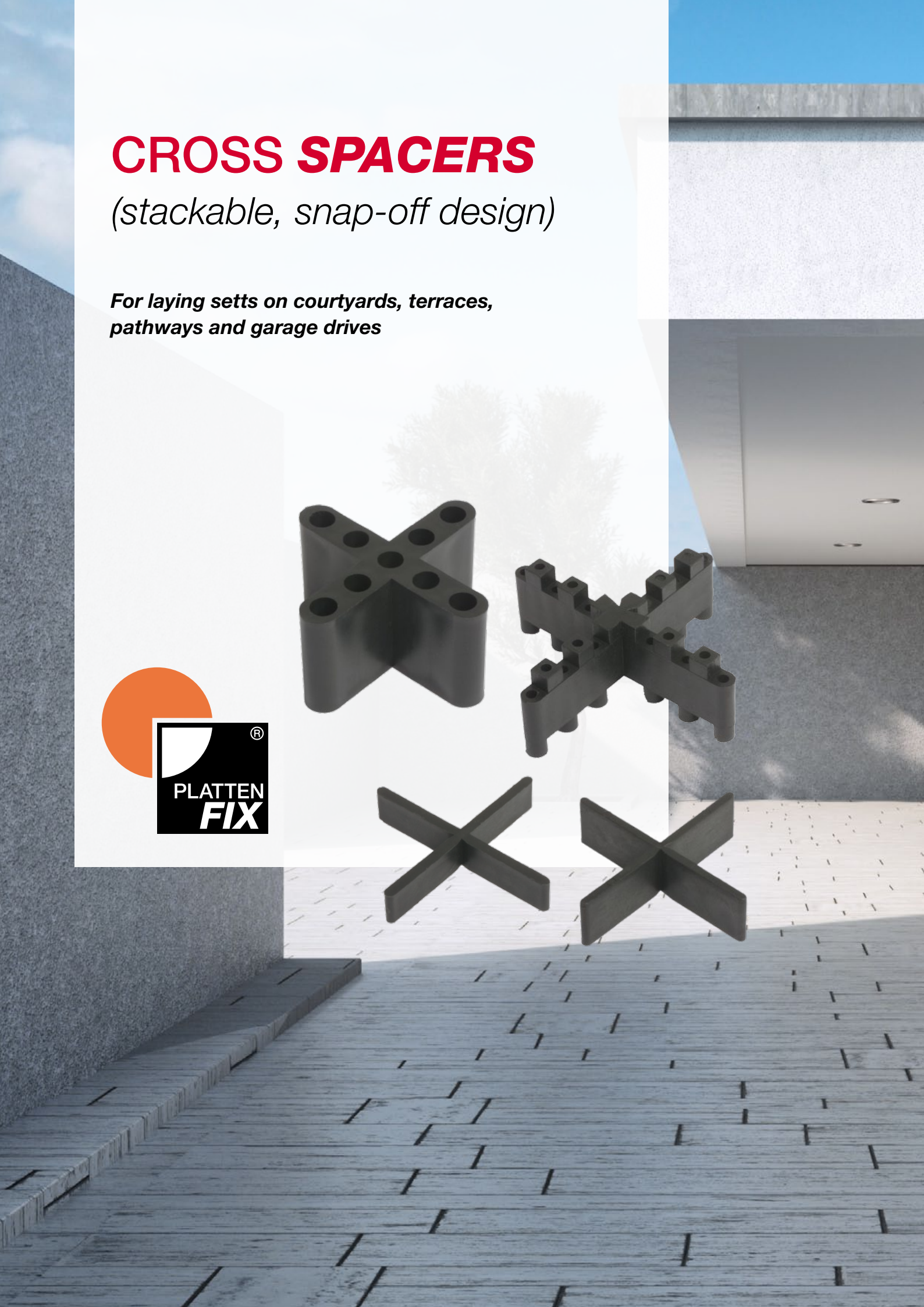


CROSS SPACERS

(stackable, snap-off design)

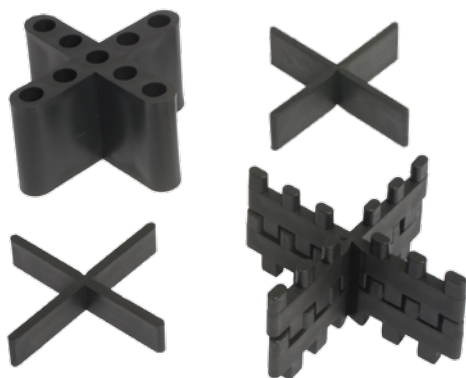
**For laying setts on courtyards, terraces,
pathways and garage drives**



THE SPACER FOR AN EXACT PATTERN OF

For laying paving on waterproofed flat roofs, concrete surfaces or beds of grit as small joint or drainage spacers.

Made from polypropylene, the cross spacers are particularly suitable for the laying of stone or ceramic slabs on a grit bed. They guarantee an even pattern of joints and good drainage.



Cross spacers,
one wing can be broken off
Prod. no. 4022514...



Cross spacer
60 x 3 x 10 mm (LxWxH)
Pack of 1000 ...**156413**
Pack of 250 ...**156420**
Pack of 100 ...**156437**



Cross spacer
60 x 3 x 15 mm (LxWxH)
Pack of 1000 ...**156314**
Pack of 250 ...**156321**
Pack of 100 ...**156338**

T-shape spacers, prod. no. 4022514...



T-shape spacer, stackable
60 x 3 x 20 mm (LxWxH)
Pack of 1000 ...**156611**
Pack of 250 ...**156628**
Pack of 100 ...**156635**



T-shape spacer, stackable
75 x 4 x 20 mm (LxWxH)
Pack of 1000 ...**152255**
Pack of 250 ...**152248**
Pack of 100 ...**152262**



Cross spacer, stackable
60 x 3 x 20 mm (LxWxH)
Pack of 1000 ...**156512**
Pack of 250 ...**156529**
Pack of 100 ...**156536**



Cross spacer, stackable
75 x 4 x 20 mm (LxWxH)
Pack of 1000 ...**152170**
Pack of 250 ...**152163**
Pack of 100 ...**152156**



T-shape spacer, stackable
75 x 6 x 25 mm (LxWxH)
Pack of 1000 ...**151210**
Pack of 250 ...**151227**
Pack of 100 ...**151265**



T-shape spacer
70 x 12 x 35 mm (LxWxH)
Pack of 1000 ...**167211**
Pack of 250 ...**167228**
Pack of 100 ...**167235**



Cross spacer, stackable
75 x 6 x 25 mm (LxWxH)
Pack of 1000 ...**151166**
Pack of 250 ...**151173**
Pack of 100 ...**151180**



Cross spacer
70 x 12 x 35 mm (LxWxH)
Pack of 250 ...**167129**
Pack of 100 ...**167136**

JOINTS

CROSS SPACERS**Advantages**

- Protect corners
- Let water through very well
- As the joints are open, rainwater is diverted off into the earth
- Reduces ground sealing
- Made of recycled material
- Environmentally compatible
- Resistant to weathering
- Even pattern of joints
- Suitable for all sorts of materials and slab sizes

Material:

Polypropylene (PP), recycled, reprocessed and environmentally compatible

Gross density: 0.895 - 0.92 g/cm³

Resistant to deformation from -10 to +110°C

Minimal water absorption

What you need:

Slab format (cm)	Cross spacers needed per m ²	Slab format (cm)	Cross spacers needed per m ²
80 x 80	1.56	30 x 60	5.55
60 x 60	2.77	50 x 50	4
40 x 120	2.08	40 x 40	6.25
40 x 80	3.13	30 x 30	11.11
40 x 60	4.16	25 x 25	16

STABILITY AND BALANCE ON BALCONIES

The cross spacers enable you to lay ceramic and concrete slabs on flat roofs, concrete surfaces or grit beds as small or drainage spacers in accordance with all relevant standards and guidelines.

The rules and regulations applicable to balconies, terraces and green roofs are the roofing trade rules for waterproof coverings (utilised roofs) and especially the flat roof guidelines and DIN 18195 (waterproofing of buildings) parts 5 and 9, relating to people being present on them.

All notes of guidance listed here are based on the guidelines already mentioned in the first paragraph.

- Another guideline that should be applied and observed is ATV DIN18318/2006 (roadway construction work – sett and slab surfaces).
- As paved surfaces with open joints have to be laid on a very stable surface, the only material permitted by DIN EN 1991-1 (formerly DIN 1055/3: load bearing in building construction - balconies and terraces) to be chosen as thermal insulation is an appropriate insulating material with a very high load-bearing capacity (XPS), as this material has to absorb the downward loads that would otherwise be absorbed by the concrete slab.
- Roof waterproofing covers overlaid with slabs made of non-flammable materials fulfil the specifications for 'hard roofing' required by the guidelines.
- When laying concrete/ceramic slabs in a grit bed on flat roofs, you must adequately protect the roof surface seal (bitumen or plastic; already in place or yet to be created) against physical damage by using a protective layer compliant with flat roof guidelines. See next section.
- The following can, for example, be used as protective layers:
 - Plastic membrane, at least 300 g/m²
 - Sheets of semi-rigid PVC, at least 1.0 mm thick
 - Sheets of PVC-P, at least 1.2 mm thick
 - Building protection mats made of rubber granules, at least 6.0 mm thick
 - Building protection mats made of plastic granules, at least 4.0 mm thick
 - Drainage mats or slabs
- Being protective layers against root penetration, their protection against the latter must be proven by the FLL testing method. All other aspects are to be taken from the flat roof guidelines.
- The edging and connecting areas of paved coverings are to be configured in such a way that any physical damage to the waterproof seal is permanently prevented and that they are so stable that the paving is held firmly in place all around and in combination with the cross spacers to be used cannot shift upon utilisation of the surface areas.
- To protect from splashes and overflows, the height of the junctions with any rising structural elements must be at least 15 cm above the top edge of the covering (paving / green roof). The junctions must be secured against slipping and against water running down behind them. They must also be protected against physical damage (e.g. with flashing).

AND ROOF TERRACES **CROSS SPACERS**

- Junctions with doors should also be raised up to 15 cm and be treated in the same way as junctions with rising structural elements. The junction height can be reduced to a maximum of 5 cm if it is assured that in the area around the door water is able to run away freely at all times and the issue of splashing water is thus minimised. This is the case, for example, when fitted in the immediate area of the door there is a grate-covered trough-shaped drain connected directly to the drainage system.
- Wheelchair-accessible crossovers require special solutions in relation to waterproof seals. These must be agreed between planners, door manufacturers and the manual trades carrying out the work. For further notes of guidance please refer to the rules on sealing used surfaces.
- The height of the waterproof seal on roof-edge junctions – just as parapets – must be at least 10 cm above the top edge of the covering (paving / green roof).
- Roof-edge junctions around gutters (in the area of the eaves) are to be configured such that there is a rigid, firm edge that can be used for the paving to butt up against, but not in such a way that surface drainage off the waterproof seal is prevented.
- In the case of balconies, terraces and green roofs, removable grilles (available as drainage system components from many manufacturers) must be fitted over roof drains, emergency drains and emergency overflows.
- Appropriate care and maintenance is required to preserve roof seals. For details, refer to the industry rules for such seals.
- In the case of balconies and terraces exposed to the weather the paved coverings must be divided into small sections in order to avoid any formation of cracks caused by thermally-induced changes in length. However, this does not work forever. Once such cracks have occurred, moisture penetrates into the joints, the covering rises due to freezing and thus gets destroyed.
- In order to avoid such damage, paved coverings on balconies, terraces and green roofs should be laid with open joints of different widths, preferably 3 to 6 mm, thus ensuring that surface water gets fed under the paving through the open joints. Any fine dust that has accrued thus also gets carried away with the water and a clean surface results.
- Paved coverings on balconies and terraces reduce the thermal strain on the seal caused by sunshine, rain or snow.

Conclusion

- What is created is paving with open joints (generally 3 to 12 mm) that is dry, clean and thus safe and pleasant to walk on.
- The seal can be made using bitumen or plastic sheeting.
- No frost damage occurs, nor does any efflorescence appear on the paving, as there are no mortar joints to release any cement or calcium carbonate.
- The joints do not clog up, allowing the fine dust to be rinsed away along with the rainwater.

LAYING SLABS BY PLAN

1. Checks of the on-site circumstances

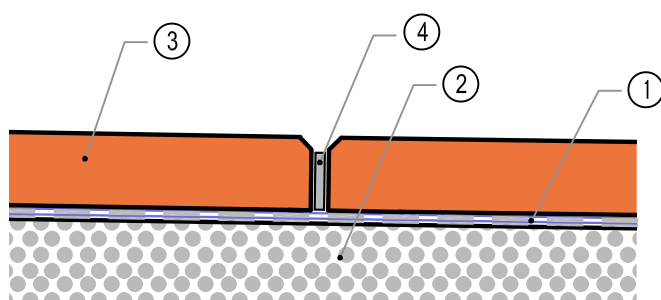
- Condition of the existing roof membrane package / waterproof seal.
- Appropriate suitability of the thermal insulation fitted / to be fitted
- Loading of the bottom concrete sections by the roof membranes potentially checked and approved by a structural engineer
- Quality of work done by any prior contractor
- When laying paved coverings in a bed of grit on balconies or terraces it is **ESSENTIAL** that you ensure that a form of thermal insulation is used that can withstand considerable pressure. The thermal insulation panels appropriate for this use, such as **XPS or cellular glass** are listed in a table on page 10.
- When laying terraces and similar areas at ground level it is not imperative that thermal insulation is fitted. It is dependent on what they are to be used for and the structure underneath (e.g. a basement).



Pursuant to VOB part B, Art. 4, point 3, any mistakes made by the prior contractor that can be detected by visual inspection or can be verifiably proven and that may impair the execution and function of subsequent work must be complained about in writing before you start your own work.

CROSS SPACERS

2. Step-by-step laying of the components on the finished waterproof roof seal made of bitumen or of plastic sealing sheets (as specified by the manufacturer).



1	A protective layer
2	The grit bed
3	The paving
4	The cross spacers



You **must lay a protective layer** as per the flat roof guidelines on top of the waterproof seal.

All junctions (with walls, doors, etc.) must be permanently protected against damage and it must be ensured that there is a fixed edge for the paving all the way around, so that it cannot shift in any direction.

A simple strip of gravel is not enough! What is needed here as a separation and fixed stop is, for example, a concrete block step laid lengthways. Alternatively, in the areas around the eaves, a robust, rigid edge made of angled steel or an appropriate flat steel bar.

These fixed, rigid borders should be individually adapted to the configuration and set-up of the balcony or terrace.

CHECK, PLAN, LAY

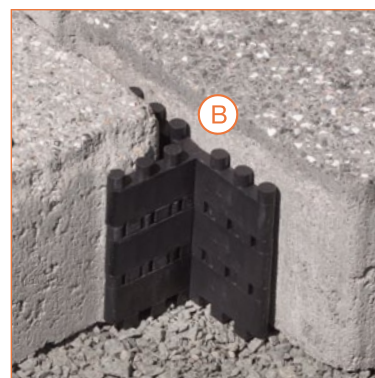
3. Laying slabs



Laying example



Laying T-shape spacers



Stacked T-shape spacers

We recommend that first of all, using suitable tools and equipment, you sound out the maximum top edges of the paving so that you can see what height difference needs to be compensated for by the grit bed.

You should then look for a crossways and lengthways side in order to establish a right angle for starting to lay the slabs. We recommend using two outer edges (eaves/parapets or similar) in order to begin laying whole slabs, extending out from the edges, within the right angle.

- A** A cross spacer is inserted into every cross joint of the laid slabs.
- B** Where laying in a running bond pattern, you can split the cross spacer at the intended break point and fit the T-shape piece thus created or order ready-made T-shape spacers from the factory.

CROSS SPACERS



The cross spacers can easily be stacked up to the required height.



Required tools



Example of laying in a running bond pattern

The tools required for laying the slabs are a spirit level / straightedge, a slab lifter and a rubber hammer.

The spirit level and straightedge are needed in order to remove the grit and lay the paving horizontally level and truly aligned. The slab lifter is needed to lay the paving slabs.

When laying the first corner of the paving, you insert the cross spacer into the joint. The slabs must be laid **really tightly** up against the edges and each other. The flat roof guidelines therefore stipulate adequate long-lasting protection of the connections. The slabs must also be laid without any surface air gaps and with only the prescribed cross spacers as spacing.

INSULATION: STABILITY UNDER HIGH PRES

Research on the pressure resistance of thermal insulation materials

Recommended XPS / foam insulating materials for laying paving slabs on pedestal supports for balconies, terraces and green roofs

Product	Insulating material	Manufacturer	Pressure resistance Compression strength at 10% distortion [kN/m ²]	Long-term pressure resistance 50 years long term, buckling <2% [kN/m ²]
Austrotherm XPS Top 50, d = 50 - 120 mm (single layer)	XPS	Austrotherm	500	180
Austrotherm XPS Top 70, d = 80 - 120 mm (single layer)	XPS	Austrotherm	700	250
Jackodur KF 300 Standard, d = 50 - 120 mm (single layer)	XPS	Jackon Insulation	300/390	130
Jackodur KF 300 Standard, d = 140 - 300 mm (single layer)	XPS	Jackon Insulation	300/390	130
Jackodur KF 500 Standard, d = 50 - 120 mm (single layer)	XPS	Jackon Insulation	500	180
Jackodur KF 500 Standard, d = 140 - 300 mm (single layer)	XPS	Jackon Insulation	500	180
Jackodur KF 700 Standard, d = 50 - 120 mm (single layer)	XPS	Jackon Insulation	700	250
Jackodur KF 700 Standard, d = 140 - 300 mm (single layer)	XPS	Jackon Insulation	700	250
Styrodur 3000 CS, d = 40 - 120 mm (single layer)	XPS	BASF	300	110
Styrodur 3000 CS, d = 140 - 200 mm (single layer)	XPS	BASF	300	110
Styrodur 3000 CS, d = 40 - 120 mm (multi-layer)	XPS	BASF	300	110
Styrodur 3035 CS, d = 40 - 120 mm (single layer)	XPS	BASF	300	130
Styrodur 3035 CS, d = 140 - 200 mm (single layer)	XPS	BASF	300	130
Styrodur 3035 CS, d = 40 - 120 mm (multi-layer)	XPS	BASF	300	130
Styrodur 4000 CS, d = 40 - 120 mm (single layer)	XPS	BASF	500	180
Styrodur 4000 CS, d = 140 - 160 mm (single layer)	XPS	BASF	500	180
Styrodur 4000 CS, d = 40 - 120 mm (multi-layer)	XPS	BASF	500	180
Styrodur 5000 CS, d = 40 - 120 mm (single layer)	XPS	BASF	700	250
Styrodur 5000 CS, d = 40 - 120 mm (multi-layer)	XPS	BASF	700	250
Ursa XPS D N-III-L, d = 50 - 120 mm (single layer)	XPS	Ursa	300	130
Ursa XPS D N-III-L, d = 140 - 160 mm (single layer)	XPS	Ursa	300	130
Ursa XPS D N-III-L, d = 50 - 120 mm (multi-layer)	XPS	Ursa	300	130
Ursa XPS D N-V-L, d = 50 - 120 mm (single layer)	XPS	Ursa	500	180
Ursa XPS D N-V-L, d = 50 - 120 mm (multi-layer)	XPS	Ursa	500	180
Ursa XPS D N-VII-L, d = 50 - 120 mm (single layer)	XPS	Ursa	700	250
Ursa XPS D N-VII-L, d = 50 - 120 mm (multi-layer)	XPS	Ursa	700	250
Foamglas Platten T4+	Cellular glass	Foamglas	600	190
Foamglas Platten T4+	Cellular glass	Foamglas	900	250
Foamglas Platten F	Cellular glass	Foamglas	1600	380
Foamglas Floor Board T4+	Cellular glass	Foamglas	600	190
Foamglas Floor Board S3	Cellular glass	Foamglas	900	250
Foamglas Floor Board F	Cellular glass	Foamglas	1600	380

Measured value of the compression strength [kN/m ²]	Note (Source)
255 340	Technical data / licence Technical data / licence
175 140 250 210 320 255	Technical data / licence Technical data / licence Technical data / licence Technical data / licence Technical data / licence Technical data / licence
150 150 150 185 185 185 255 255 255 355 355	Technical data / licence Technical data / licence Technical data / licence Technical data / licence Technical data / licence Technical data / licence Technical data / licence Technical data / licence Technical data / licence Technical data / licence Technical data / licence
185 185 185 255 255 355 355	Product data sheet Product data sheet Product data sheet Product data sheet Product data sheet Product data sheet Product data sheet
270 350 530 270 350 530	Product data sheet Product data sheet Product data sheet Product data sheet Product data sheet Product data sheet



Insulating material manufacturers

Austrotherm Dämmstoffe GmbH, Hirtenweg 15, 19322 Wittenberge, Germany
www.austrotherm.de

JACKON Insulation GmbH, Carl-Benz-Straße 8, 33803 Steinhagen, Germany
www.jackon-insulation.com

BASF SE Performance Materials, Carl-Bosch-Straße 38, 67056 Ludwigshafen, Germany
www.styrodur.de

Ursa Deutschland GmbH, Carl-Friedrich-Benz-Straße 46-48, 04509 Delitzsch, Germany
www.ursa.de

Deutsche Foamglas GmbH, Itterpark 1, 40724 Hilden, Germany
www.foamglas.de

KAIM – THE COMPANY

For more than 40 years, the Hans Kaim company has been firmly in family hands, standing with its name for extreme expertise in the field of paving slab pads, height-adjustable pedestal supports on balconies and terraces and for cross spacers in the garden and landscaping and tiling trades. Hans Kaim, after whom the company is named, transformed his business in 1977 from one supplying components to the toys industry into a firm with its own products. Since then the company's affairs have already been managed by three generations of the female side of the family: Hans Kaim's wife Veronika Kaim and daughter Magdalena Kraiß-Güdü (1979-2011) and now granddaughter Meryem Güdü (since 2012).

As specialists for paving slab pads, pedestals and cross spacers, Kaim has been making high-quality products for many years. All staff at the family business in Oberschwarzach, Germany also constantly work on improving this high standard still further. A particularly important element in this is dialogue with specialist retailers, users, planners and architects. In this way ideas and suggestions get incorporated from practitioners in the field and turned into new features and enhancements and specialist knowledge of products and their use gets passed on.

With expert, innovative product development, tested and certified (to DIN EN ISO 9001:2008) production processes and fast, reliable and timely service, Hans Kaim is the market leader for pedestal supports made of recycled plastic.

Our product range:



**PLATTENFIX
STANDARD-PAD**



**PLATTENFIX
MAXI-PAD**



MULTI-PAD



VARIO-PAD 2



CROSS SPACERS



GRASS CROSS SPACERS

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Methods of use 08/2015 Our verbal and written recommendations in respect of technical application that we provide based on our experience to assist the purchaser/user are in line with current theoretical and practical knowledge. Neither they nor any external calculations are binding or create any legal contractual relationship or any additional obligations arising from the purchase contract. They do not absolve purchasers/users from the need to check themselves that our products are suitable for their intended purpose.