Tip: It is best to leave the wallpapered surface to dry out well overnight so that you can continue working the next day.

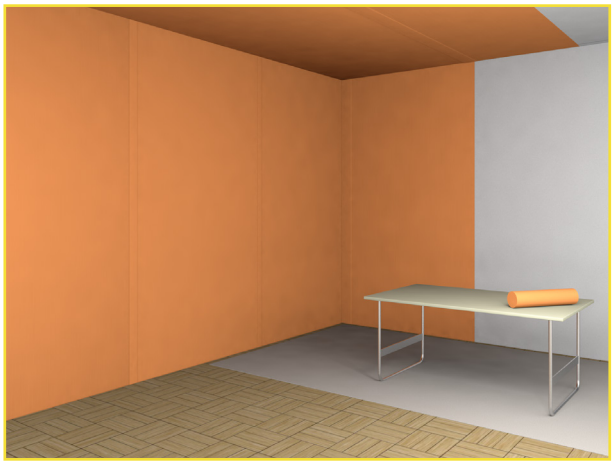

Fig.6: Wallpapering the individual strips with an overlap of 5-10cm.

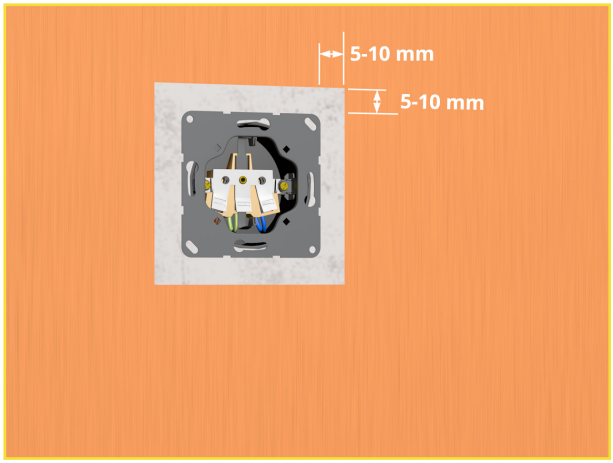

Fig.7: Keep approx. 5-10mm distance to socket and switch inserts.

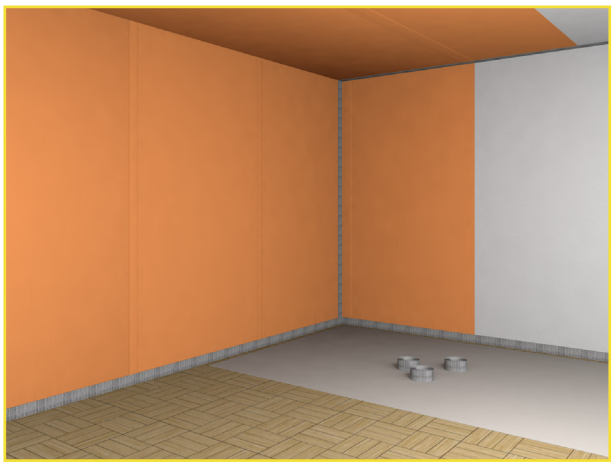

Fig.8: Attaching the electrically conductive earthing tape AEB in the base area. If the ceiling area is to be shielded, the earthing tape is led upwards and glued across the entire width of the ceiling (always against the direction of installation).

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Saphir Extra - EMF shielding fleece (high + low frequency)

Mount earthing plate EGP

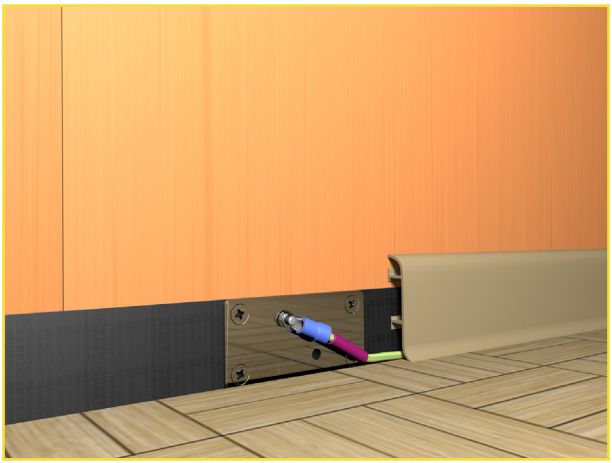

Fig.9: Fixing the earthing plate EGP and connecting the earthing wire

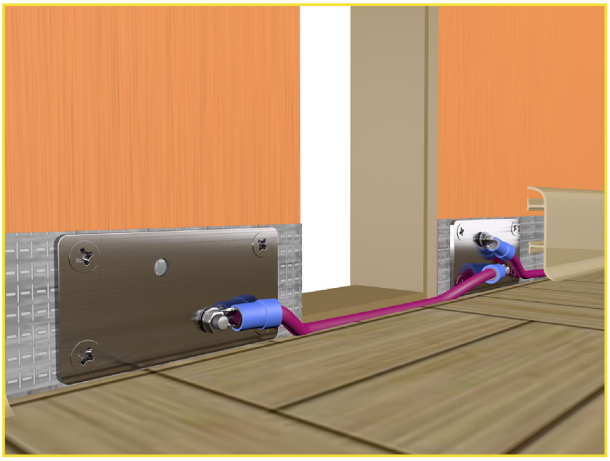

Fig.10: Connecting room openings with floor wedge technique (AEB above floor) or with the help of 2 earthing plates

Attaching the earthing strap AEB 3.0

Then apply the self-adhesive and electrically conductive earthing tape AEB in the skirting board area and optionally up to the ceiling. **(Fig.8)**.
The AEB 3.0 earthing tape is attached to the fleece.

Press the tape firmly onto the non-woven fabric, preferably with a wallpaper roller (small rubber roller).

In the area of doors and floor-to-ceiling windows (balcony), the strap can be continued along the floor under the door. It is also possible to connect two earthing plates using an earthing wire to the left and right of the door. The connecting cable can then be placed in the expansion joint of the floor. **(Fig.10)** The earthing strap must not be laid in a closed circle. So save an opening in the room.

Attaching the earthing plate EGP

If not already done, now drill the holes for the earthing plate EGP. The holes are drilled through the screen paint and through the earthing strap AEB 3.0. The holes can be vacuumed.

Your electrician will now attach the earthing plate and connect the earthing wire to the earthing plate and the socket. The earthing accessories for connection are included in the scope of delivery of the earthing plate EGP. **(Fig.9)**

Further processing of the wall coating after drying

After the wallpaper paste has dried, Saphir Extra is covered with a wallpaper and painted over if necessary. The wallpaper is covered with wallpaper paste for heavy wallpapers.

EN-200040-TECH.BPRO-V1.2.0-15.08.23

Saphir Extra - EMF shielding fleece (high + low frequency)

Installation under floor coverings (1)

1. Preliminary work / measuring the area

Please clarify in advance which floor covering will be used. It is important to know whether the floor covering is to be laid floating or glued. A floating installation of the floor covering simplifies the installation of the shielding material. This fleece is not suitable for use with glued floor coverings, e.g. under parquet or tiles. We will be happy to provide information by telephone on +49 7433 955 7172.

Determine the earthing point and have the earthing checked by an electrician. Ask the electrician to bring a correspondingly long 2.5 mm² earthing wire (yellow/green protective insulation), depending on the distance to the earthing point. In case of a functional equipotential bonding to be carried out after testing, you or your electrician order the flat earthing cable (EFK).

Measure the length and width of the surface. Plan an overlap of 5-10 cm (area +10%) (Fig.11)

Switch off the fuses and secure them against being switched on again. Check that the room is voltage-free. If necessary, remove the socket insert for connecting the earth.

When using the safety equipotential bonding, prepare a small slot from the socket to the floor. Insert the cable so that it protrudes approx. 20 cm in the socket and at the edge of the floor. Protect the two visible ends with insulating tape. The wire can also rest on the wall.

2. Laying the fleece

Clean the floor and lay out the sheets preferably on the long side of the room incl. 5-10 cm overlap from sheet to sheet (Fig.11).

The individual strips can be fixed with double-sided carpet tape (Fig.12), strips, screws, staples, nails or similar. Pay special attention to the overlapping areas. The individual sheets should lie flat on top of each other. Use a conventional adhesive tape to further secure the individual sheets in the overlap area (Fig.13). Optionally, stapling, screwing or nailing can also be done lengthwise at a distance of approx. 20-30 cm. The individual sheets are fixed 1x in the middle of the sheet and 1x in the overlap area.

Cut out heating pipes and keep a distance to the pipes of approx. 0.5 - 1.0 cm.

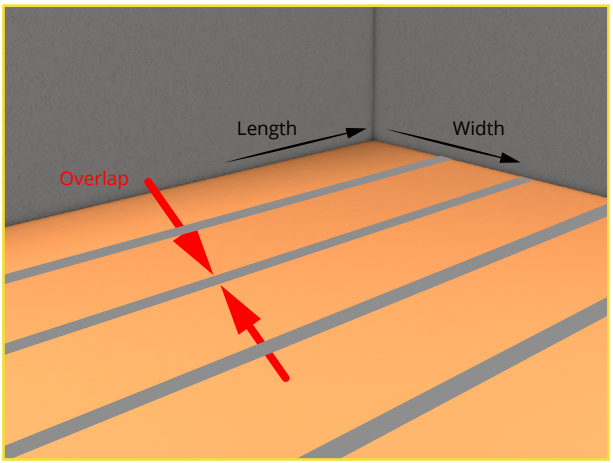

Fig.11: Length and width of the surface / overlap.

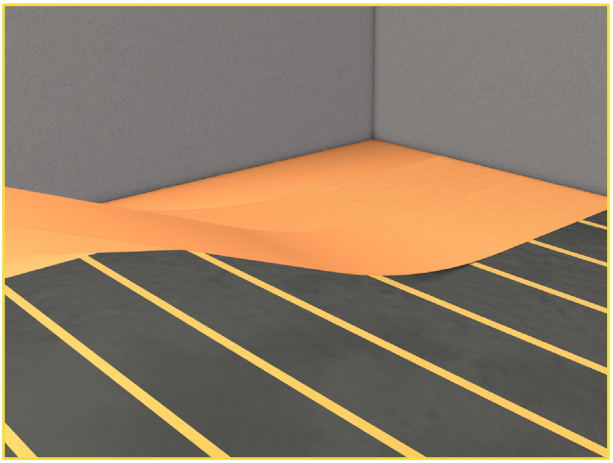
Fig.12: Laying the screen material on the floor. Double-sided carpet tape

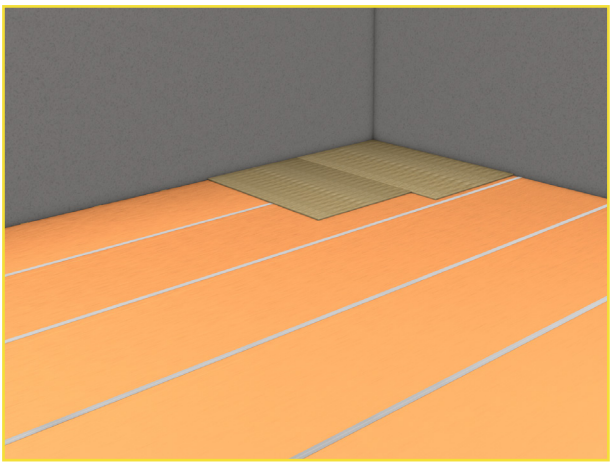
Fig.13: Fastening the shielding sheets / overlapping areas.

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Saphir Extra - EMF shielding fleece (high + low frequency)

Installation under floor coverings (2)

3. Connect earthing / further processing

Glue the earthing tape AEB 3.0 flat and continuously on the material webs. (Fig.14)

Your electrician now connects the earthing strap to the socket or your electrical distributor (functional equipotential bonding) using the earthing plate EGP and the prepared earthing cable.

Subsequently, the floor can be built up further with impact sound insulation and floor covering.

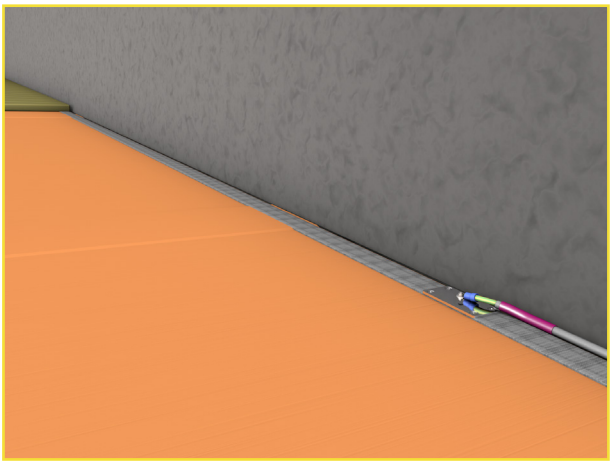

Fig.14: Electrically conductive connection of the individual tracks to each other and connection to the equipotential bonding (AEB 3.0 + EGP).

Saphir Extra - EMF shielding fleece (high + low frequency)

Laying the facing shell wall (1)

1. Preliminary work / measuring the area

Determine the earthing point and have the earthing checked by an electrician. Ask the electrician to bring a correspondingly long 2.5 mm² earthing wire (yellow/ green protective insulation), depending on the distance to the earthing point. In case of a functional equipotential bonding to be carried out after testing, you or your electrician order the flat earthing cable (EFK).

Measure the width and height of the surface. Allow for an overlap of 5-10 cm (area +10%).

Switch off the fuses and secure them against being switched on again. Check that the room is voltage-free. Remove all socket and switch inserts in the walls to be shielded.

2. Attaching the fleece

Temporarily fix the individual panels in the upper wall area with small nails, staples or screwed wooden strips (Fig.15).

Screw the screen material panels directly onto the wall with the help of the battening the panels (Fig.16)

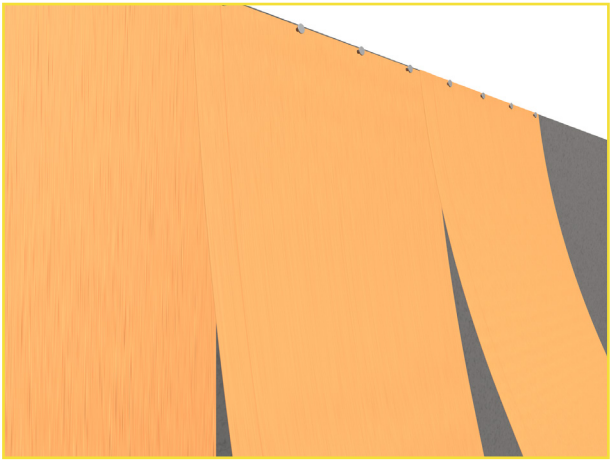

Fig.15: Temporary fixation of the tissue sheets

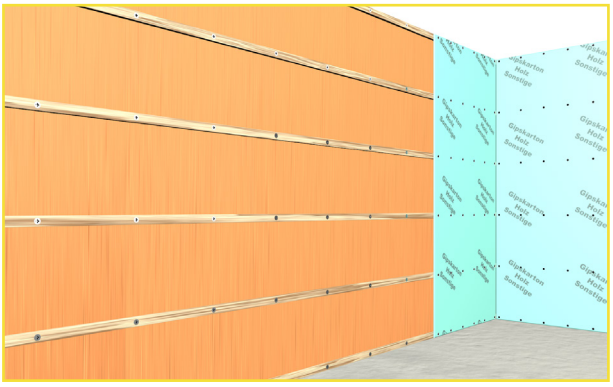

Fig.16: Fixed fastening of the sheets with the help of the battening - Removal of the auxiliary fastening

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Saphir Extra - EMF shielding fleece (high + low frequency)

Laying the facing shell wall (2)

3. Connect earthing / further processing

Glue the earthing tape AEB 3.0 flat and continuously from track to track (as Fig.14).

Your electrician now connects the earthing strap to the intended socket or your electrical distributor (functional equipotential bonding) using the earthing plate EGP and the prepared earthing cable.

Subsequently, the further wall construction of the facing layer with wood, plasterboard, panels or similar can take place.

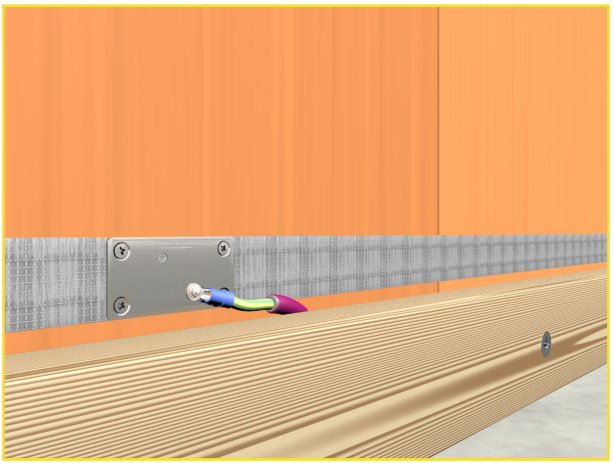

Abb.17: Anbringen des Erdungsbandes AEB 3,0 - Erdung mit EGP

Saphir Extra - EMF shielding fleece (high + low frequency)

Installation of facing layer ceiling (1)

1. Preliminary work / measuring the area

Determine the earthing point and have the earthing checked by an electrician. Ask the electrician to bring a correspondingly long 2.5 mm² earthing wire (yellow/ green protective insulation), depending on the distance to the earthing point. In case of a functional equipotential bonding to be carried out after testing, you or your electrician order the flat earthing cable (EFK).

Measure the length and width of the surface. Allow for an overlap of 5-10 cm (area +10%).

Switch off the fuses and secure them against being switched on again. Check that the room is voltage-free. Remove all luminaires and luminaire canopies.

2. Attaching the fleece

Temporarily fix the individual sheets to the entire ceiling surface with small nails, staples or screwed wooden strips (Fig.18).

Screw the screen material panels onto the ceiling using the battening (fig.19)

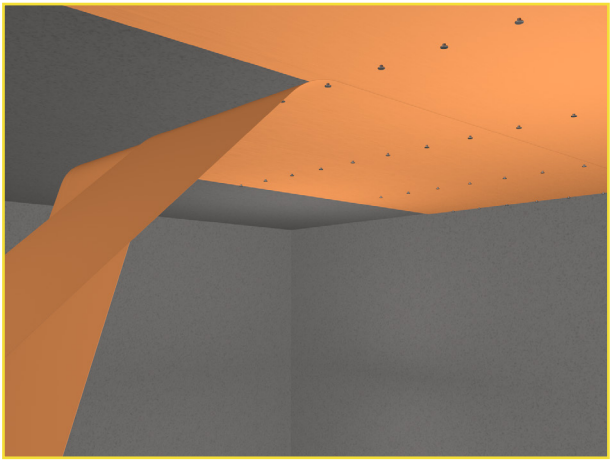

Fig.18: Temporary fastening of the sheets

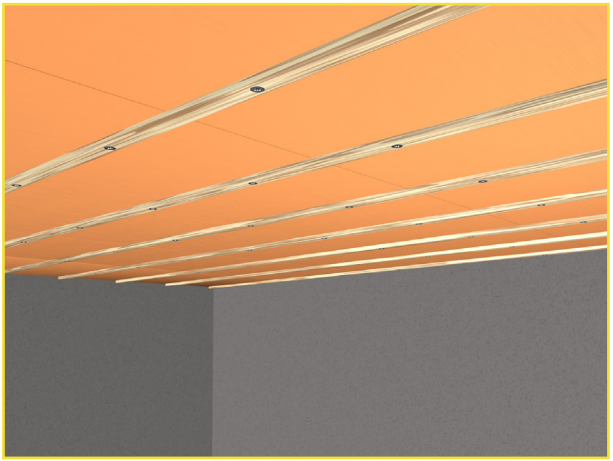

Fig.19: Fixing the panels - removing the auxiliary nails

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Saphir Extra - EMF shielding fleece (high + low frequency)

Installation of facing layer ceiling (2)

3. Connect earthing / further processing

Stick the earthing tape AEB 3.0 flat and continuously on the material webs near a luminaire outlet (Fig.20).

Your electrician now connects the earthing strap to the intended socket (Fig.20) or your electrical distributor (functional equipotential bonding) using the earthing plate EGP and the prepared earthing cable.

Subsequently, the ceiling can be built up with wood, plasterboard, wood panels or similar.

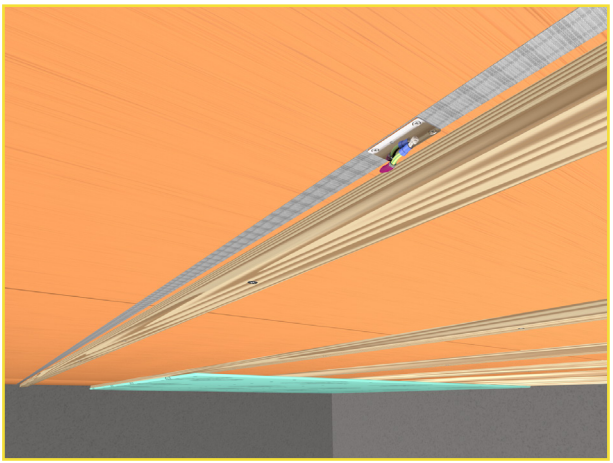

Fig.20: Earthing strap AEB self-adhesive - Earthing with EGP

Saphir Extra - EMF shielding fleece (high + low frequency)

Loose laying on floor (1)

1. Laying the fleece

Determine the earthing point and have the earthing checked by an electrician. Use the earthing set- B (ESB) or earthing set ESR-DK to connect the fleece.

Measure the length and width of the surface. Allow for an overlap of 5-10 cm (area +10%). The total length and width of the fleece sheets under the bed or similar should be approx. 10-20 cm larger than the surface of the bed in each direction. Cut the sheets to length and lay them out (Fig.21+22). Normal household scissors can be used for this.

To prevent the fleece from rubbing off onto surrounding materials, it is recommended to place one layer under the fleece and one layer above the fleece. For this purpose, a thicker paper web/anti-slip mat is suitable under Saphir Extra and carpeting on top of the fleece (Fig.22).
Saphir Extra can also be laid loosely in other parts of the room.

Fig.21: Laying out the underlay

Fig.22: Laying out the screen material

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Saphir Extra - EMF shielding fleece (high + low frequency)

Loose laying on floor (2)

2. Grounding the fleece

If more than one sheet of Saphir Extra is to be laid out, glue the earthing strip as shown in Fig. 23.

Attach the earthing push button to the material. The push button should be pushed through the earthing strap in the overlap area. (Fig.25-28)

Then the open end (ESB) or the plug insert (ESR-DK) is led to the equipotential bonding or the lockable plug is inserted into the socket.

If required, a sheet of fleece can also be placed behind the headboard of the bed and connected to the floor surface.

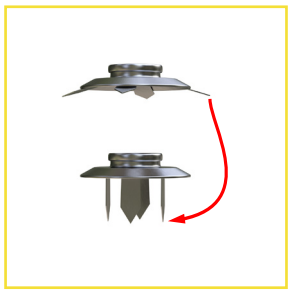

Fig.25: Step 1

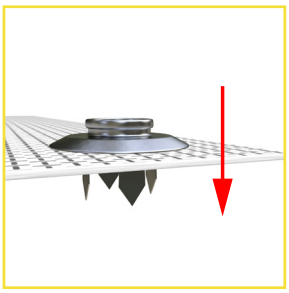

Fig.26: Step 2

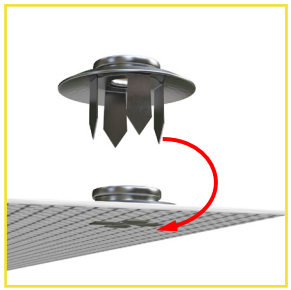

Fig.27: Step 3

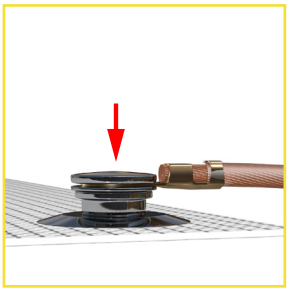

Fig.28: Step 4

Important / Absolutely observe !!!

Have your electrical installation checked by a specialist / electrician. Earthing is only possible in a TN-S (3-wire) or TT system. Earthing on an existing TNC system is not possible or requires the replacement of some parts of the electrical system (fig. TN-S).
The processing examples listed here refer exclusively to products offered by Biologa. Due to various technical peculiarities of the materials, compatibility with umbrella products from other manufacturers is not given!

Fig.23: Bonding the earthing strap (only with 2 or more strips)

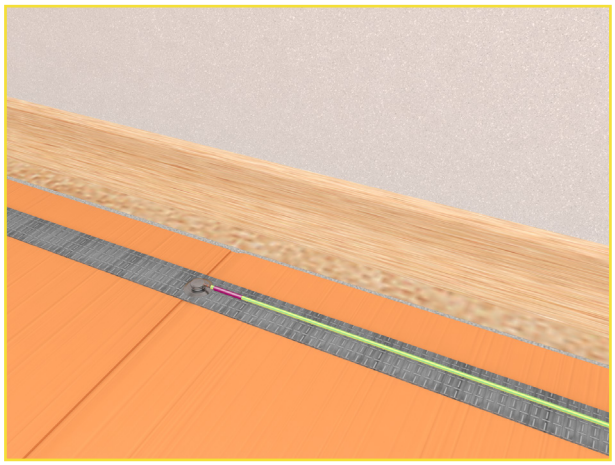

Fig.24: Earthing with ESB or ESR-DK

Fig.29: Carpeting / bed

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Saphir Extra - EMF shielding fleece (high + low frequency)

Tips and frequently asked questions

IMPORTANT / Tips

Be careful not to pull or tear Saphir Extra excessively. The material has been deliberately produced thin to avoid heavy application.

The holes to be drilled can be made in advance at the fixing point of the earthing plate or after wallpapering and after the screen surface has dried.

The earthing plate is not supplied with an earthing wire to prevent improper connection of the components. Please inform your electrician about this and he will bring it with him in the appropriate length.
An earthing flat cable is used for integration into the functional equipotential bonding (earthing variant B). This can be ordered from Biologa by you or your electrician. Please state which variant you will be using.

Saphir Extra residues can be disposed of in the normal residual waste.

Frequently asked questions	Answers
General testing of the absorbency of a surface with regard to the wallpaper paste	The absorbency can be tested by wetting with water. If the water beads off, the substrate is not or only slightly absorbent. If there is rapid water absorption and a clear dark colour, this is an indication of highly absorbent substrates.
Does Saphir Extra have to be laid overlapping?	In contrast to low-frequency shielding materials, the installation of high-frequency shielding materials have to be overlapping. However, it is extremely important to „earth“ all tracks in order to obtain the low frequency function.
Can pictures or other objects be attached to the wall or ceiling after the screen has been completed?	Fixing pictures or other objects is no problem and can also be done on a screen surface. Small nails or screws may be used. Please note the cable routing of your electrical installation in advance! in order not to damage existing cables in the wall. You can find appropriate cable finders in DIY stores or at specialist dealers.
Kann die Erdung nach Version A auch an anderen Wand- oder Deckenauslässen erfolgen?	Can earthing according to version A also be carried out at other wall or ceiling outlets?
How can Saphir Extra be removed again?	After removing the earth connection, Saphir Extra can be removed and peeled off like a conventional wallpaper. Please note to cover floors and other surfaces well.

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