BSP Bracket System® Polska

Product Catalogue 2018

Aluminum fixing systems for façades

PASSIVE SOLUTIONS

ITE®

§ 225

INNOVATIVE ECONOMY
NATIONAL COHESION STRATEGY

EUROPEAN UNION
EUROPEAN REGIONAL DEVELOPMENT FUND

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TABLE OF APPLICATIONS

		internal	external		
					
STANDARD SYSTEM – KW TYPE	**page no.**	**any selected**	**up to 12 m**	**from 12 to 25m**	**more than 25m**
KW1	5	✓	✓	✓	✓
KWP1	7	✓	✓	✓	✓
KWW1; KWP2	8	✓	✓	✓	✓
KWR1 ; KWR2	9	✓	✓	✓	✓
KWRG	10	✓	✓	✓	✓
PASSIVE SYSTEMS					
KW1 PAS	12	✗	✓	✓	✓
KW2 PAS	13	✗	✓	✓	✓
KW 3 PAS	14	✗	✓	✓	✓
KN1 PAS	15	✗	✓	✓	✓
ECO BRACKET SYSTEMS					
KW1 EB	17	✓	✓	✓	✗
KWR7, KWR9, KWR10, KWR11	18	✓	✓	✓	✗
KWR 3, KWR4	19	✓	✓	✓	✗
OTHER SYSTEMS					
SYSTEM KWRY	21	✓	✓	✓	✓
SYSTEM KCS	22	✓	✓	✓	✓
SYSTEM KWRW ; KWRZ	23	✓	✓	✓	✓
SYSTEM F-T-F	24	✓	✓	✓	✓
SYSTEMY KRS ; KRW	25	✓	✓	✓	✓
INTERNAL LININGS					
KW1 40	27	✓	✓	✓	✓
KWR5, KWR8	28	✓	✓	✓	✓
RW2	29	✓	✓	✓	✓
KWRW	30	✓	✓	✓	✓

PASSIVE SOLUTIONS — The product meets stricter thermal requirements.

The product has been tested by the Building Research Institute.

The product has been tested on the basis of the guidelines issued by the European Organisation for Technical Approvals.

The product has Construction Mark "B".

§ 225 — The product has been tested in accordance with requirements referred to in Art. 225 of the Regulation of the Minister of Infrastructure concerning technical conditions.

The product has been tested by Warsaw Technical University.

✓ Recommended

✓ Application possible after accurate static verification

✗ Not recommended

BSP | BracketSystem® Polska

BSP Bracket System Polska Sp. z o.o. is focused on aspects associated with ventilated façades and fixing arrangements accompanied by comprehensive services and professional consulting.

BSP Bracket System Polska Sp. z o.o. is the designer and manufacturer of a complete façade fixing systems that is commonly known and recognised on the market under the brand "BSP System".

We rely on the many years of experience of our managerial staff, gained in the sector of professional construction services in Poland and abroad.

The primary objective of our business is to provide our customers with innovative technological solutions based on our know-how and experience. Our company's staff are experts recognised on the market in engineering, construction, building and investment process management, such as design, performance and financing as well as coordination and engineering.

BSP Bracket System Polska Sp. z o.o. cooperates with world-renowned partners, such as contractors, manufacturers, design and architectural offices, universities, research institutes, authorities and building surveyors.

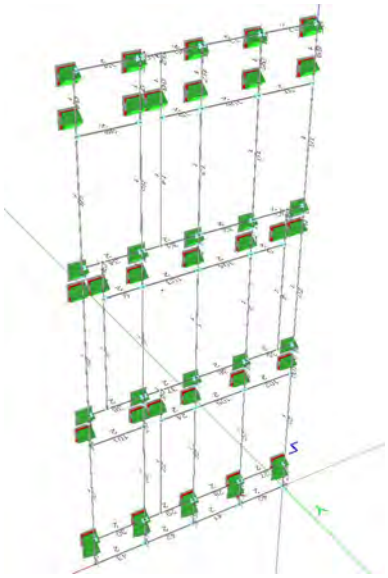
The BSP system is recommended by a leading manufacturer of façade panels – EQUITONE (formerly Euronit).

GLAZED FAÇADES

Glazed façades are the most common type of curtain walls. These are building elements that have a no load-bearing role but serve only as a thermal and functional division. Such façades can be fixed to floor slabs of transverse walls, structural mullions or steel structures.

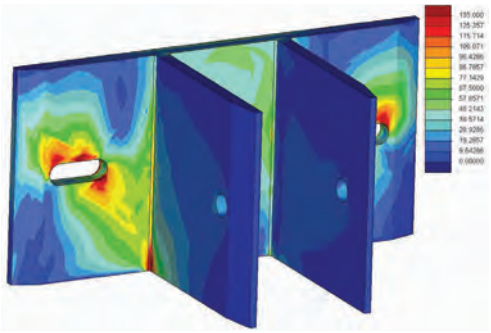
They only transfer their own load and wind pressure and take no part in transferring loads of the primary building structure. As there are various fixing methods and final effects, several types of façades can be distinguished, which are informally referred to as:

Mullion and transom curtain façades
Segmental façades

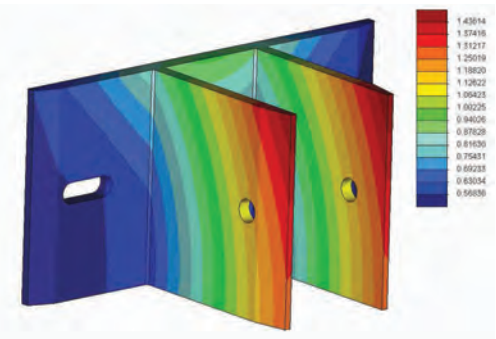


MULLION AND TRANSFOM CURTAIN FAÇADES

Stress distribution in the K1/100-100 bracket



Deflection distribution in the K1/100-100 bracket



Advantages of BSP extruded aluminum brackets for mullion and transom curtain façades:

- High weather resistance, especially when compared to steel brackets that are susceptible to corrosion
- Relatively low mass that has a substantial impact on the reduction of transport cost
- Drilling new holes and cutting without the need for corrosion protection
- No galvanic corrosion at the contact between brackets and other aluminum elements
- No welded joints and the risk that may occur in case of improper welding
- Lack of internal stresses typical for bent or welded brackets
- Great aesthetics as brackets can optionally be anodised or powder coated
- Fast delivery and wide-range offer as standard products are always available from stock

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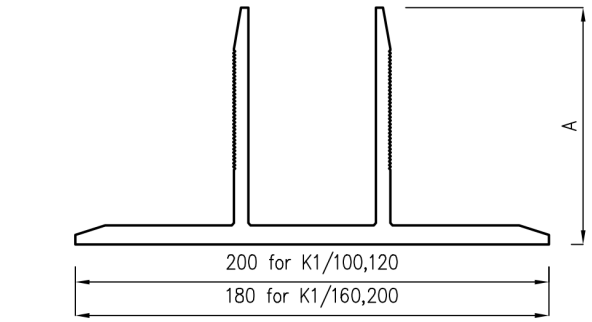
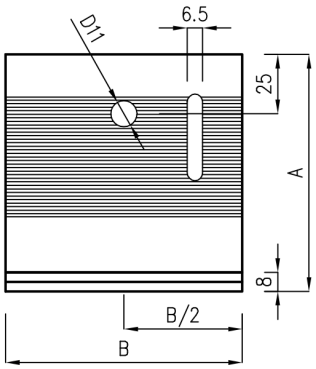
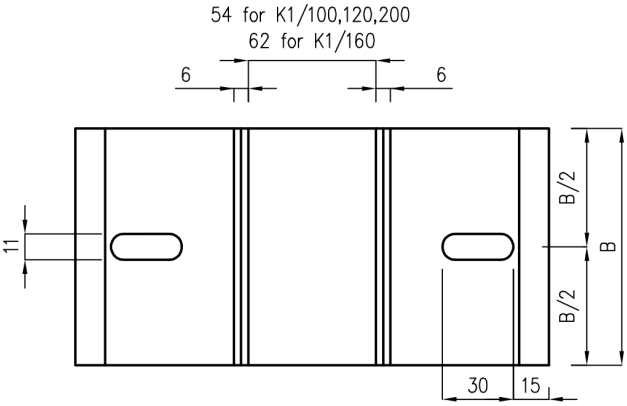
BRACKET - K1







Bracket	A	B
K1/100-150 - FIX	100	150
K1/100-120 - FIX	100	120
K1/100-100 - FIX	100	100
K1/100-80 - FIX	100	80
K1/120-150 - FIX	120	150
K1/120-120 - FIX	120	120
K1/120-100 - FIX	120	100
K1/120-80 - FIX	120	80
K1/160-150 - FIX	160	150
K1/160-120 - FIX	160	120
K1/160-100 - FIX	160	100
K1/160-80 - FIX	160	80
K1/200-150 - FIX	200	150
K1/200-120 - FIX	200	120
K1/200-100 - FIX	200	100
K1/200-80 - FIX	200	80

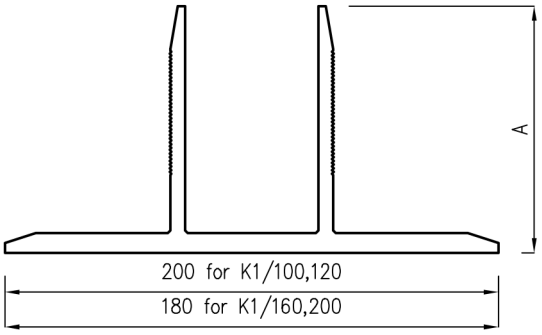
*Other dimensions on request.

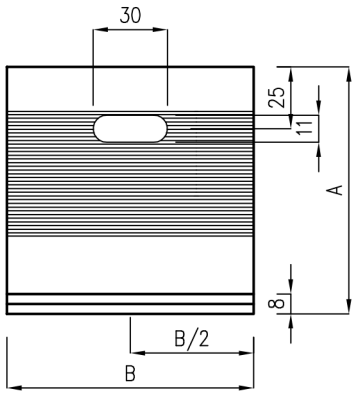
The K1 brackets are a standard solution designed to fix mullions of the façade. The bracket that looks like the π letter provide good access to all dowel bars and bolts as well as the adjusting element.

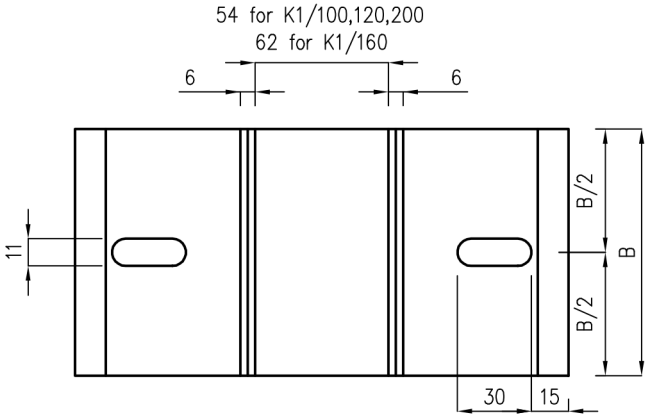
The K1 FIX bracket (fixed element) is, by default, equipped with a 11-mm dia. hole to install a mullion with a M10 bolt and an ancillary hole. An additional slotted hole is used for temporary fastening of the mullion with a 5.5 screw during installation.

Our CNC can be used to make any hole pattern requested by the customer.

BRACKET – K1

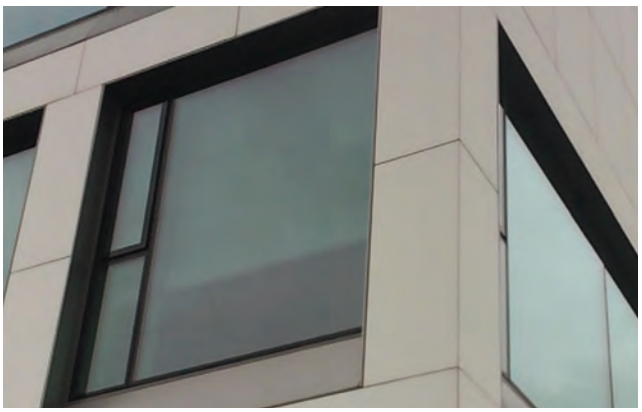






The K1 LOS bracket (sliding element) is, by default, equipped with a 30x11 mm slotted hole. The hole is used to fix the façade mullion with a M10 bolt. The LOS bracket is not used for load transfer of the façade's own mass and, in most cases, can be smaller than the load-bearing bracket.

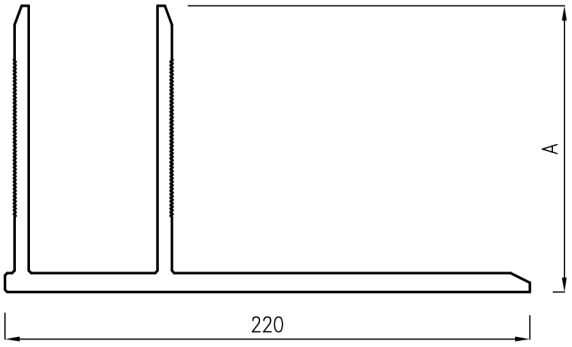
Our CNC can be used to make any hole pattern requested by the customer.

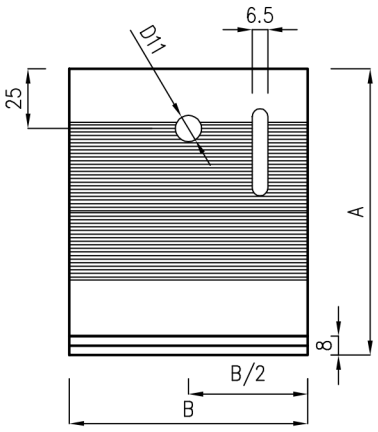


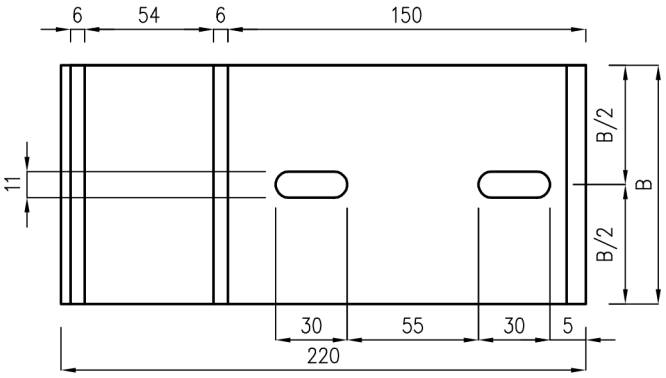
Bracket	A	B
K1/100-150 - LOS	100	150
K1/100-120 - LOS	100	120
K1/100-100 - LOS	100	100
K1/100-80 - LOS	100	80
K1/120-150 - LOS	120	150
K1/120-120 - LOS	120	120
K1/120-100 - LOS	120	100
K1/120-80 - LOS	120	80
K1/160-150 - LOS	160	150
K1/160-120 - LOS	160	120
K1/160-100 - LOS	160	100
K1/160-80 - LOS	160	80
K1/200-150 - LOS	200	150
K1/200-120 - LOS	200	120
K1/200-100 - LOS	200	100
K1/200-80 - LOS	200	80

*Other dimensions on request.

BRACKET - K2







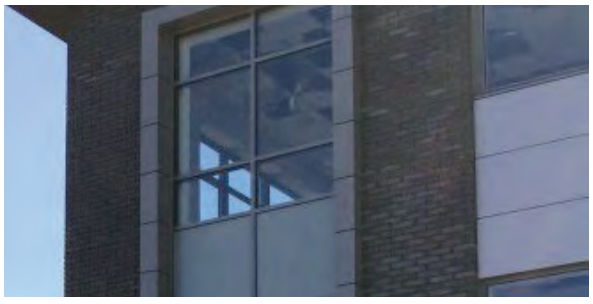
The K2 bracket is a non-standard solution designed to fix mullions on façade sides or in places where only one-sided access to the bracket is available.

The K2 FIX bracket (fixed element) is, by default, equipped with a 11-mm dia. hole, designed to install a mullion with a M10 bolt and an ancillary hole. An additional slotted hole is used for temporary fastening of the mullion with a 5.5 screw during installation.

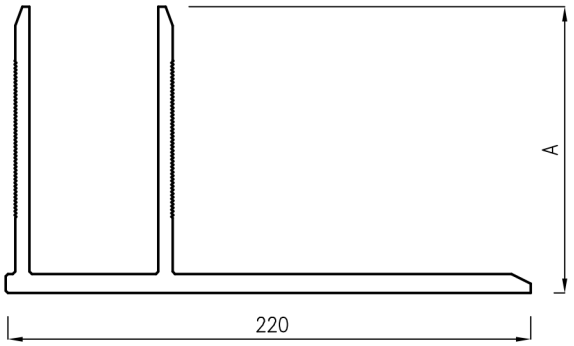
Our CNC can be used to make any hole pattern requested by the customer.

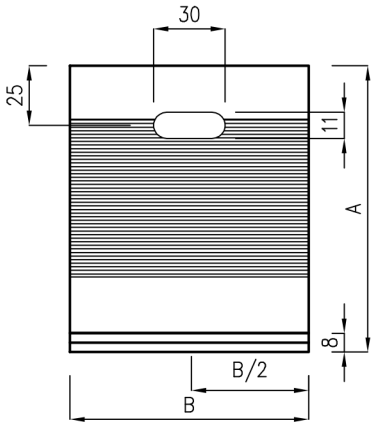
Bracket	A	B
K2/100-150 - FIX	100	150
K2/100-120 - FIX	100	120
K2/100-100 - FIX	100	100
K2/100-80 - FIX	100	80
K2/120-150 - FIX	120	150
K2/120-120 - FIX	120	120
K2/120-100 - FIX	120	100
K2/120-80 - FIX	120	80

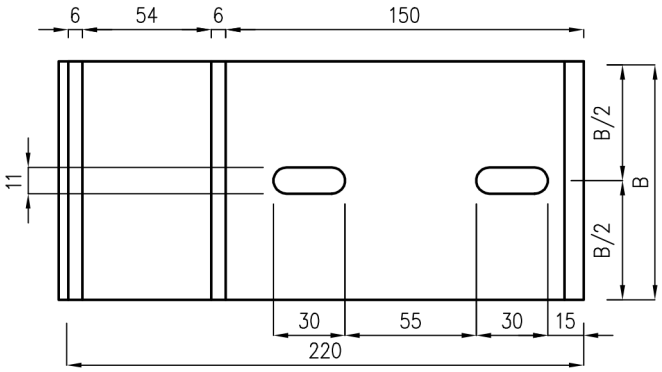
* Other dimensions on request.



BRACKET - K2

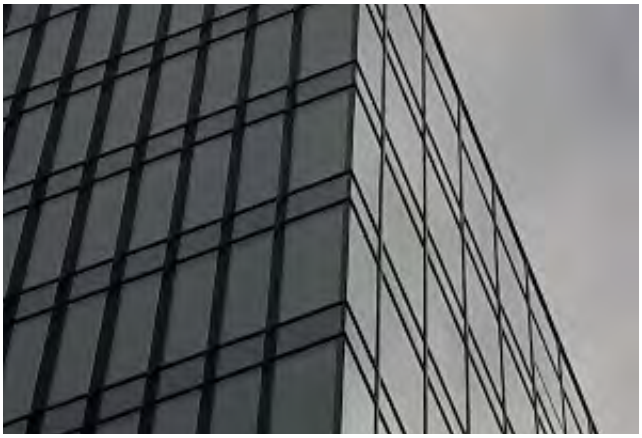






The K2 LOS bracket (sliding element) is, by default, equipped with a 30x11 mm slotted hole. The hole is used to fix the façade mullion with a M10 bolt. The LOS bracket is not used for load transfer of the façade own mass and, in most cases, can be smaller than the load-bearing bracket.

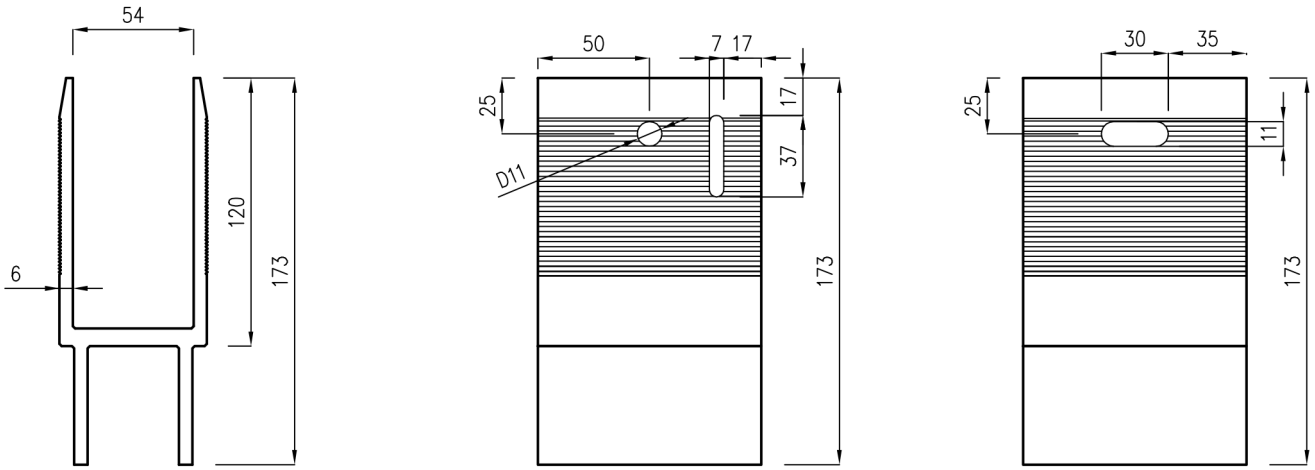
Our CNC can be used to make any hole pattern requested by the customer.

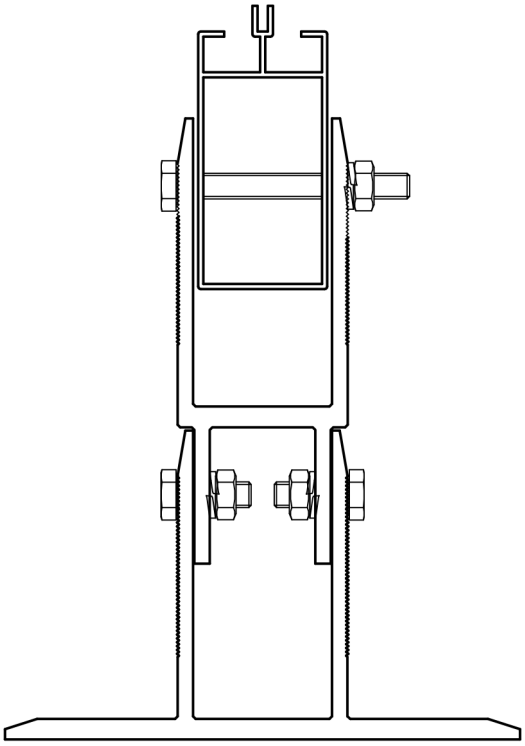


Bracket	A	B
K2/100-150 - LOS	100	150
K2/100-120 - LOS	100	120
K2/100-100 - LOS	100	100
K2/100-80 - LOS	100	80
K2/120-150 - LOS	120	150
K2/120-120 - LOS	120	120
K2/120-100 - LOS	120	100
K2/120-80 - LOS	120	80

* Other dimension on request..

EXTENSION PIECE – KP1

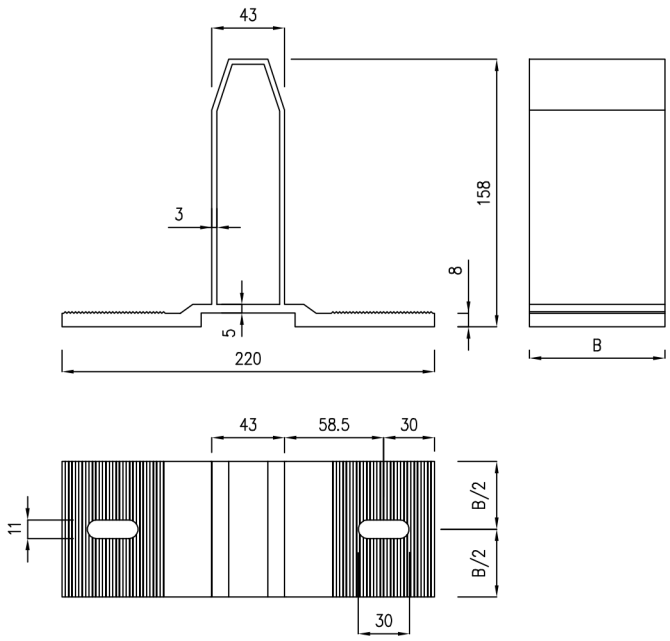




Extension pieces	B
KP1/173-150 - FIX-LOS	150
KP1/173-120 - FIX-LOS	120
KP1/173-100 - FIX-LOS	100
KP1/173- 80 - FIX-LOS	80

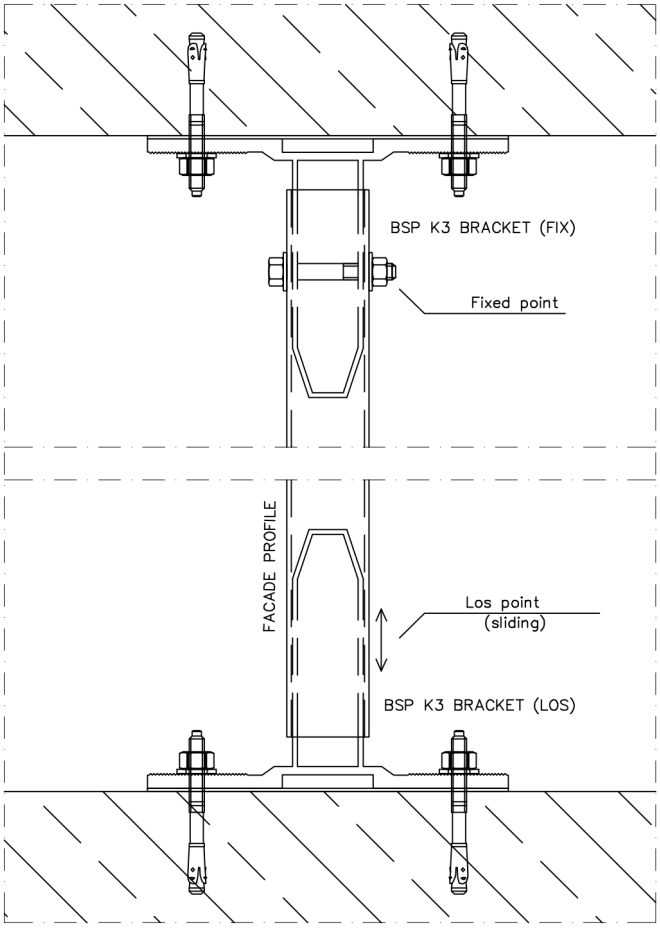
The KP1/173-B extension piece can be used to obtain a uniform surface of the ventilated façade in case of a longer outreach, greater unevenness or at the offset in the building structure. This solution eliminates the need for brackets of different sizes, being advantageous in terms of logistics and the pace of work.

INSERTABLE BRACKET – K3



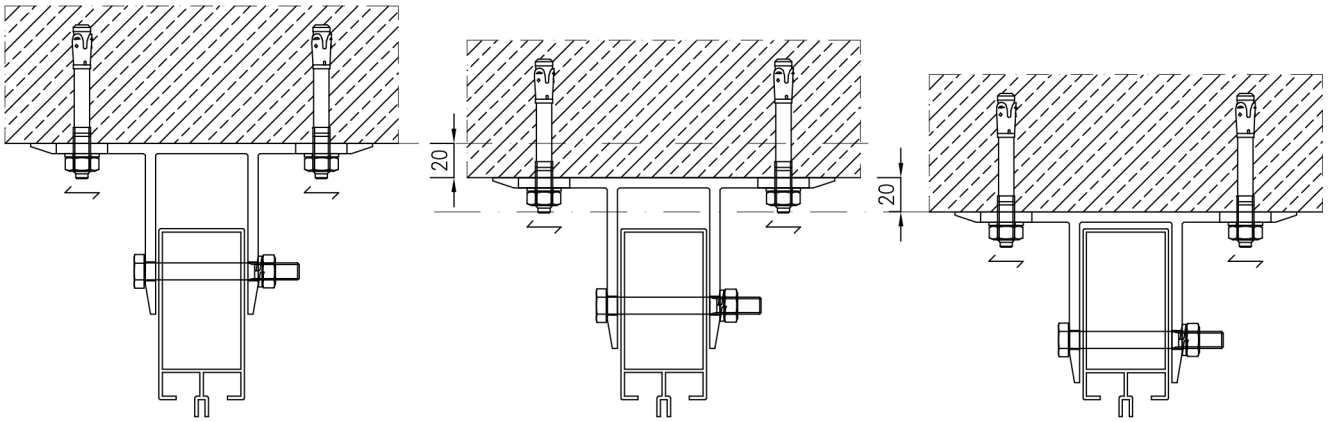
B - The dimension depends on the depth of the façade profile.

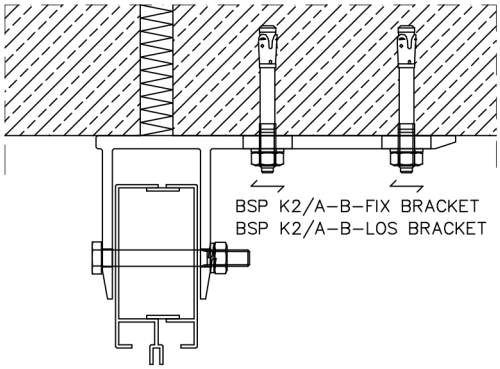
Unlike the K1 and K2 brackets with the mullion fixed laterally, the K3 brackets are designed to fix mullion and transom curtain façades to perpendicular surfaces – from top and bottom. Here the profile slides onto the bracket as shown in the drawing below.



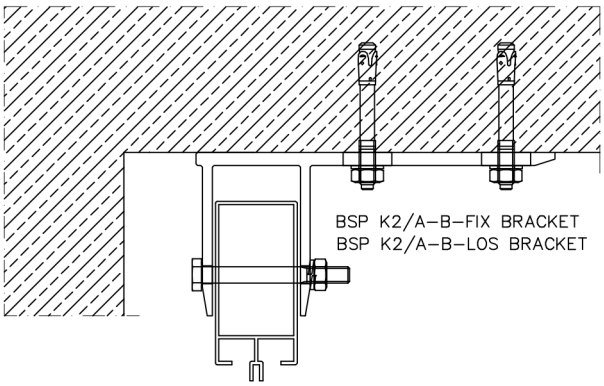
In addition, the K3 bracket can be used to fix mullion profiles when lateral fixing is impossible, e.g. support structures on the roof for installation of louvers.

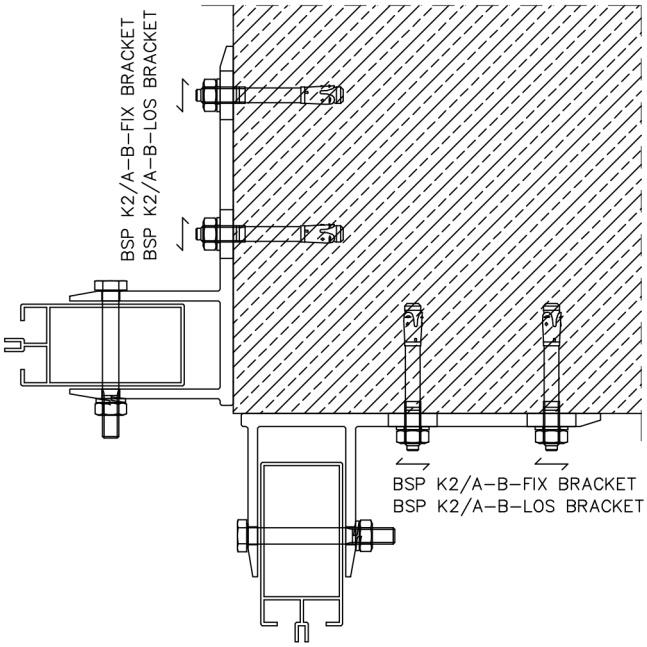
EXAMPLE APPLICATIONS OF MULLION AND TRANSOM CURTAIN FAÇADE BRACKETS





The adjustment range of the bracket helps to avoid problems associated with the tolerance of wall construction within ± 20 mm and in places where wall arrangement prevents fixing standard brackets, e.g. in corners.





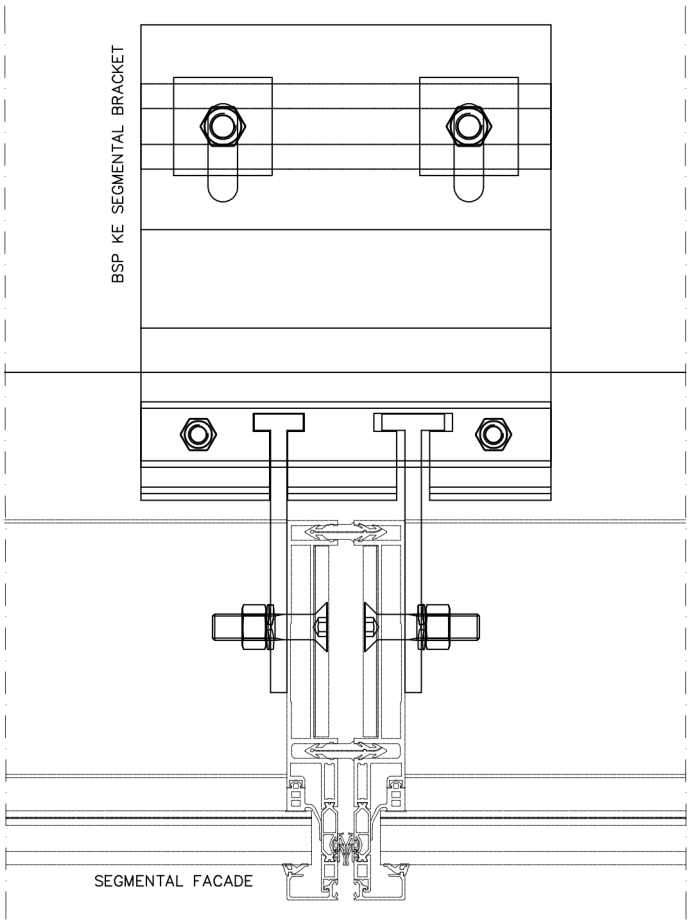
SEGMENTAL FAÇADES

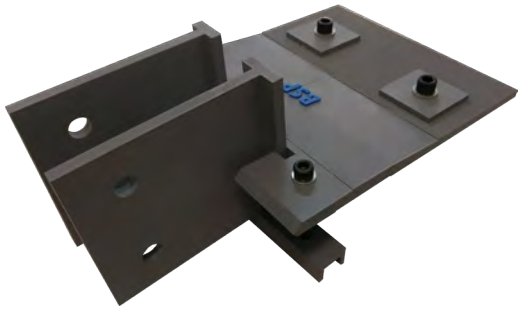
Over the years, buildings have been becoming higher and more demanding, whereas construction time has been successively reduced. In order to meet the requirements relating to façades, it is a perfect solution to use segmental façades (element-based façades, block façades). These are neatly finished façade modules that are prefabricated and asselinear metreled with one another on the site. Segmental façades ensure fast mounting and require no scaffoldings during installation on the building.

The façade structure consists of complete segments fixed to the building's load-bearing structure with **SEGMENTAL BRACKETS** to be joined with one another.

Façade installation is not very dependent of weather conditions and location of the site relative to the manufacturing plant. Depending on the building structure, brackets can be fixed from the front or from above the spandrel wall.

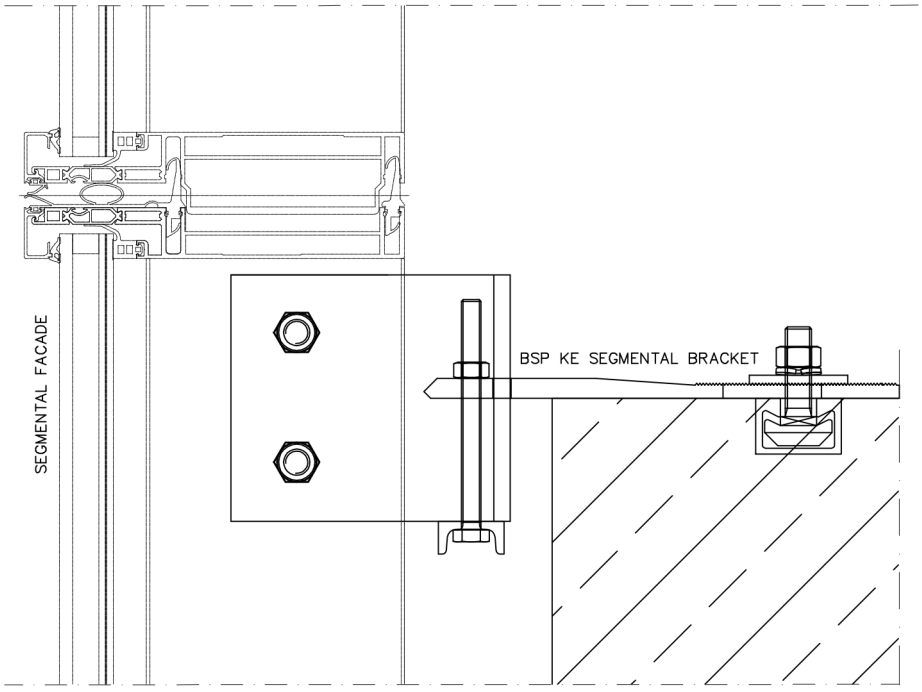
SEGMENTAL BRACKET – KE1



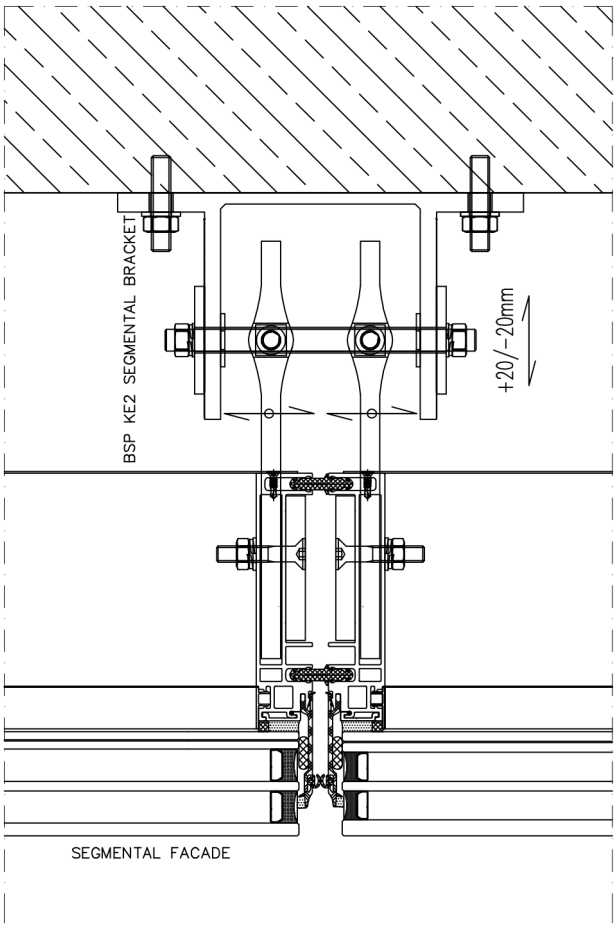


Segmental bracket fixed from top of the floor slab

Brackets are usually fixed from the inside. The bracket fixed from top of the floor slab makes it possible to stay within the floor envelope. Simplicity and safety of installation greatly speeds up the entire work, which is of significant importance as regards the total installation cost of the whole façade. This installation method depends on the space available above the bracket. Since the bracket occupies some space, it is usually applied in places where a raised floor is to be constructed. While installing this bracket, it is recommended to use a mounting rail embedded in the floor slab.

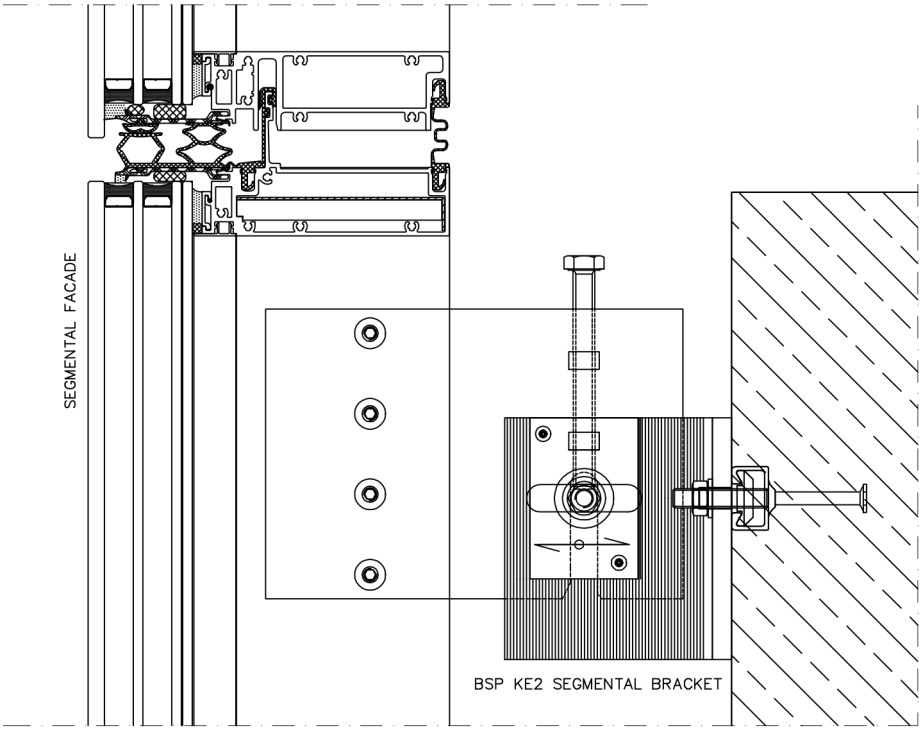


SEGMENTAL BRACKET – KE2



Segmental brackets fixed on the face of the floor slab

If there is a floor slab with a wider spandrel wall or installation from above is impossible (no space – no raised floor), brackets are installed on the face of the floor slab. There is a certain difficulty during installation that is performed outside of a building without any scaffolding. During the stage of floor slab pouring, mounting rails are used to facilitate the process as much as possible. The rails must be taken into account when designing reinforcement and formwork. Due to hindered access during installation and the following adjustment, the use of segmental brackets is an optimal solution that saves both time and money.



VENTILATED FAÇADES

Ventilated façade is a specific method of finishing external walls. The method consists in fixing flat or non-planar elements to the substructure. An important technical condition is to ensure ventilation between the panel and wool (This is the reason why that façade has its name). Ventilation is used to equalise temperature and humidity on both sides of the suspended elements. In addition, ventilated façades provide many positive features that are unavailable for traditional wall finishing.

Advantages of ventilated façades:

ACOUSTICS

As the element that is the first one reached by an acoustic wave is displaced, sounds are dispersed, meaning sound absorption of the wall is increased.

TEMPERATURE

Apart from the use of wool that obviously improves the thermal conditions of the space-dividing element, ventilated façades feature increased resistance to sun heating and wind cooling. As previously mentioned for thermal conditions, the major advantage of these façades is that the first surface of the cladding system is displaced from the wool.

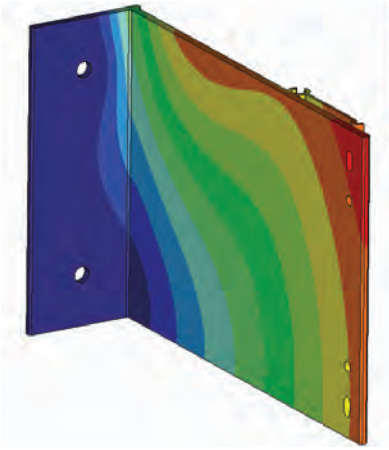
VENTILATION

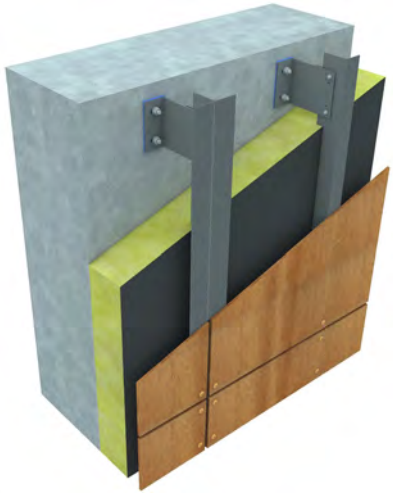
Wool colinear metreined with ventilation provides better air exchange, and as such, improved evacuation of moisture. Unlike ventilated façades, traditional façades may stay damp too long and fail to maintain the assumed parameters during heavy rain.

FIRE RESISTANCE

Unlike traditional façades with Styrofoam, ventilated façades can be made entirely of non-inflammable elements.

STANDARD SYSTEM – KW





The KW aluminum substructure for ventilated cladding systems consists mainly of KW1 brackets as well as KWR1 and KWR2 load-bearing profiles. It is used for fixing external cladding panels with great precision. It can be used to obtain a perfect plane for fixing the cladding panels made of fibre-cement, HPL, composite, architectural concrete, aluminum panels, louvres and many others.

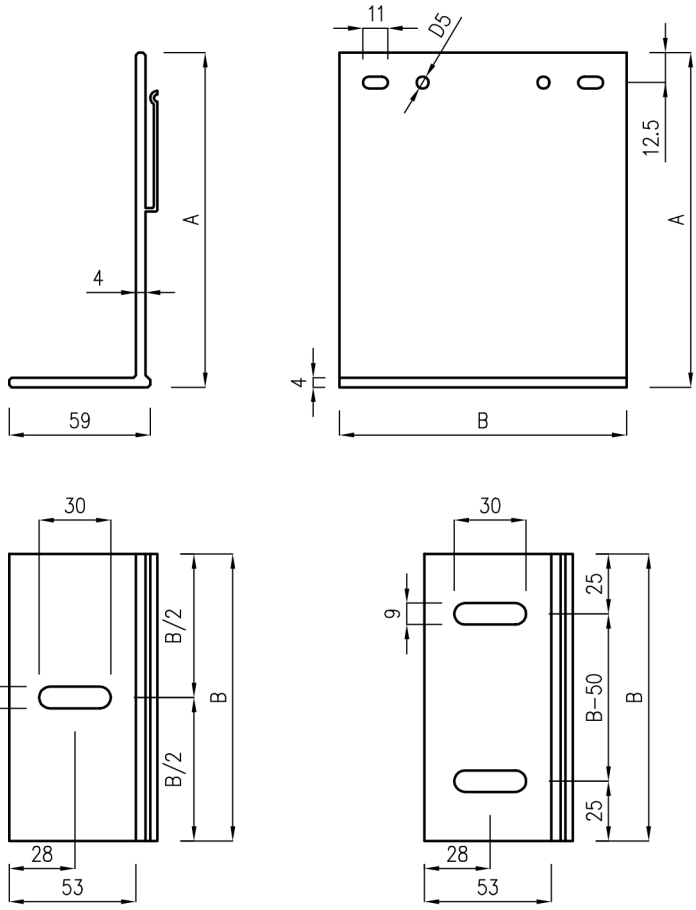
Brackets transfer loads between load-bearing profiles and the building structure. Depending on the outreach, brackets of different lengths are used. In order to facilitate the installation process and shorten the time of installation work, the shape of the bracket has been designed to ensure smooth vertical alignment of the subframe within the admissible structural tolerances. The bracket can be adjusted for wall unevenness within ± 20 mm without the need for additional levelling plates. The aluminum substructure system mainly comprises L-profiles for intermediate fixings and T-profiles on joints of cladding elements. Another advantage of the BSP substructure is its specially shaped, grooved external surface that considerably improves the durability of the connection between the elements of the substructure and the external cladding.

Advantages of the BSP - extruded aluminum brackets for ventilated façades:

- Improved load capacity of brackets resulting in lower cost of substructure
- Patented foot at the bottom of the bracket that considerably increases mechanical strength
- Lack of assembly stresses and scratching typical for bent brackets
- High weather resistance, especially when compared to steel brackets that are susceptible to corrosion
- Relatively low mass that has a substantial impact on the reduction of transport cost
- Drilling additional holes or size cutting without the need for corrosion protection
- Eliminated galvanic corrosion at the contact between brackets and other aluminum elements
- Great aesthetics, as brackets can optionally be anodised or powder coated
- Fast delivery and wide-range offer as standard products are always available from stock

BRACKET – KW1

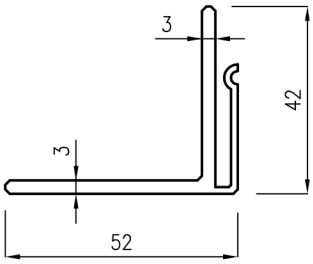
Bracket	A	B
KW1/42-150	42	150
KW1/42-120	42	120
KW1/42-90	42	90
KW1/42-60	42	60
KW1/80-150	80	150
KW1/80-120	80	120
KW1/80-90	80	90
KW1/80-60	80	60
KW1/120-150	120	150
KW1/120-120	120	120
KW1/120-90	120	90
KW1/120-60	120	60
KW1/140-150	140	150
KW1/140-120	140	120
KW1/140-90	140	90
KW1/140-60	140	60
KW1/170-150	170	150
KW1/170-120	170	120
KW1/170-90	170	90
KW1/170-60	170	60
KW1/210-150	210	150
KW1/210-120	210	120
KW1/210-90	210	90
KW1/210-60	210	60
KW1/260-150	260	150
KW1/260-120	260	120
KW1/260-90	260	90
KW1/260-60	260	60
KW1/310-150	310	150
KW1/310-120	310	120
KW1/310-90	310	90
KW1/310-60	310	60

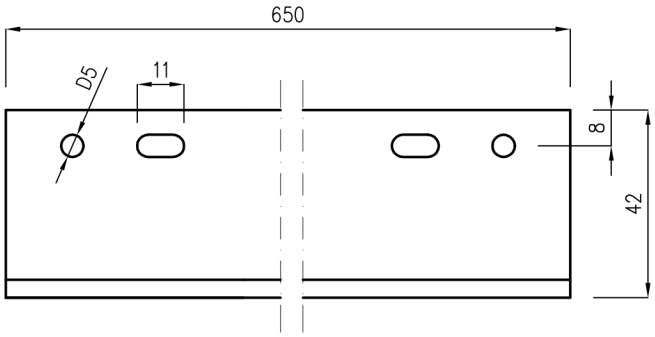


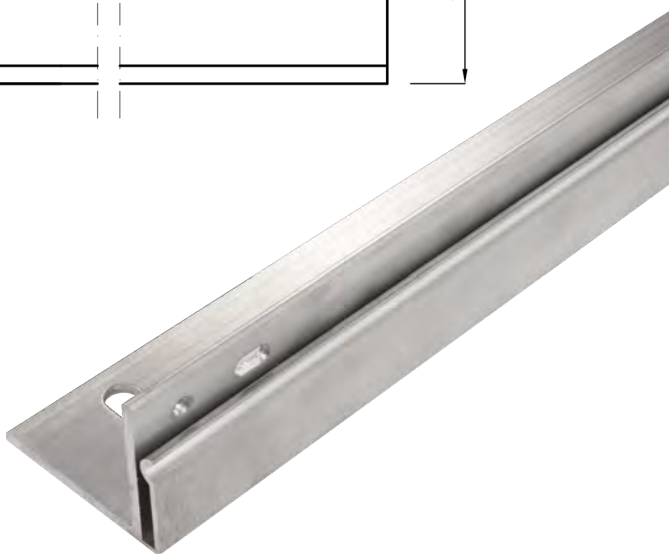
The bracket has been designed to provide convenience during installation of aluminum profiles and position adjustment along all three axes to avoid problems with wall unevenness.

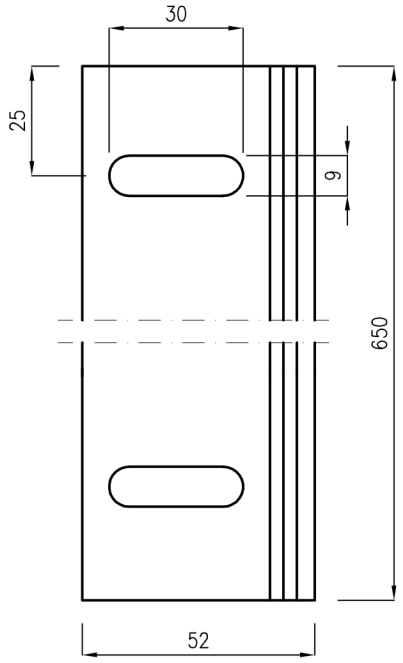
Standard sizes of holes for bracket installation are 9x30 mm but 11x30mm are also available. Hole spacing is 70 mm for brackets Ax120 mm and 100 mm for brackets Ax150 mm. The height of brackets and hole spacing can be modified on request.

BRACKET – KW1-650









This bracket type is recommended for renovation, e.g. when ventilated façade is installed on the existing façade, without the need for removal of the current thermal insulation.

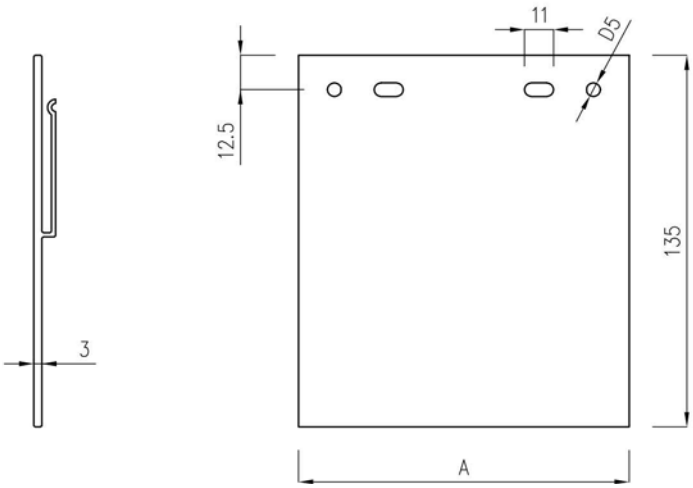
It is also used to install a ventilated façade on steel wall cassettes.

EXTENSION PIECE – KWP1

EXTENSION PIECES	B
KWP1/135-150	150
KWP1/135-120	120
KWP1/135-90	90
KWP1/135-60	60

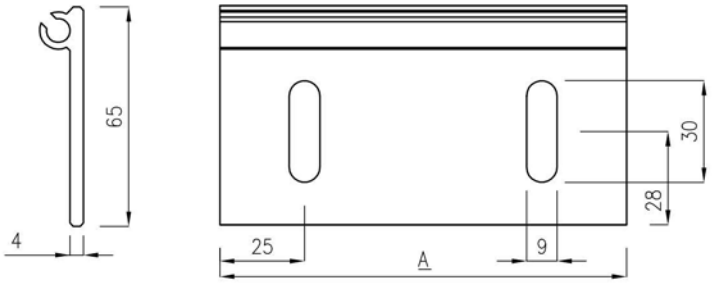
The KWP1 extension piece is used to obtain a uniform surface of the ventilated façade in case of greater unevenness or at the offset in the building structure.

This solution eliminates the need for brackets of different outreaches, being advantageous in terms of logistics and the pace of work.



FOOT – KWW 1 TYPE

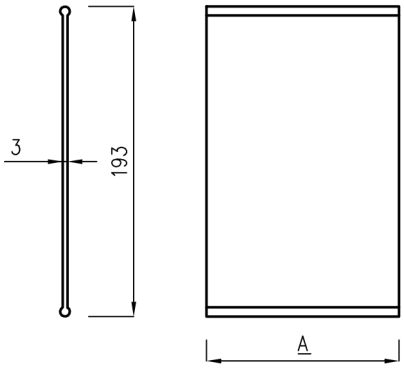
FOOT ELEMENTS	A
KWW1/65-150	150
KWW1/65-120	120
KWW1/65-90	90
KWW1/65-60	60



SUPPORT PIECE – KWP2 ELEMENT

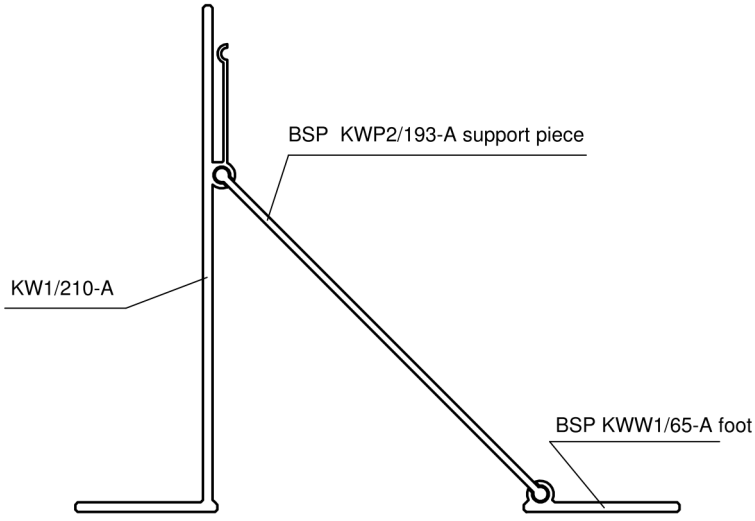
The support piece is used for bracket reinforcement if the outreach is longer, e.g. when an extension piece is used, and adaptation of greater loads, e.g. if panels are made of architectural concrete.

A substructure system with the KW1/210-B bracket installed horizontally also requires KWW1/65-A and KWP2/193-A elements. The same parts can be used to support the KW1/170-B bracket in horizontal arrangements.



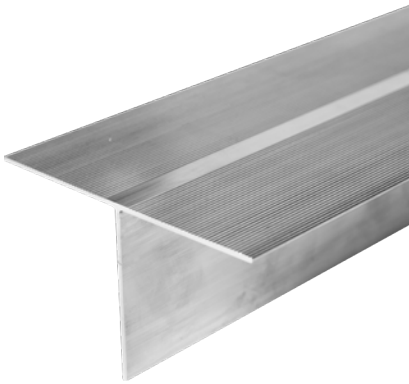
Foot elements	A
KWP2/193-150	150
KWP2/193-120	120
KWP2/193-90	90
KWP2/193-60	60

BRACKET WITH SUPPORT PIECE



The foot element is used for greater loads and outreach distances as well as a horizontal bracket.

PROFILE – KWR1



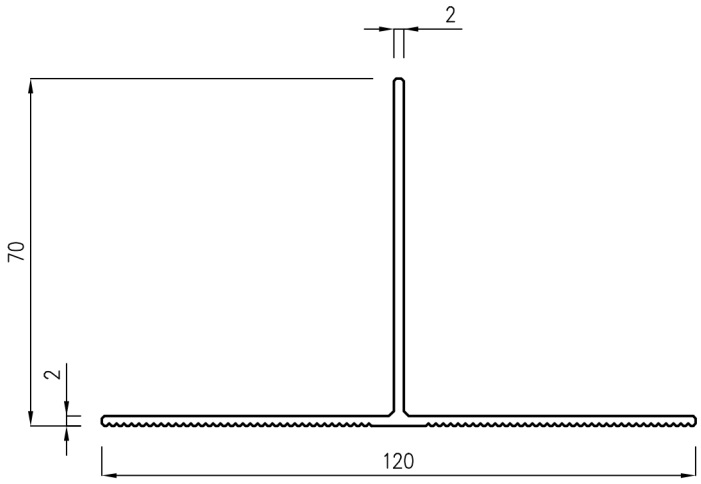
The subframe is designed accordingly to provide plane adjustment within 50 mm to avoid problems associated with concrete unevenness. A larger profile wall (70 mm) ensures rigidity and is suitable for a larger vertical bracket span.

Profile

KWR1, straight length 3100 mm

KWR1, straight length 3600 mm

Ix	15,580 cm^4
Wx	2,785 cm^3
Area	3,642 cm^2
Iy	27,096 cm^4
Wy	4,516 cm^3
Mass	0,983 kg/linear metre



PROFILE KWR2

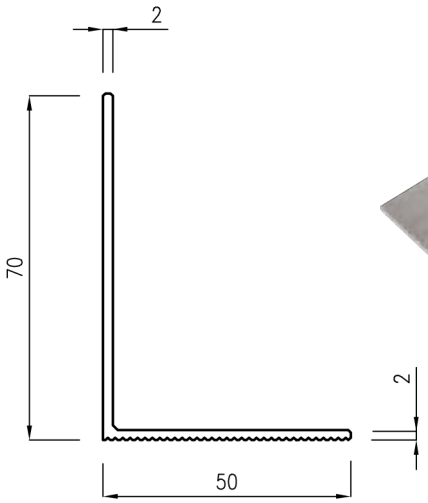
Profile

KWR2 straight length 3100 mm

KWR2 straight length 3600 mm

*Customized length to be extruded on request.

Ix	12,001 cm^4
Wx	2,480 cm^3
Area	2,305 cm^2
Iy	5,154 cm^4
Wy	1,315 cm^3
Mass	0,622 kg/linear metre



WINDOW-RECESS PROFILE – KWRG

The KWRG window-recess profile is designed to stiffen window-recess panels at the contact between façade cladding and the window reveal. The KWRG profile can also be used in areas where the fixing point of the cladding is located further from the closest anchoring point in the substructure. See the example illustrations below.

Ix	131,388 cm^4
Wx	12,695 cm^3
Area	4,819 cm^2
Iy	17,280 cm^4
Wy	2,934 cm^3
Mass	1,301 kg/linear metre

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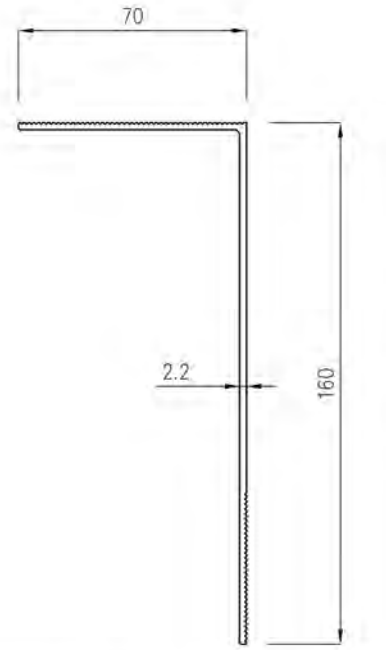
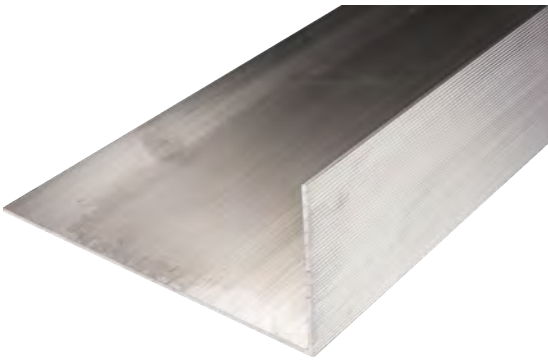
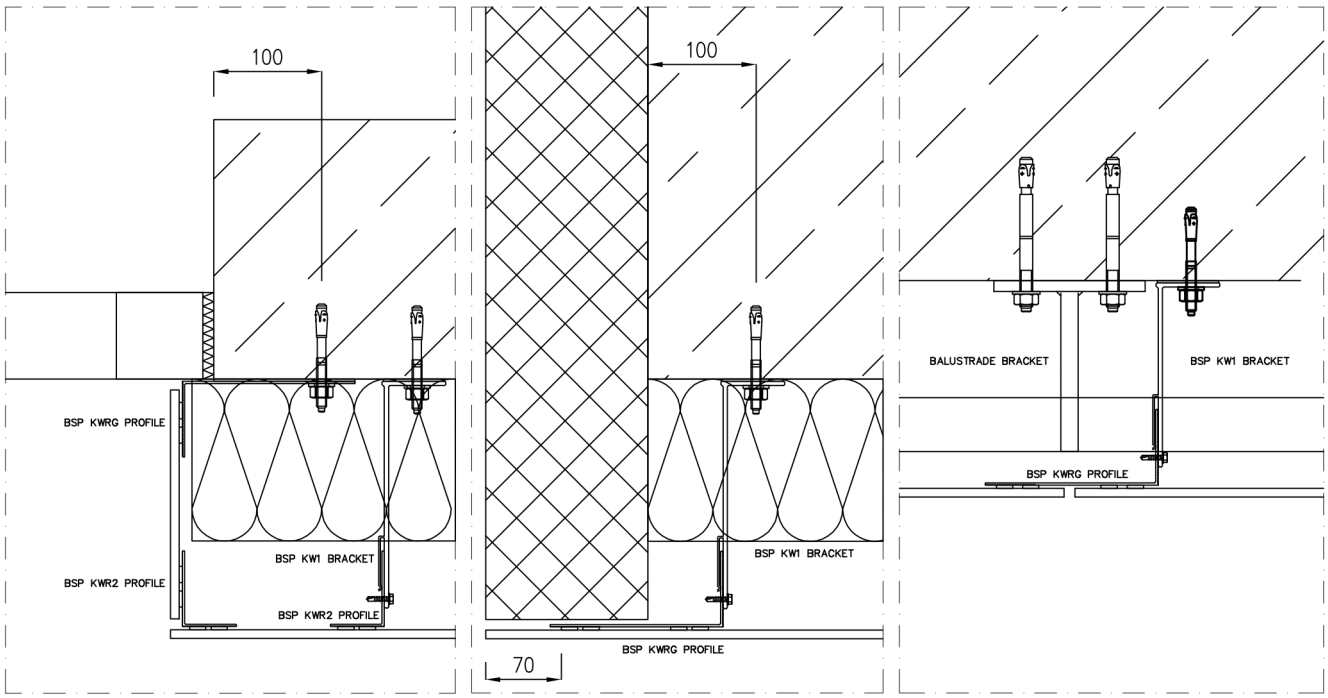
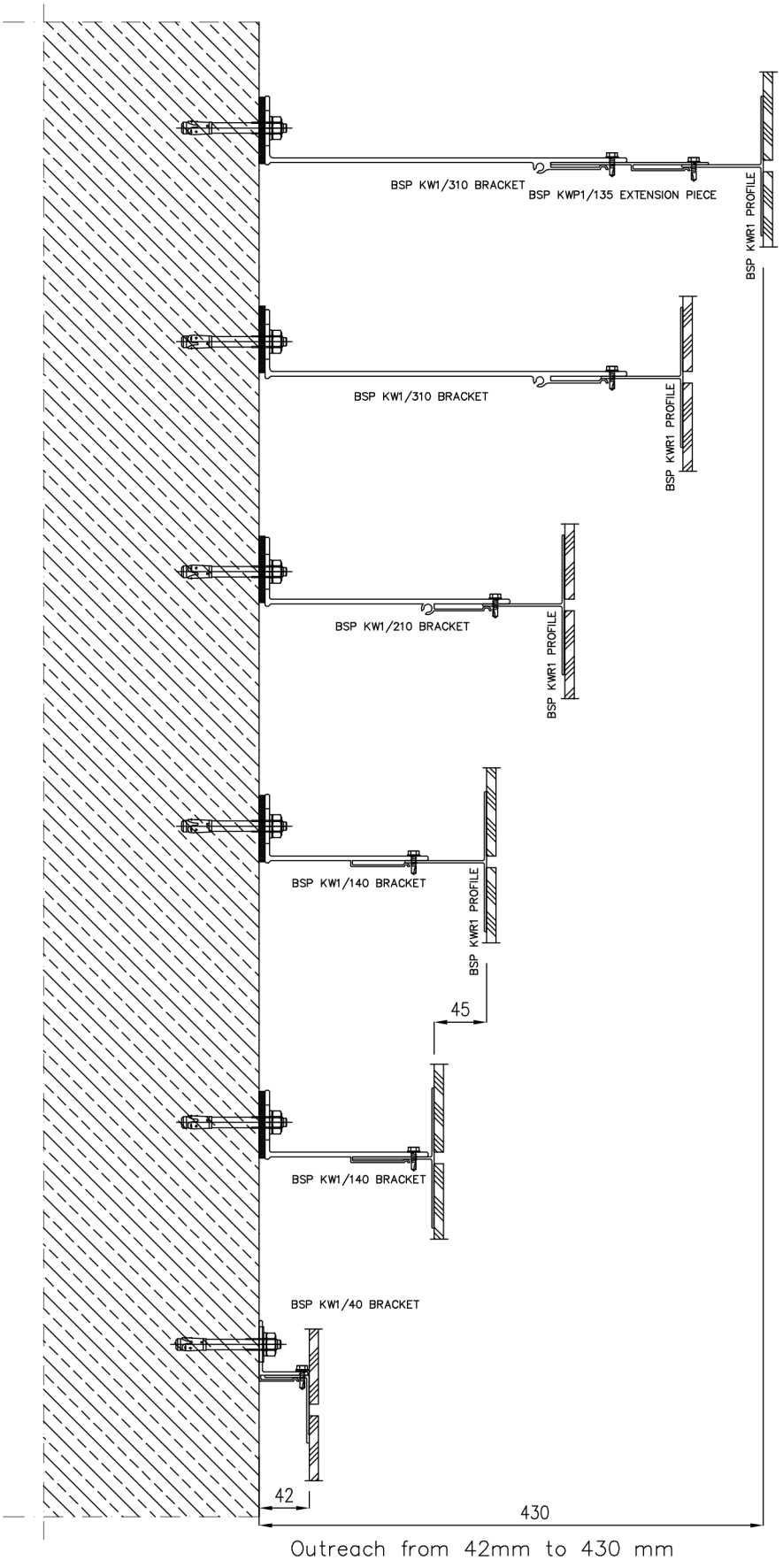




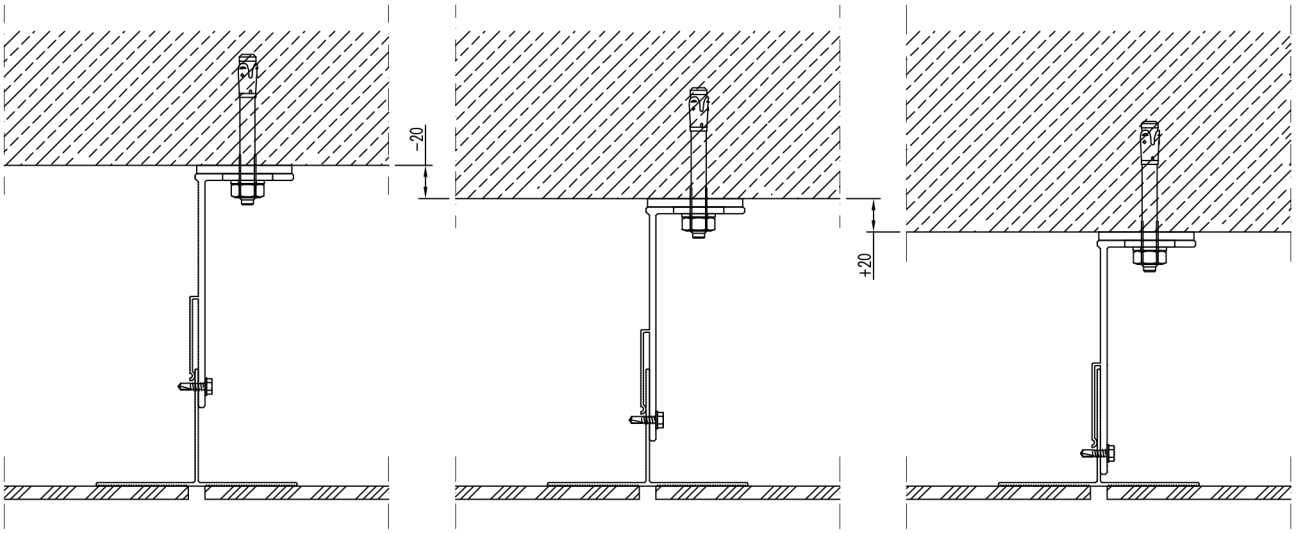


EXAMPLE APPLICATIONS OF THE ALUMINUM SUBSTRUCTURE



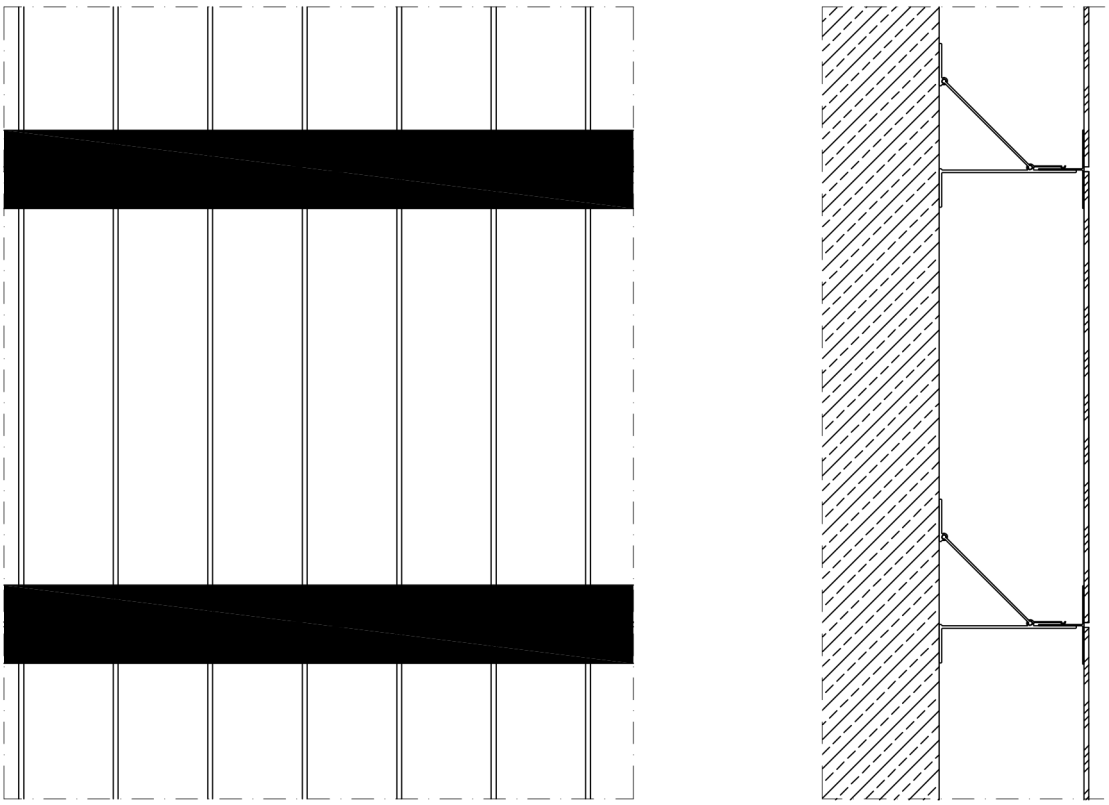
Substructure extension ranging from 42 mm to 430 mm.

EXAMPLE APPLICATIONS OF THE ALUMINUM SUBSTRUCTURE



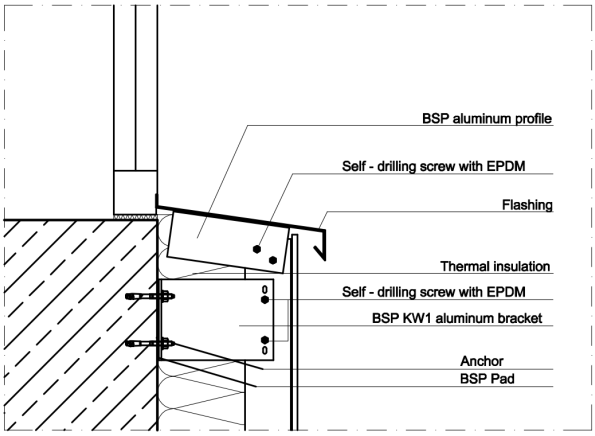
EXAMPLE APPLICATIONS OF HORIZONTAL BRACKETS

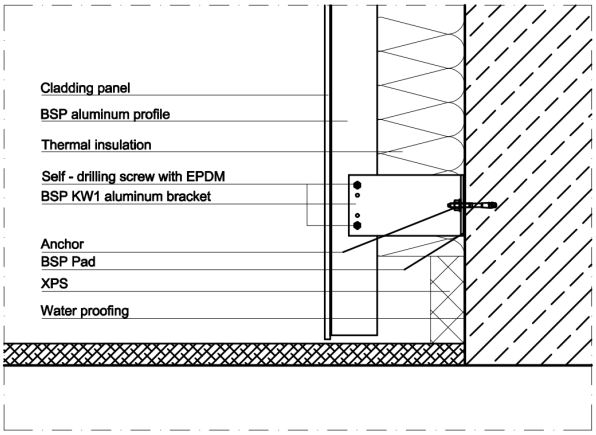
The range of bracket adjustment prevents any problems associated with wall tolerance (within ± 20 mm).

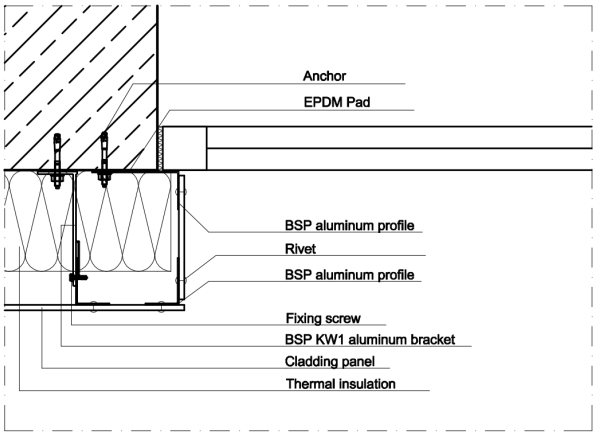


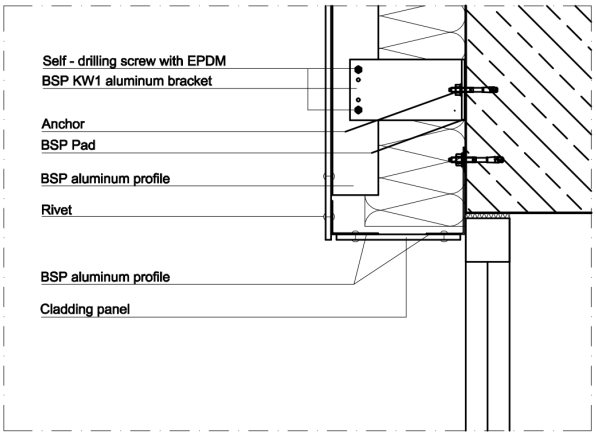
The substructure in a horizontal arrangement results in cost and material optimisation of the façade installed using narrow panels.

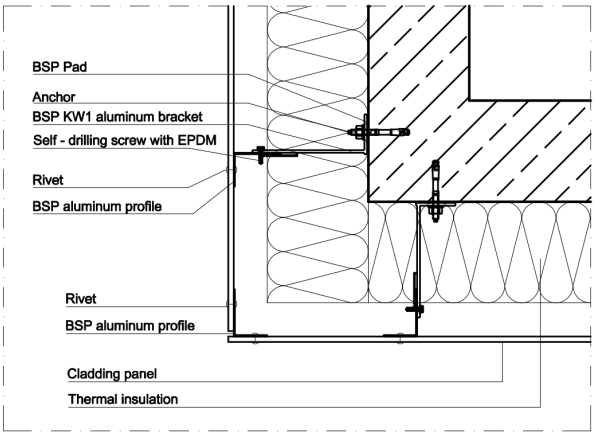
EXAMPLE DETAILS AFTER INSTALLATION

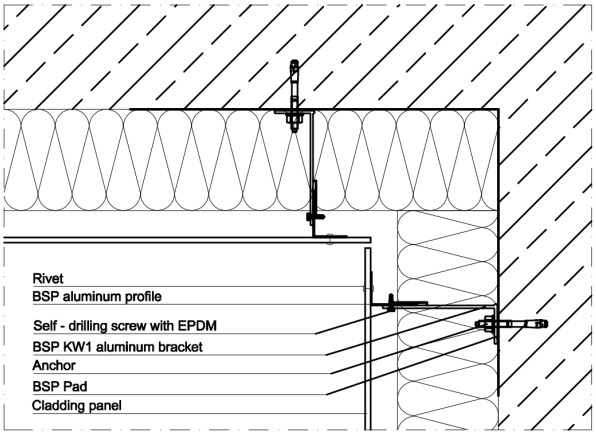


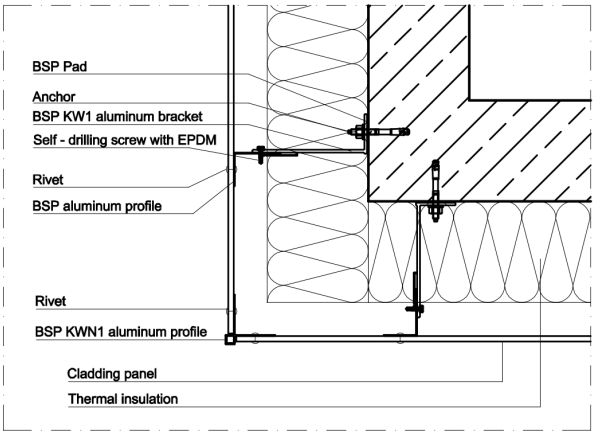


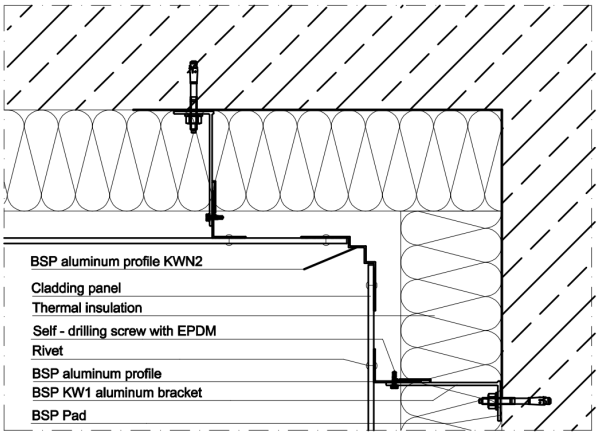












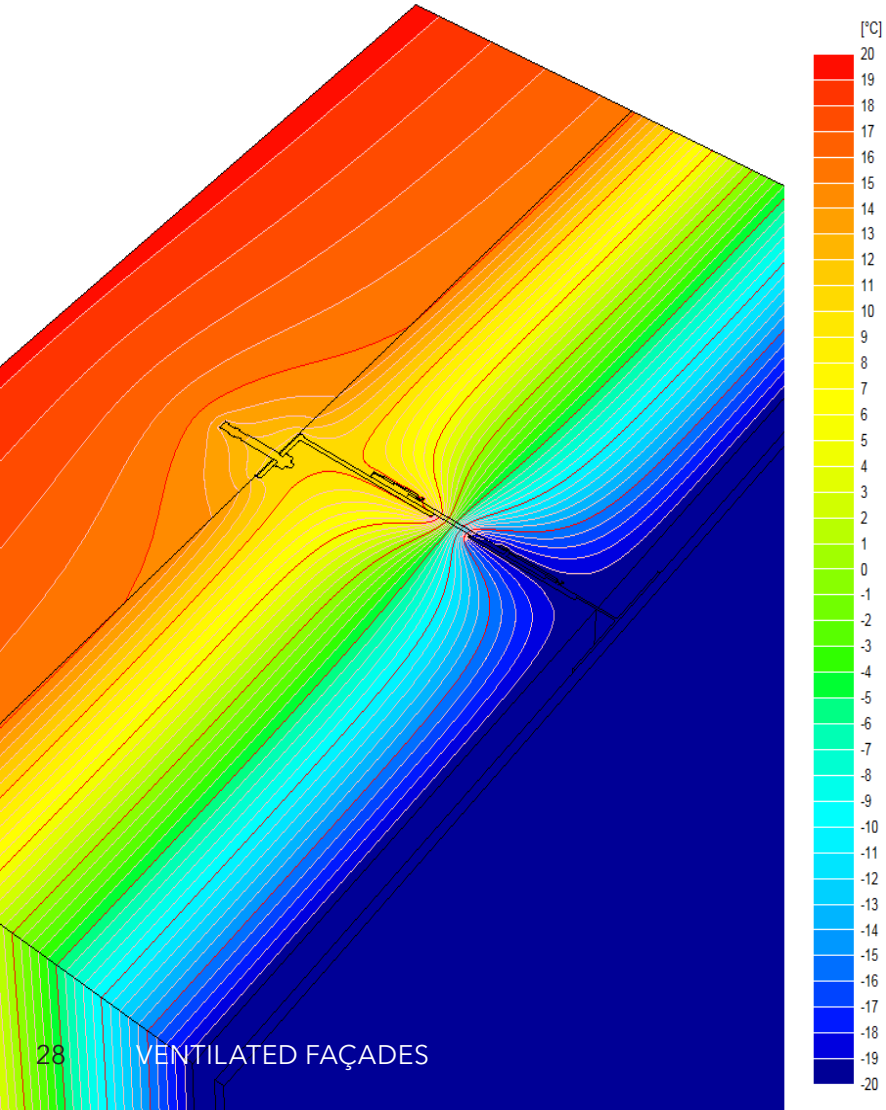
PASSIVE SYSTEM – KW PAS

Heat transfer reduction

Despite many essential advantages such as excellent thermal insulation, a wide range of architectural design possibilities, great aesthetics, fast moisture evacuation from the building, etc., the technology behind the ventilated façade is also associated with an adverse effect – the thermal bridge. One of the factors causing uncontrollable heat transfer between the building interior and the external surface of the cladding is caused by substructure elements used to fix cladding panels to the building structure. The substructure is fixed to the wall with aluminum brackets. These brackets pass through individual insulation layers that are made of materials featuring relatively high thermal conductivity, and therefore they contribute to increased heat loss.

Possible consequences of thermal bridges include:

- Heat loss resulting in energy loss affecting the energy balance of the building.
- Reduced temperature of the building envelope may result in water condensation and moisture of insulating and structural materials. As a consequence, fungi and moulds harmful to health may grow.



In order to reduce the risk of thermal bridges in ventilated façades, appropriate design engineering and careful installation of the substructure is required by following good building practices.

However, stricter regulations and standards relating to thermal parameters (heat-transfer coefficient) of building structures may be insufficient. Therefore, BSP has developed a solution that provides a wide range of possibilities to architects designing energy-efficient buildings.

How to minimise the risk of thermal bridges:

- Use pads that provide thermal and corrosion insulation between a bracket foot and the building wall. BSP recommends engineered HDPE pads with low thermal conductivity.
- Using the BSP substructure reduces the number of brackets, and therefore the number of potential thermal bridges decreases as well.
- Using the passive bracket with a non-metallic element ensures that the occurrence of thermal bridges is almost completely eliminated.

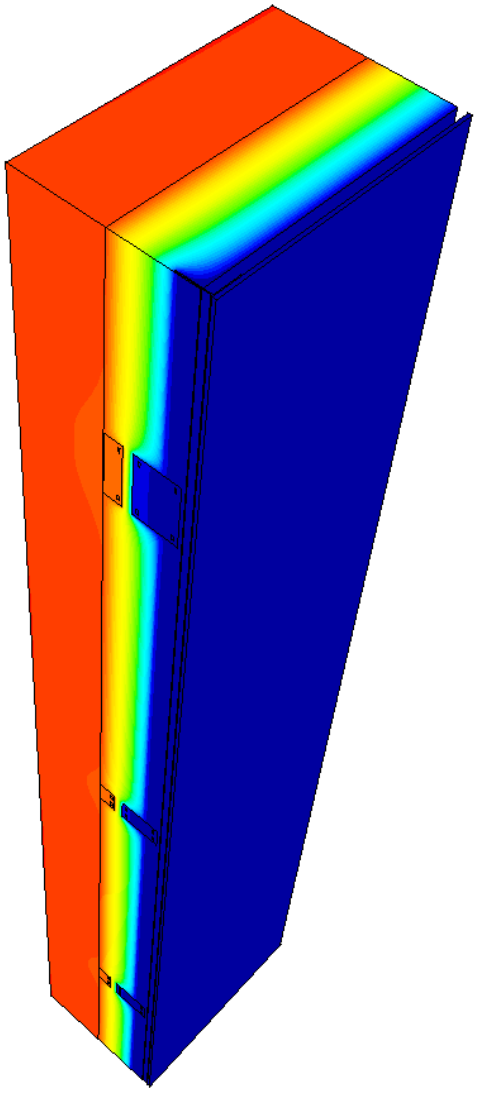
These values (given in W/m2K) for external walls are as follows:

Validity period	before 2014	since 2014	since 2017	from 2021
Max. U	0,30	0,25	0,23	0,20

In order to meet stricter requirements concerning insulation parameters of building envelopes, our R&D department has developed a passive bracket. This product is dedicated to architects, investors, design engineers and contractors looking for modern, energy-efficient and innovative solutions.

The bracket has been approved by the Building Research Institute, together with the BSP engineered substructure for ventilated façades, in accordance with Art. 225 of the Regulation of the Minister of Infrastructure (Journal of Laws no. 75, item 690).

The passive bracket ensures practically complete elimination of thermal bridges to meet the very high requirements for the heat transfer coefficient (Umax) with a margin that will be in compliance with regulations to become effective after 2021.



PASSIVE SOLUTIONS

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PASSIVE BRACKET – KW1 PAS

Passive bracket	A	B
KW1 PAS 170-150 FIX/LOS	170	150
KW1 PAS 170-120 FIX/LOS	170	120
KW1 PAS 170-90 FIX/LOS	170	90
KW1 PAS 170-60 FIX/LOS	170	60
KW1 PAS 200-150 FIX/LOS	200	150
KW1 PAS 200-120 FIX/LOS	200	120
KW1 PAS 200-90 FIX/LOS	200	90
KW1 PAS 200-60 FIX/LOS	200	60
KW1 PAS 220-150 FIX/LOS	220	150
KW1 PAS 220-120 FIX/LOS	220	120
KW1 PAS 220-90 FIX/LOS	220	90
KW1 PAS 220-60 FIX/LOS	220	60
KW1 PAS 240-150 FIX/LOS	240	150
KW1 PAS 240-120 FIX/LOS	240	120
KW1 PAS 240-90 FIX/LOS	240	90
KW1 PAS 240-60 FIX/LOS	240	60
KW1 PAS 260-150 FIX/LOS	260	150
KW1 PAS 260-120 FIX/LOS	260	120
KW1 PAS 260-90 FIX/LOS	260	90
KW1 PAS 260-60 FIX/LOS	260	60
KW1 PAS 280-150 FIX/LOS	280	150
KW1 PAS 280-120 FIX/LOS	280	120
KW1 PAS 280-90 FIX/LOS	280	90
KW1 PAS 280-60 FIX/LOS	280	60

PASSIVE SOLUTIONS

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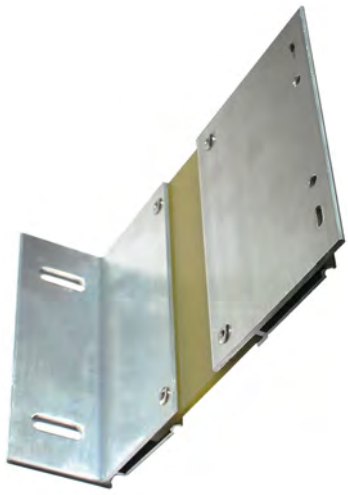

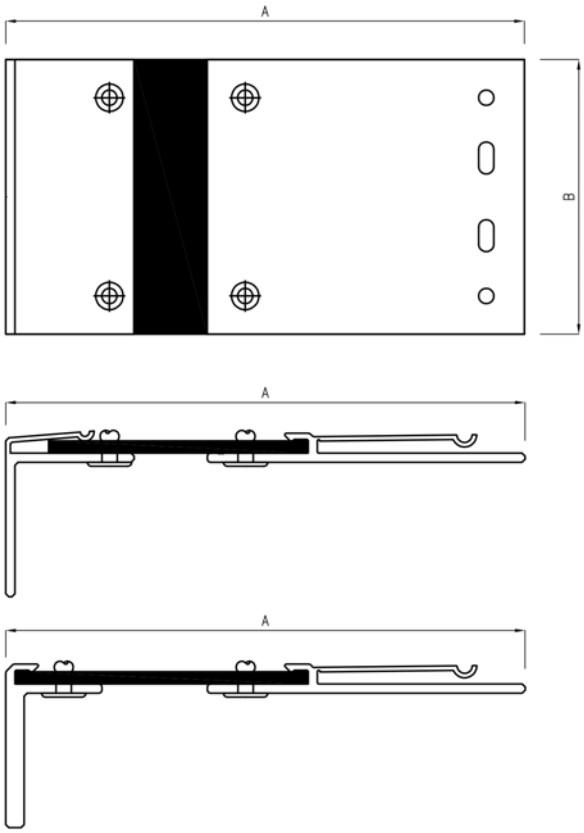

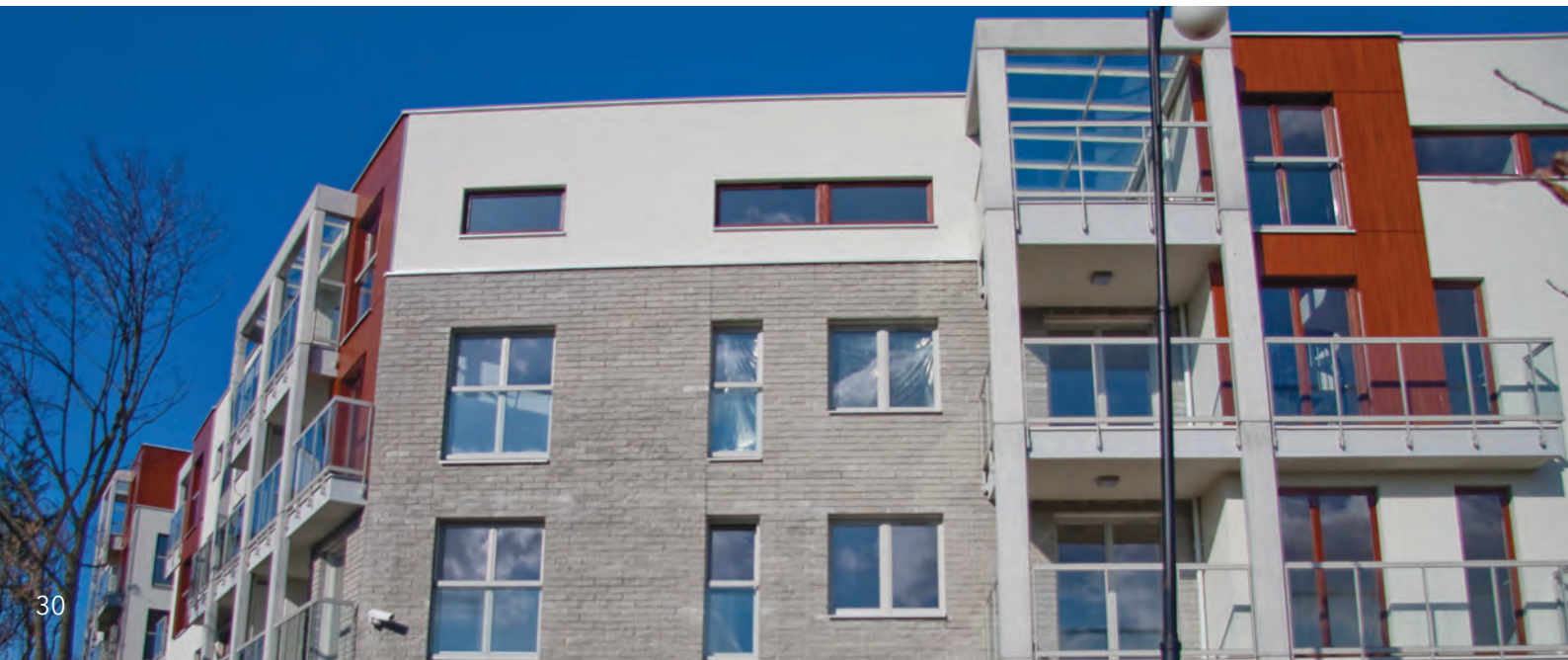

PASSIVE BRACKET – KW2 PAS

Passive bracket	A	B
KW2 PAS 170-150 FIX/LOS	170	150
KW2 PAS 170-120 FIX/LOS	170	120
KW2 PAS 170-90 FIX/LOS	170	90
KW2 PAS 170-60 FIX/LOS	170	60
KW2 PAS 200-150 FIX/LOS	200	150
KW2 PAS 200-120 FIX/LOS	200	120
KW2 PAS 200-90 FIX/LOS	200	90
KW2 PAS 200-60 FIX/LOS	200	60
KW2 PAS 220-150 FIX/LOS	220	150
KW2 PAS 220-120 FIX/LOS	220	120
KW2 PAS 220-90 FIX/LOS	220	90
KW2 PAS 220-60 FIX/LOS	220	60
KW2 PAS 240-150 FIX/LOS	240	150
KW2 PAS 240-120 FIX/LOS	240	120
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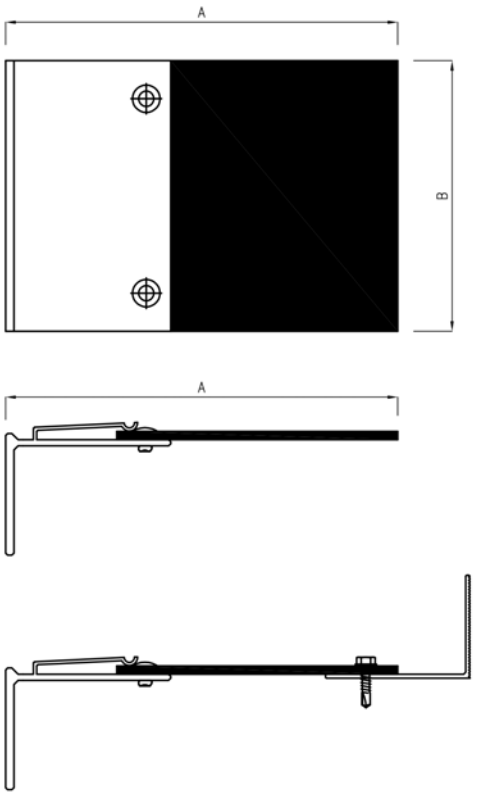
KW2 PAS 260-60 FIX/LOS	260	60
KW2 PAS 280-150 FIX/LOS	280	150
KW2 PAS 280-120 FIX/LOS	280	120
KW2 PAS 280-90 FIX/LOS	280	90
KW2 PAS 280-60 FIX/LOS	280	60

PASSIVE SOLUTIONS

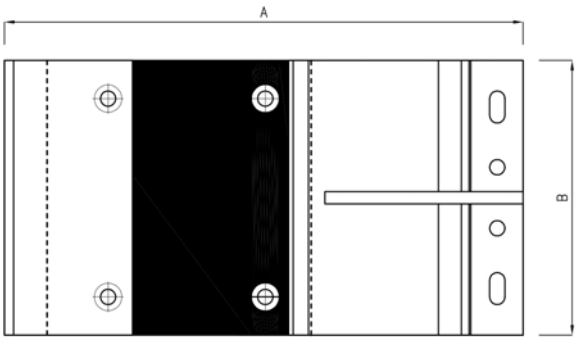
The offer of KW2 PAS brackets complements the range of passive brackets. These brackets are not equipped with aluminum extension pieces. The solution can be applied if it is not required to facilitate vertical alignment of the façade being fixed and the outreach distance is small.

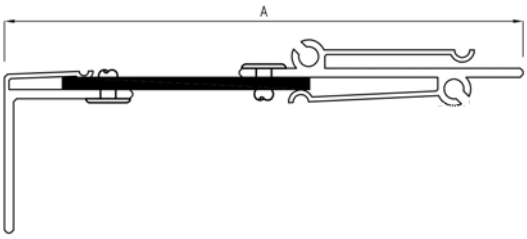


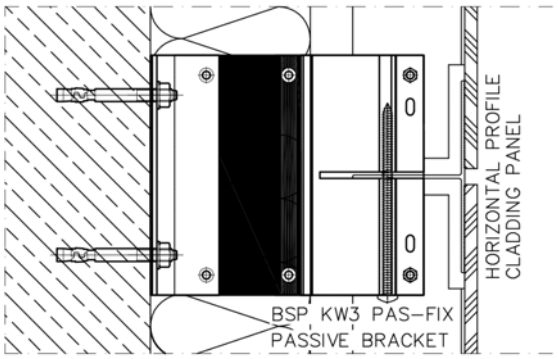
PASSIVE BRACKET – KW3 PAS

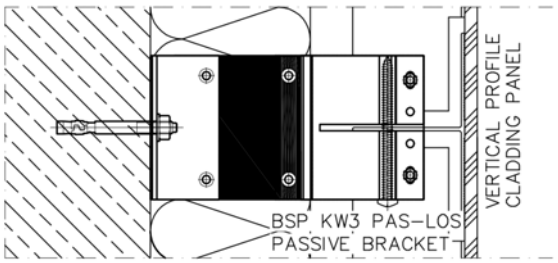
KW3 PAS brackets feature a design similar to standard KW1 PAS brackets, but the aluminum end of the bracket is additionally equipped with a screw socket and features a cut portion to accommodate a profile. This is a solution for installing the subframe horizontally when the brackets are installed vertically.

Passive bracket	A	B
KW3 PAS 170-150 FIX/LOS	170	150
KW3 PAS 170-120 FIX/LOS	170	120
KW3 PAS 170-90 FIX/LOS	170	90
KW3 PAS 170-60 FIX/LOS	170	60
KW3 PAS 200-150 FIX/LOS	200	150
KW3 PAS 200-120 FIX/LOS	200	120
KW3 PAS 200-90 FIX/LOS	200	90
KW3 PAS 200-60 FIX/LOS	200	60
KW3 PAS 220-150 FIX/LOS	220	150
KW3 PAS 220-120 FIX/LOS	220	120
KW3 PAS 220-90 FIX/LOS	220	90
KW3 PAS 220-60 FIX/LOS	220	60
KW3 PAS 240-150 FIX/LOS	240	150
KW3 PAS 240-120 FIX/LOS	240	120
KW3 PAS 240-90 FIX/LOS	240	90
KW3 PAS 240-60 FIX/LOS	240	60
KW3 PAS 260-150 FIX/LOS	260	150
KW3 PAS 260-120 FIX/LOS	260	120
KW3 PAS 260-90 FIX/LOS	260	90
KW3 PAS 260-60 FIX/LOS	260	60
KW3 PAS 280-150 FIX/LOS	280	150
KW3 PAS 280-120 FIX/LOS	280	120
KW3 PAS 280-90 FIX/LOS	280	90
KW3 PAS 280-60 FIX/LOS	280	60

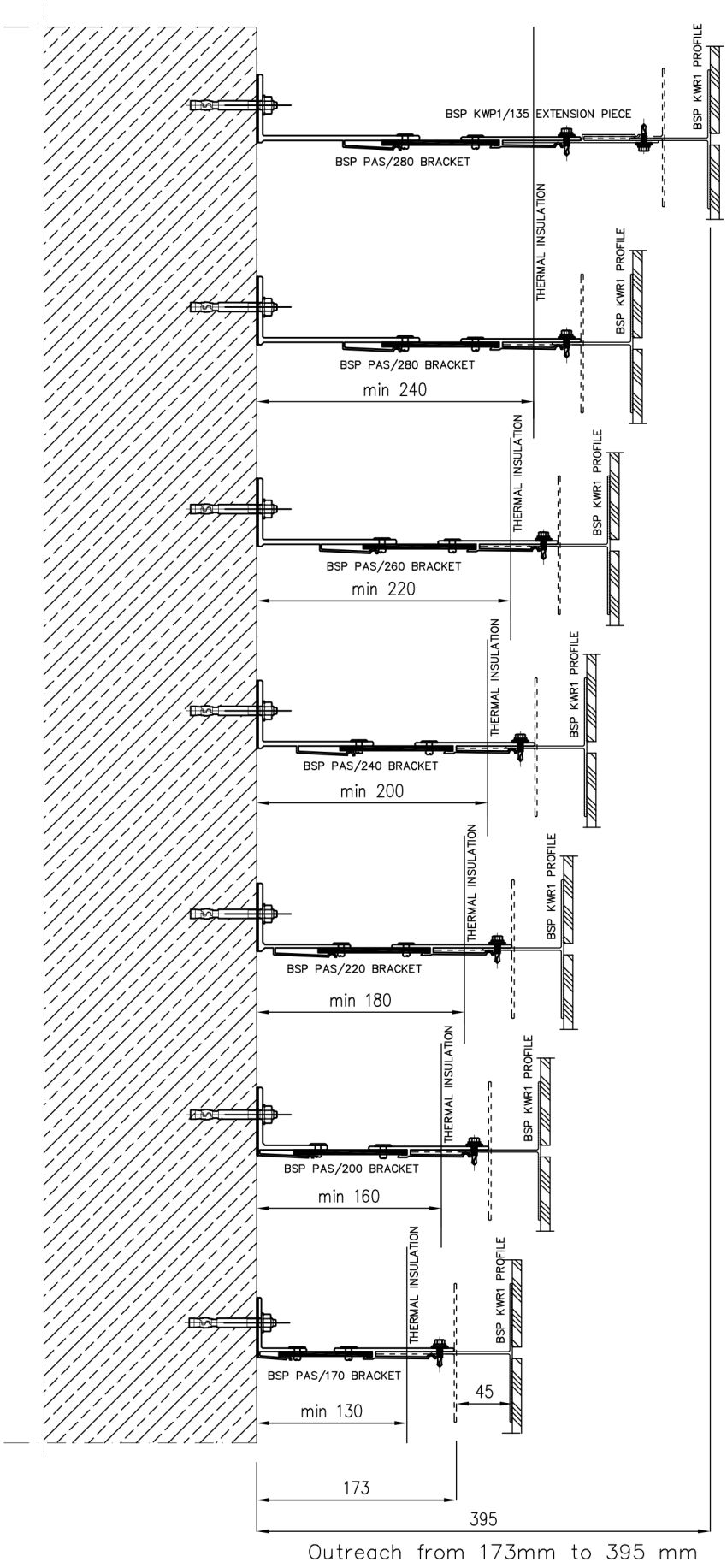








EXAMPLE APPLICATIONS OF PASSIVE BRACKETS



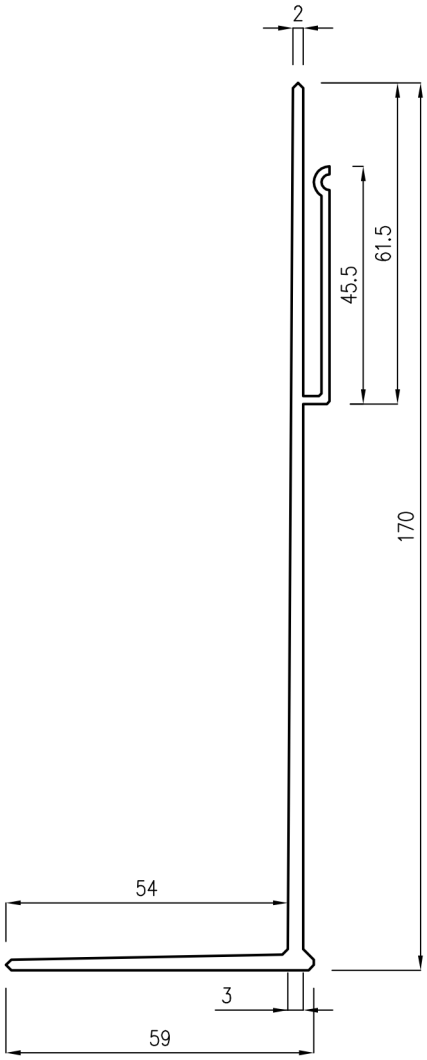
ECO BRACKET SYSTEM

Through in-depth research and analyses, BSP has developed a new cost-effective engineered solution with an extruded aluminum substructure designed for fixing façade cladding panels. The ECO BRACKET range consists of brackets with 170 mm outreach, available in five lengths. Variable wall thickness of the brackets is intended to maximise load capacity and optimise material consumption.

NOTE: BSP recommends ECO BRACKETS for buildings that are up to 12 m high.

BRACKET – KW1 EB

ECO BRACKET	A	B
KW1 EB/170-150 FIX/LOS	170	150
KW1 EB/170-120 FIX/LOS	170	120
KW1 EB/170-90 FIX/LOS	170	90
KW1 EB/170-60 FIX/LOS	170	60
KW1 EB/170-40 FIX/LOS	170	40



ECO BRACKET PROFILE – KWR9

While developing the ECO BRACKET system, we applied solutions proven in the BSP substructure design, including grooved surface of profiles to facilitate water and moisture drainage from the space between the cladding panel and the subframe. Now, the range also includes an asymmetrical T-shaped profile, which is a unique solution to facilitate panel installation.

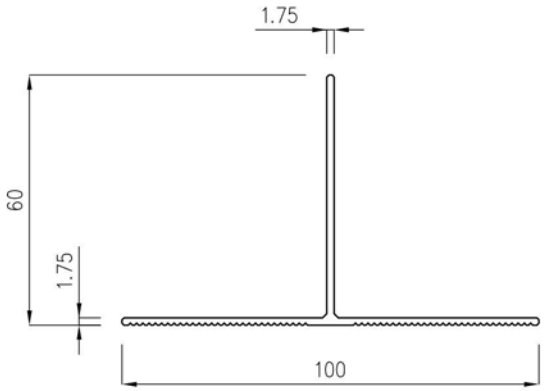
Load-bearing profiles made of extruded aluminum feature an optimum wall thickness and can be used in all places where the aluminum structure is not required to transfer considerable loads.

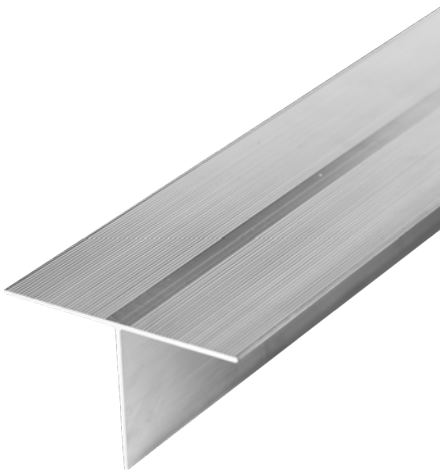
NOTE: BSP recommends ECO BRACKET PROFILES for buildings that are up to 25 m high.

Profile

ECO BRACKET – KWR9 profile,
straight length 3100 mm

Ix	8,421 cm^4
Wx	1,773 cm^3
Area	2,627 cm^2
Iy	13,179 cm^4
Wy	2,636 cm^3
Mass	0,712 kg/linear metre



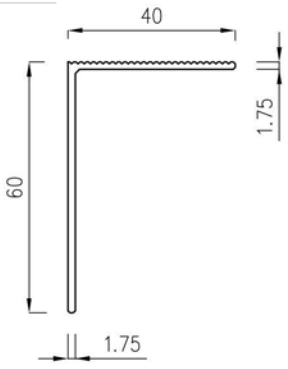


ECO BRACKET PROFILE – KWR10

Profile

ECO BRACKET – KWR10 profile,
straight length 3100 mm

Ix	6,354 cm^4
Wx	1,561 cm^3
Area	1,654 cm^2
Iy	2,266 cm^4
Wy	0,712 cm^3
Mass	0,448 kg/linear metre

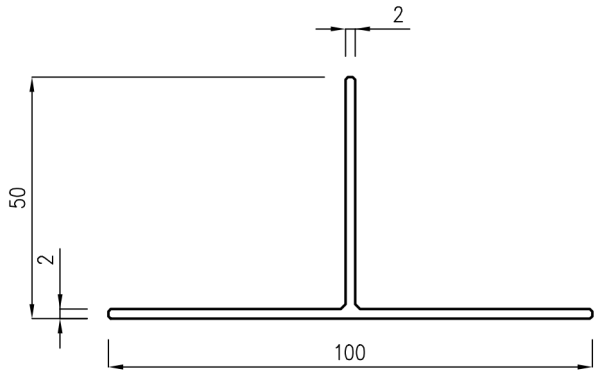


PROFILE – KWR3

Profile

KWR3, straight length 3000 mm

Ix	5,864 cm^4
Wx	1,432 cm^3
Area	2,963 cm^2
Iy	16,546 cm^4
Wy	3,309 cm^3
Mass	0,803 kg/linear metre

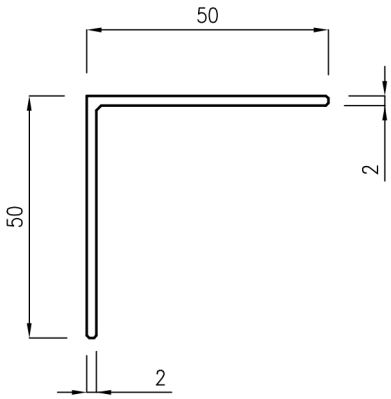


PROFILE – KWR4

Profile

KWR4, straight length 3000 mm

Ix	4,908 cm^4
Wx	1,335 cm^3
Area	1,960 cm^2
Iy	4,908 cm^4
Wy	1,335 cm^3
Mass	0,531 kg/linear metre

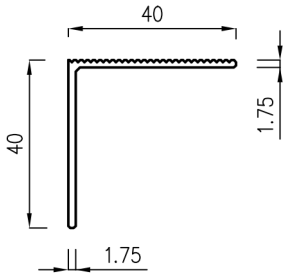


ECO BRACKET PROFILE – KWR7

Profile

KWR7, straight length 3100 mm

Ix	2,092 cm4
Wx	0,724 cm3
Area	1,304 cm2
Iy	2,027 cm4
Wy	0,679 cm3
Mass	0,353 kg/linear metre

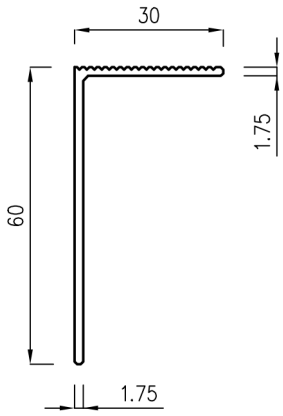


ECO BRACKET PROFILE – KWR11

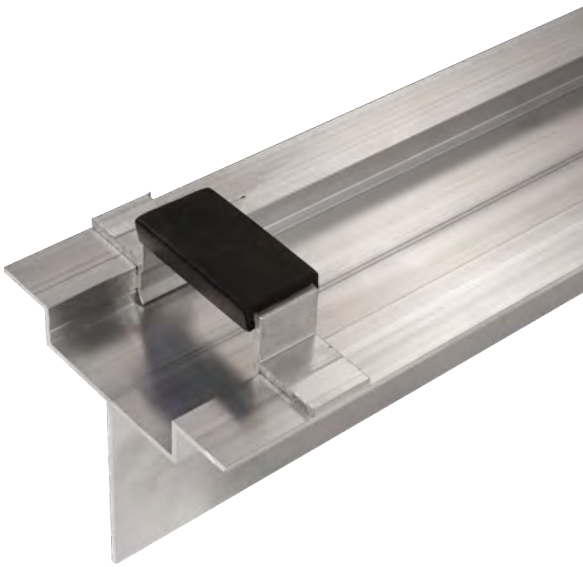
Profile

KWR11, straight length 3100 mm

Ix	5,767 cm^4
Wx	1,488 cm^3
Area	1,497 cm^2
Iy	1,003 cm^4
Wy	0,407 cm^3
Mass	0,406 kg/linear metre



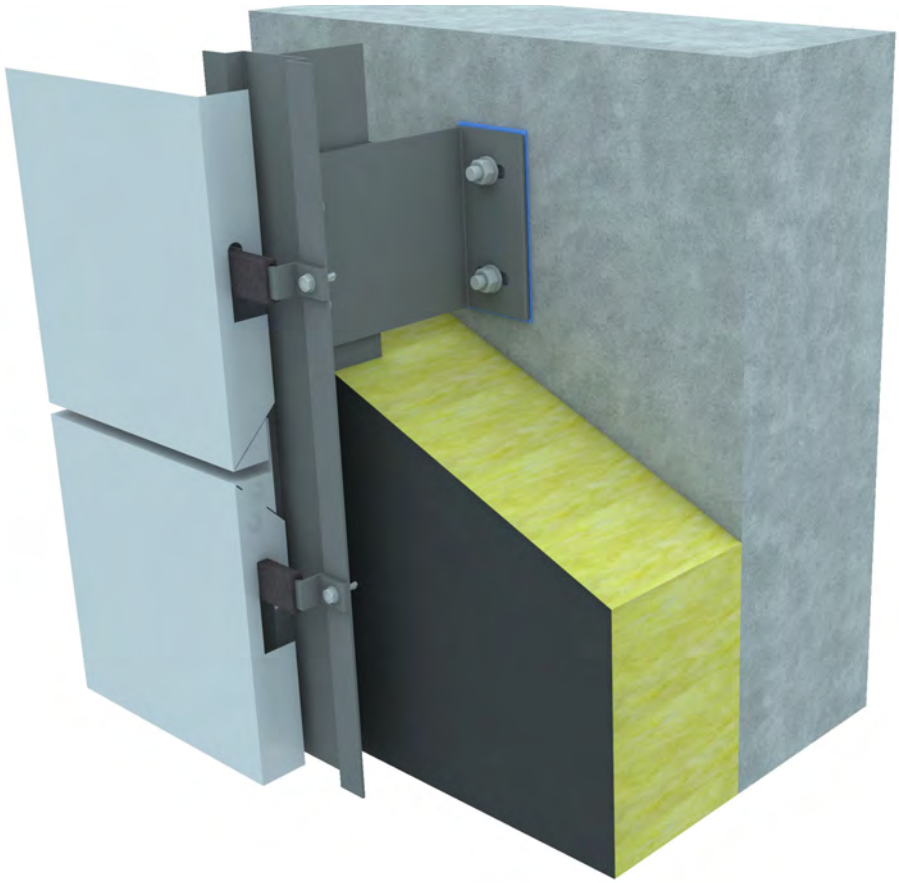
HANGING SYSTEM – KWRY



The system consists of two size versions of the Y-type profile, KWRY50 and KWRY80, and a dedicated hanging element with a gasket used to hang composite panels or cassettes made of metal sheets.

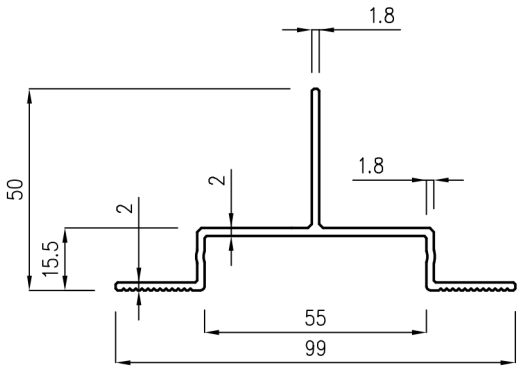
The aluminum substructure manufactured by BSP consists of fixing brackets and the main profile. Both brackets and profiles have been designed only for the ventilated façade. This feature is distinctive among other competitors on the market.

The KWRY profile, commonly referred to as the "Y-type", combines the advantage of the omega shape, i.e. a deep joint so expected from composite panels, and a single foot used for fixing to the KW bracket. With its design, the Y-type profile is rigid. When combined with robust KW brackets, a lower number of supports is needed.



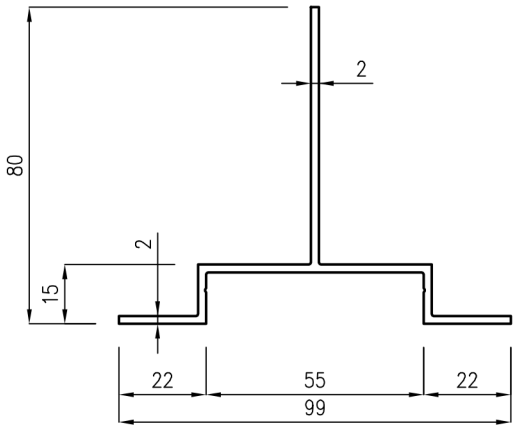
PROFILE – KWRY50

Ix	4,3421 cm^4
Wx	1,195 cm^3
Area	3,024 cm^2
Iy	18,992 cm^4
Wy	3,837 cm^3
Mass	0,819 kg/linear metre



PROFILE – KWRY80

Ix	18,639 cm^4
Wx	3,197 cm^3
Area	3,800 cm^2
Iy	20,392 cm^4
Wy	4,120 cm^3
Mass	1,025 kg/linear metre



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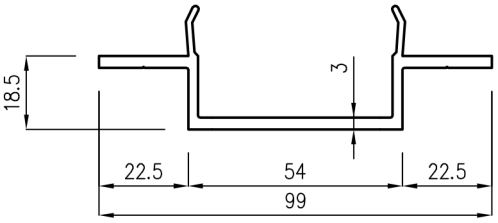
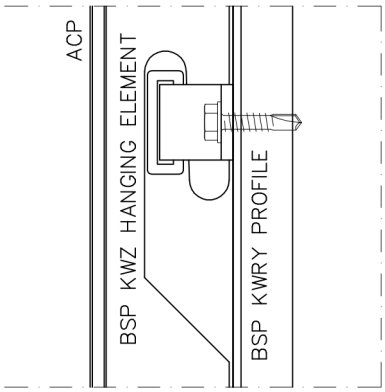
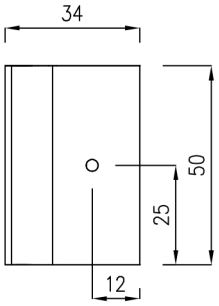
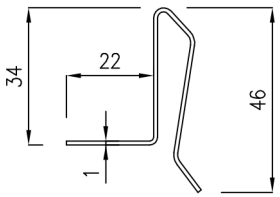
HANGING ELEMENT – KWZ

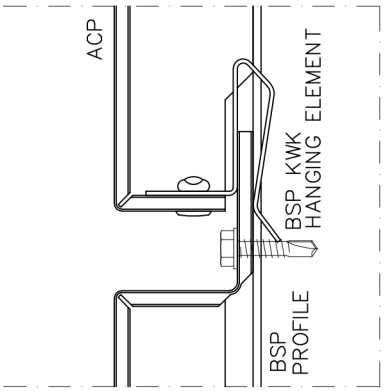




HANGING ELEMENT – KWK

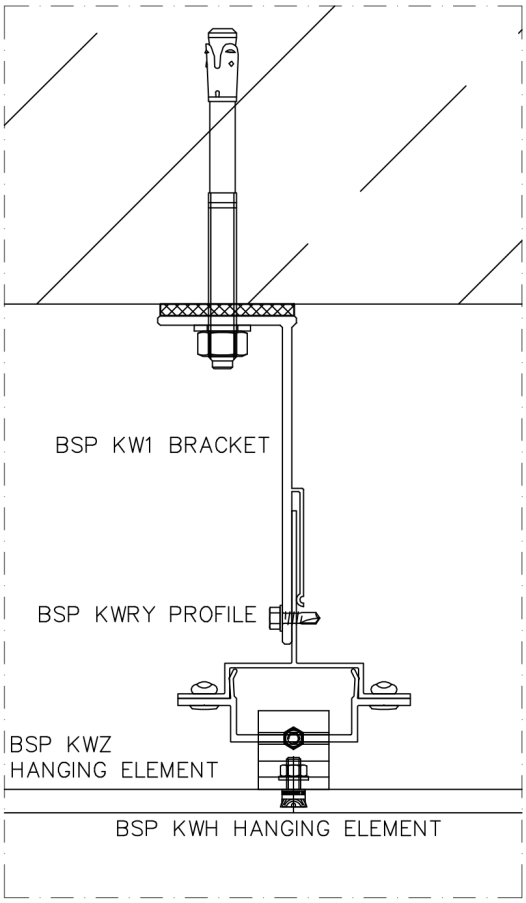


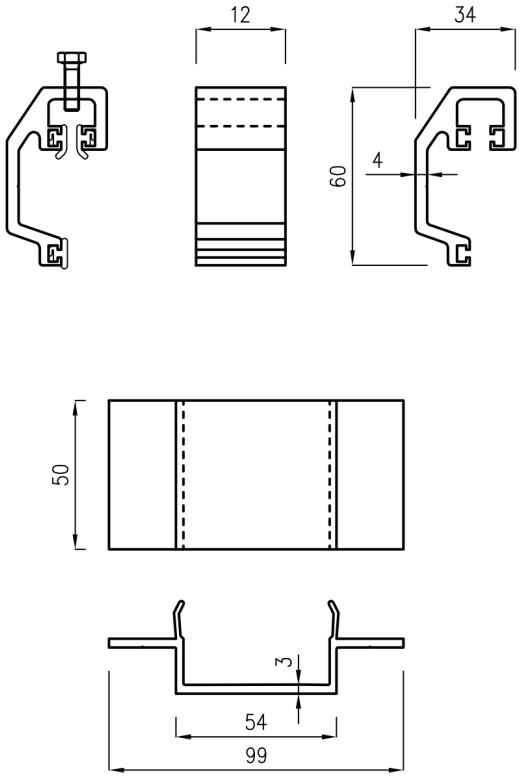


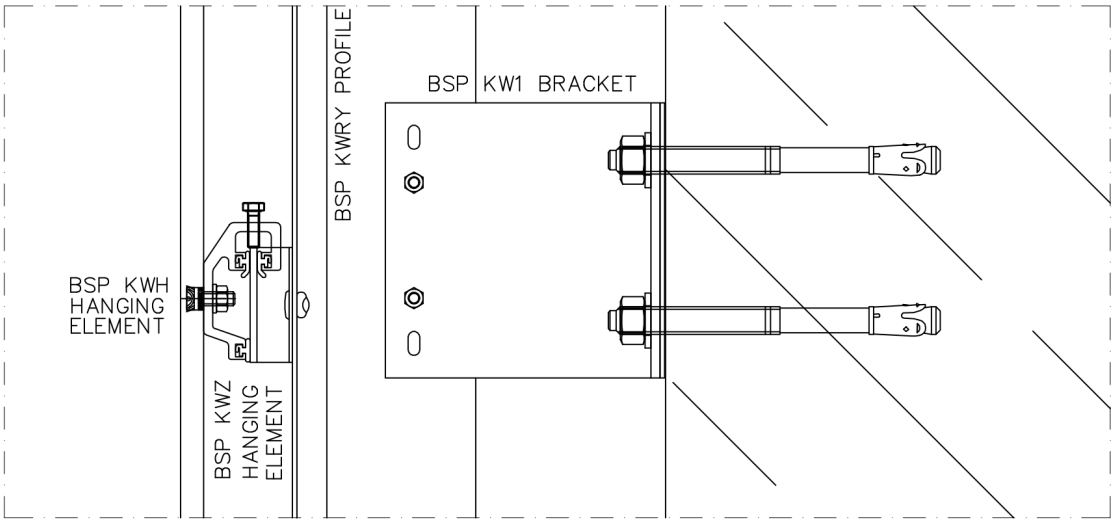


HANGING SYSTEM – KWH

The KHW hanging system is used for the concealed fixing of external façade panels with undercut anchors. The system features a high load capacity to make it possible to fix heavy panels, e.g. stone or architectural concrete panels.

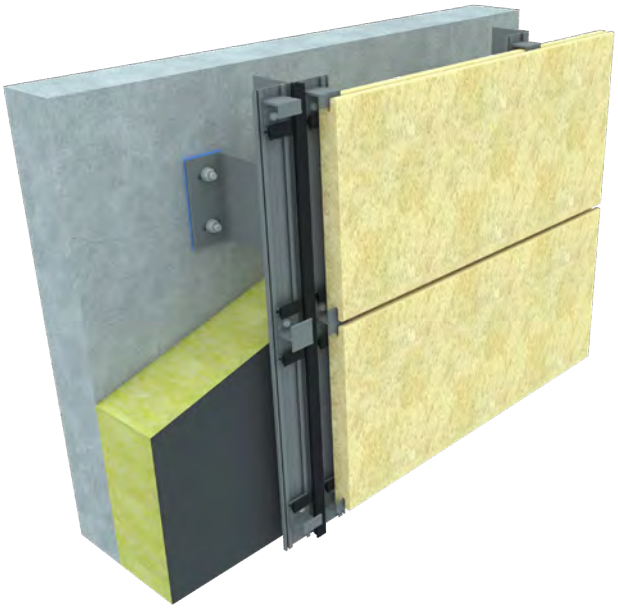






HANGING SYSTEM – KCS

The KCS system has been developed for ventilated façades based on ceramic, stone and glazed panels. The system can be used to fix panels of different thicknesses with the adjustment gasket. In addition, a specially designed guide rail in vertical profiles facilitates the fixing of hanging elements and provides horizontal alignment.

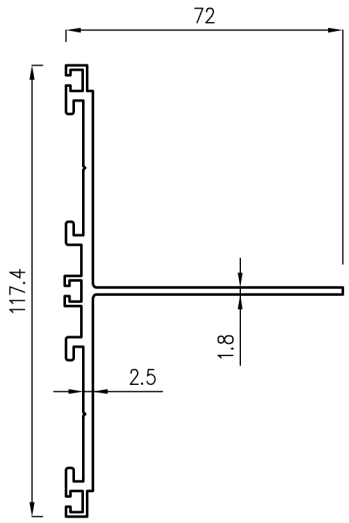


SUBSTRUCTURE SYSTEM FOR CERAMIC AND STONE CLADDING

Hanging element

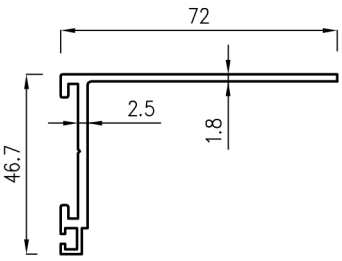
End-piece for ceramics and stone KC1 | Intermediate piece for ceramics and stone KC2

KCT



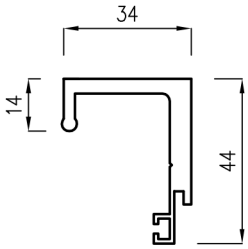
Ix	15,309 cm⁴
Wx	2,573 cm³
Area	5,134 cm²
Iy	43,667 cm⁴
Wy	7,439 cm³
Mass	1,386 kg/linear metre

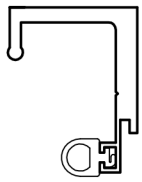
KCL



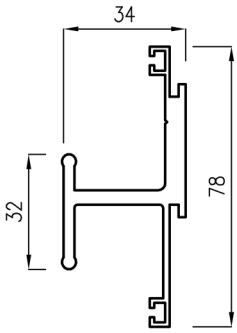
Ix	12,288 cm⁴
Wx	2,349 cm³
Area	2,699 cm²
Iy	6,472 cm⁴
Wy	1,932 cm³
Mass	0,729 kg/linear metre

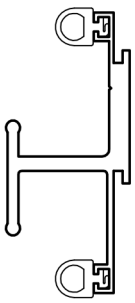
KC1

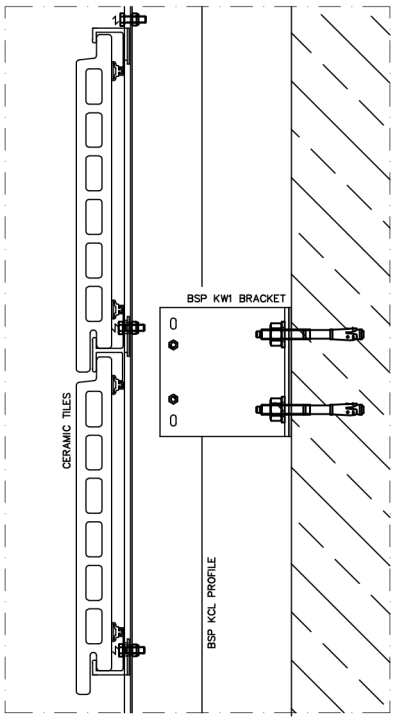


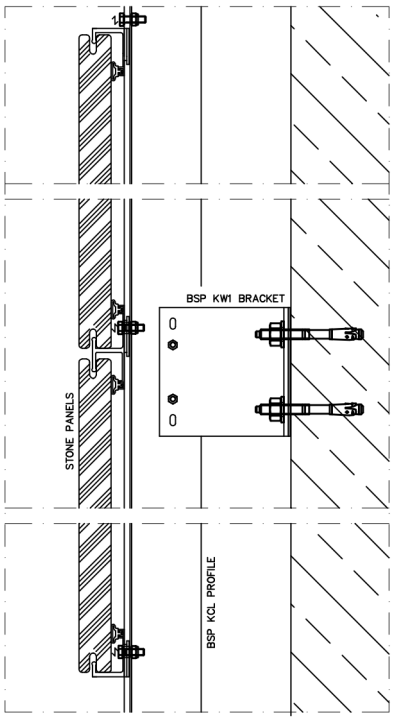


KC2



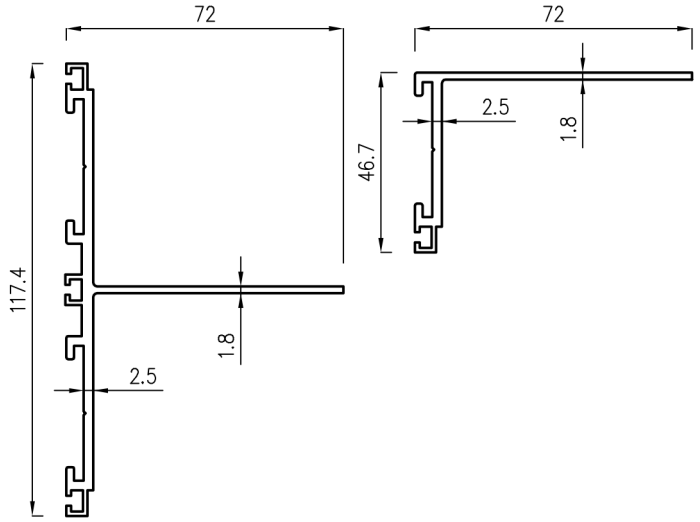


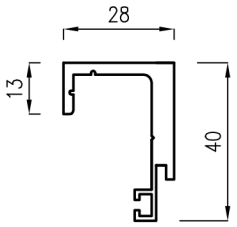


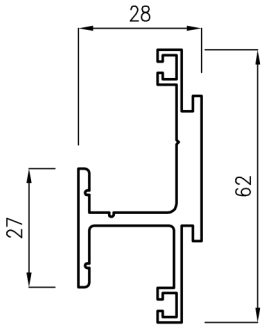


SUBSTRUCTURE SYSTEM FOR GLAZED CLADDING

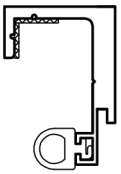
KCT	KCL	Hanging element	Engineered profile
		End-piece for glazing KC3	T-shaped profile - KCT
		Intermediate piece for glazing KC4	L-shaped profile - KCL



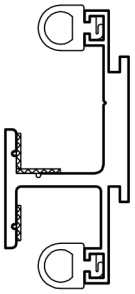


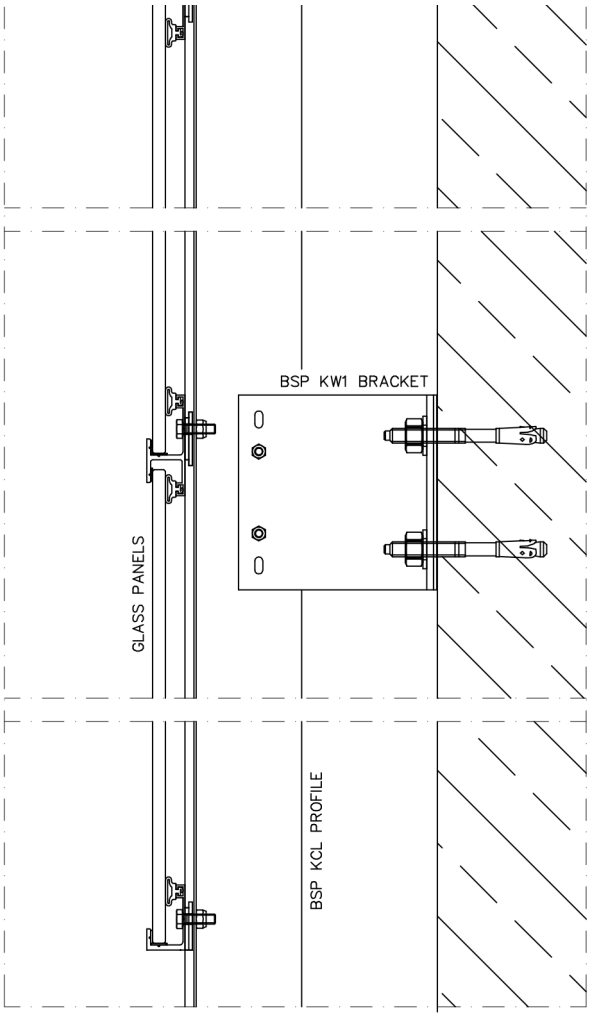


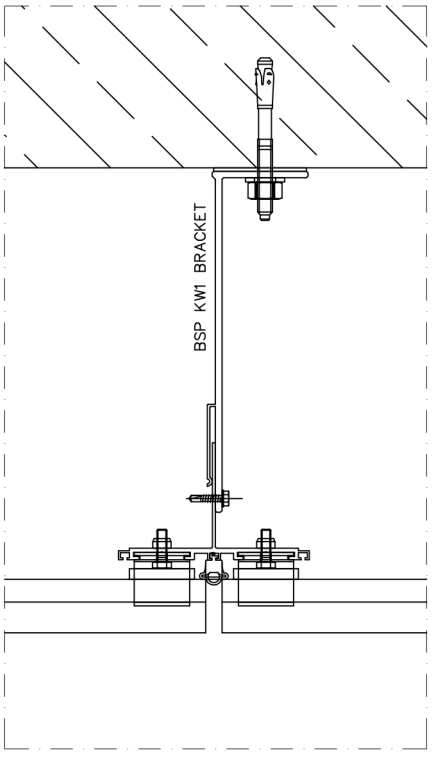
KC3



KC4







HANGING SYSTEM – KWRW AND KWRZ

The BSP hanging system is suitable for precise fixing of GRC, fibre-cement and other types of cladding panels – used both inside and on external walls. The hanging system can be adjusted vertically within 10 mm. Vertical adjustment is performed with an adjusting screw and a nut set in a dedicated guide channel. The installer is aided by marks that indicate pre-drilling spots on the profile.

Another advantage of the BSP hanging system is problem-free detachment and re-attachment of the panels, without risking any damage to the panel or the substructure.

The system is available for installation in two configurations:

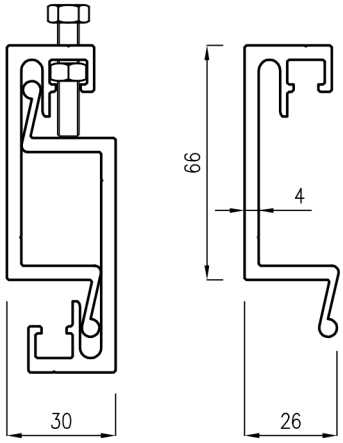
- When it is not required to remove wall unevenness and use insulation, the KWRW/KWRZ load-bearing profile is fixed directly to the wall, while the hanging element is fixed directly to the backside of the cladding panel with adhesive or undercut anchors.
- On the walls that require thermal insulation, additional vertical load-bearing profiles are used, fixed to the wall with KW1 brackets. Later KWW/KWRZ load-bearing profiles are installed and used to hang cladding panels.

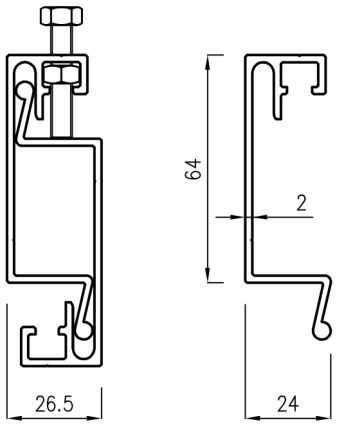
KWRZ

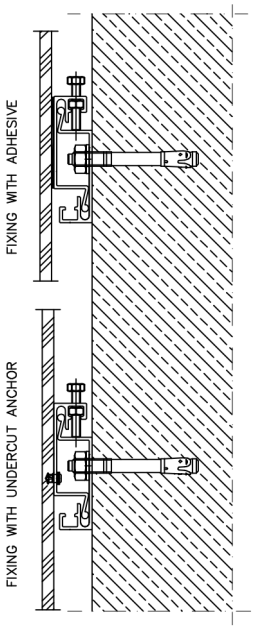
Ix	40,294 cm^4
Wx	8,270 cm^3
Area	5,781 cm^2
Iy	4,539 cm^4
Wy	2,753 cm^3
Mass	1,561 kg/linear metre

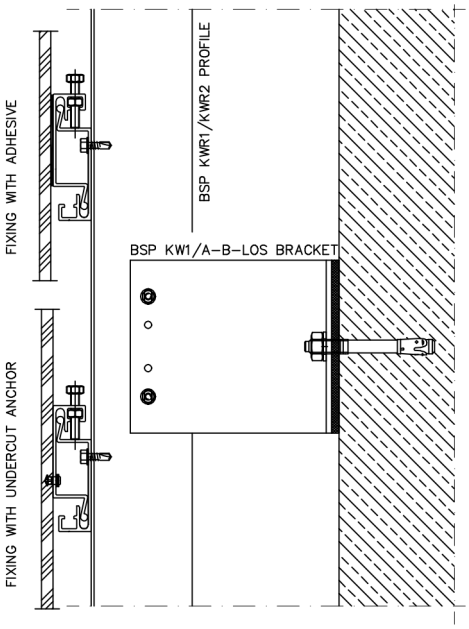
KWRW

Ix	23,223 cm^4
Wx	4,971 cm^3
Area	3,154 cm^2
Iy	2,251 cm^4
Wy	1,522 cm^3
Mass	0,852 kg/linear metre

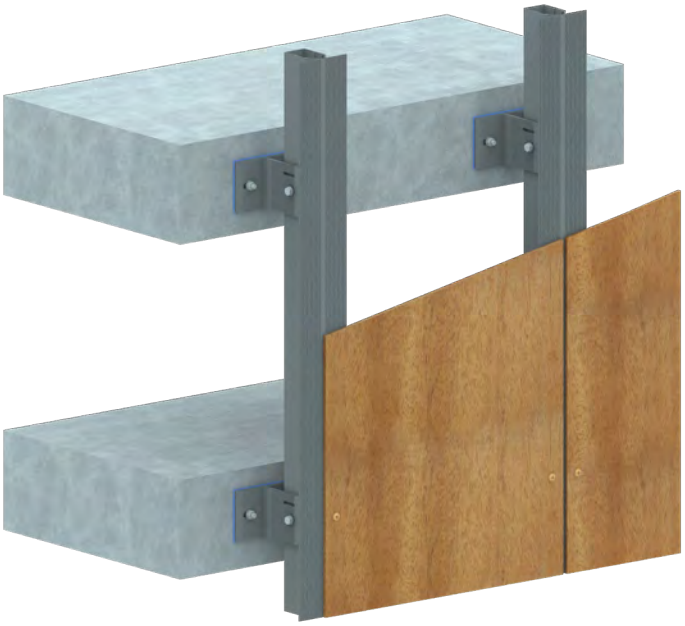








BSP FLOOR-TO-FLOOR SYSTEM



BSP FTF (floor-to-floor) system has been designed to minimise the number of fixing points between the façade and the wall of a building.

The essence of the BSP FTF system is the increased installation span of brackets, mostly between floor slabs. The brackets are fixed to building's structural members, most frequently to the front face of the floor slab.

The high-strength parameters of the K1 and K2 brackets meet strict requirements relating to load capacity and rigidity of support elements that can transfer considerable stresses caused by the arrangement of fixing points on only one level of individual floor slabs.

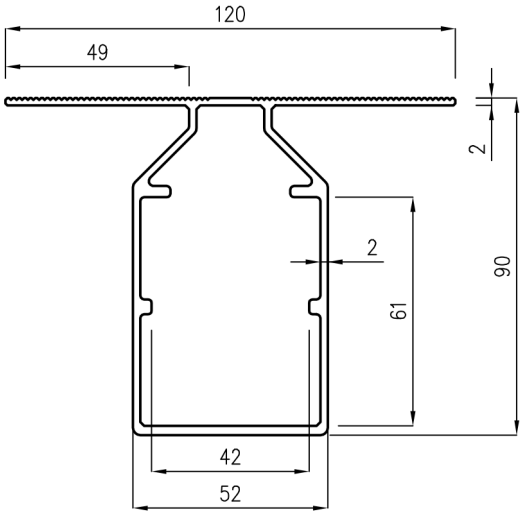
KWR6 vertical profiles in the BSP FTF system are structurally reinforced to ensure safe transfer of increased loads caused by wind, wherein the maximum deflection of the profile will not exceed the critical value. An undoubted advantage of the KWR6 load-bearing profiles is their specially-shaped grooved exterior surface that considerably improves joint durability at the contact with the external cladding.

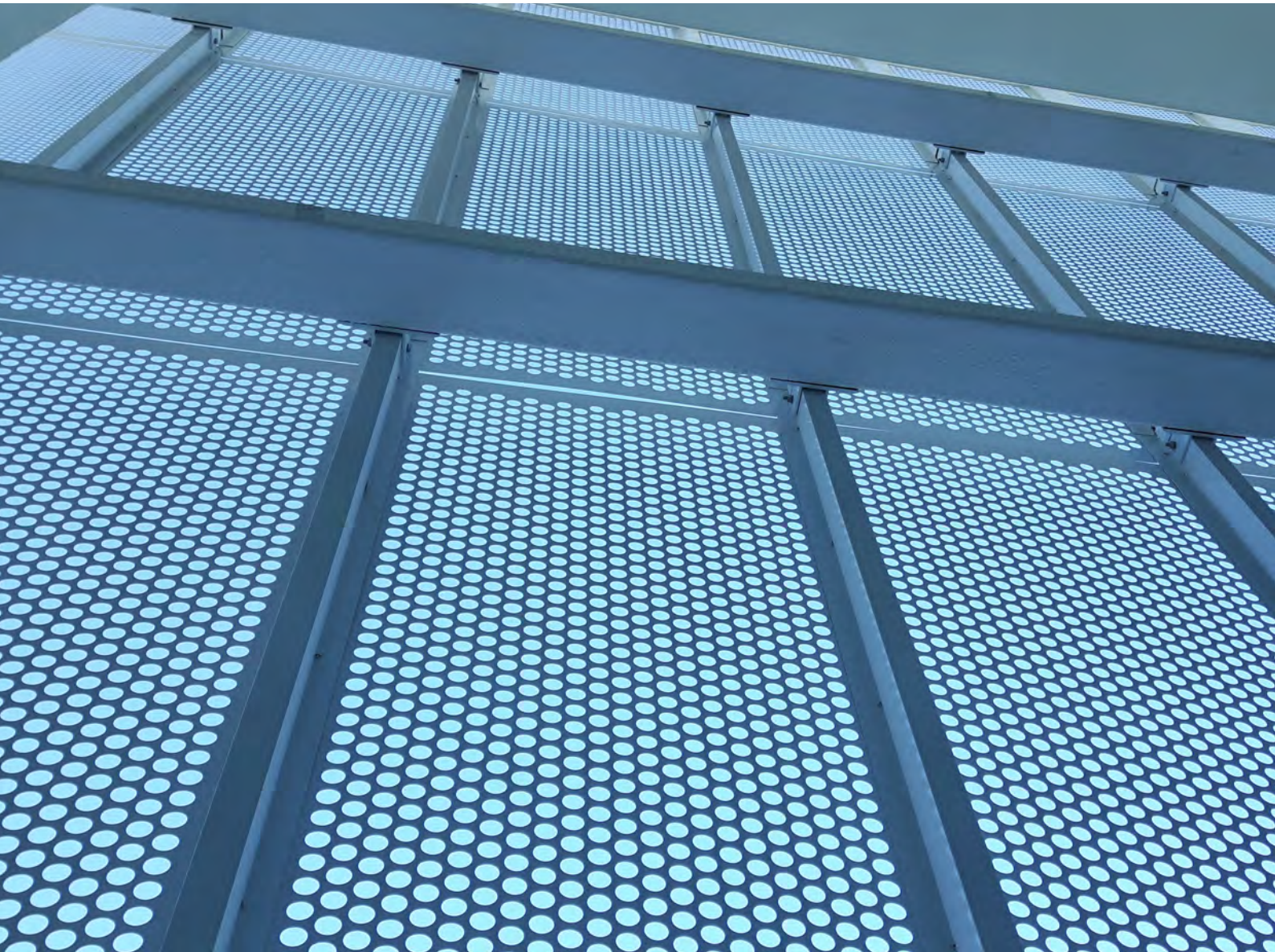
Advantages of the BSP FTF system:

- Less fixing brackets and therefore considerably reduced occurrence of thermal bridges.
- Reduced number of brackets means shorter installation of the substructure.
- Brackets are fixed to the building's load-bearing members, mostly those made of reinforced concrete, which facilitates installation and allows the use of standard anchors instead of expensive chemical anchoring.

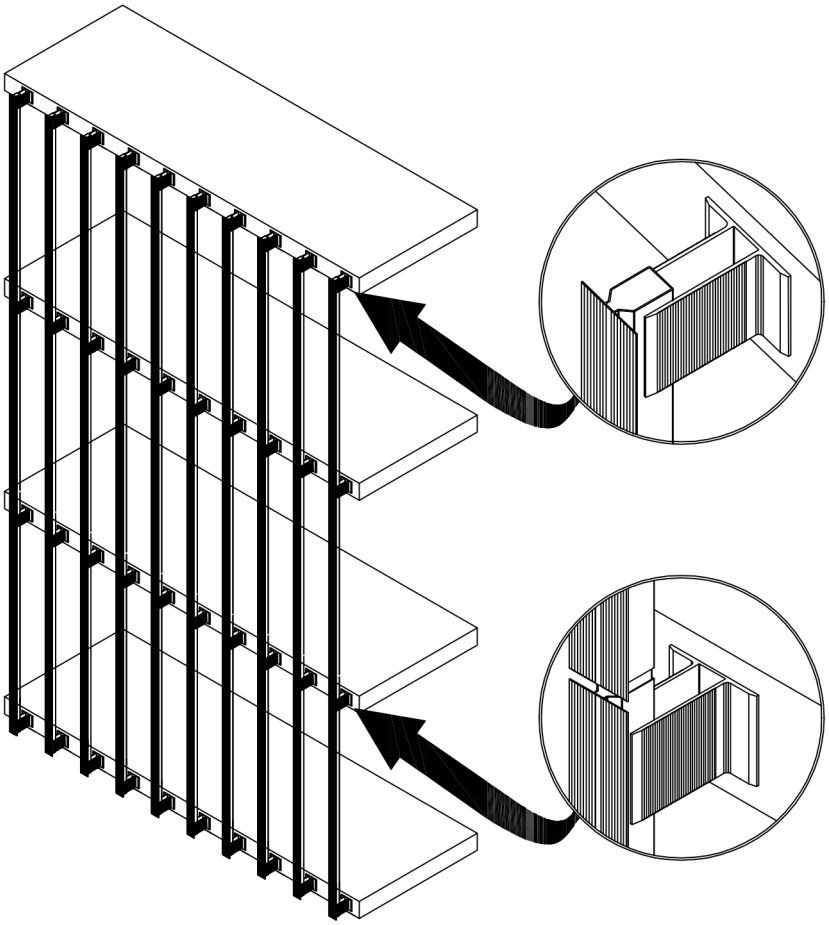
PROFILE – KWR6

Ix	95,865 cm^4
Wx	17,540 cm^3
Area	8,536 cm^2
Iy	58,829 cm^4
Wy	9,805 cm^3
Mass	2,305 kg/linear metre

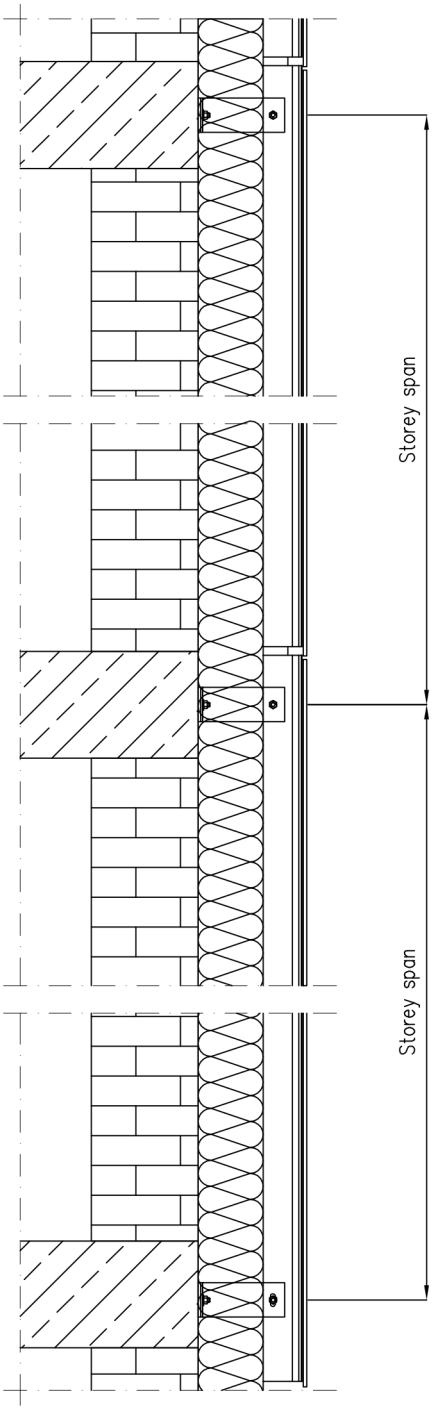


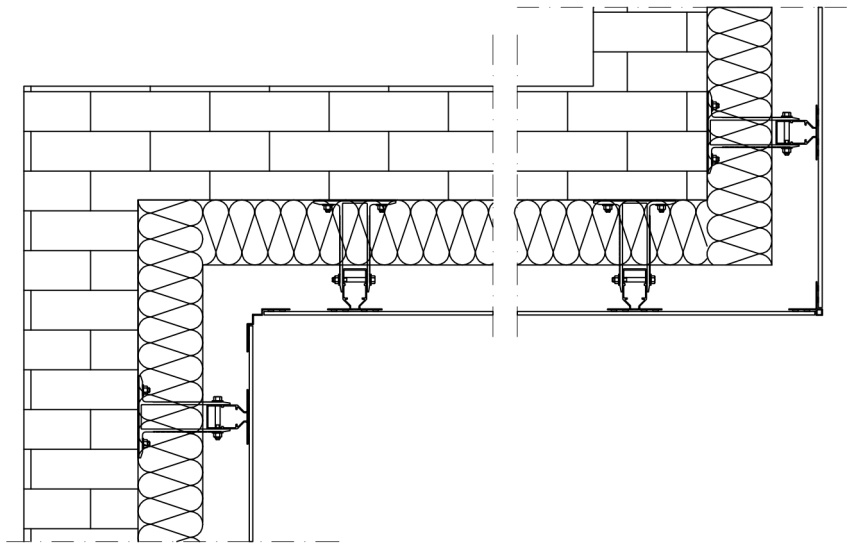


CROSS-SECTIONS AND MODELS



3D model



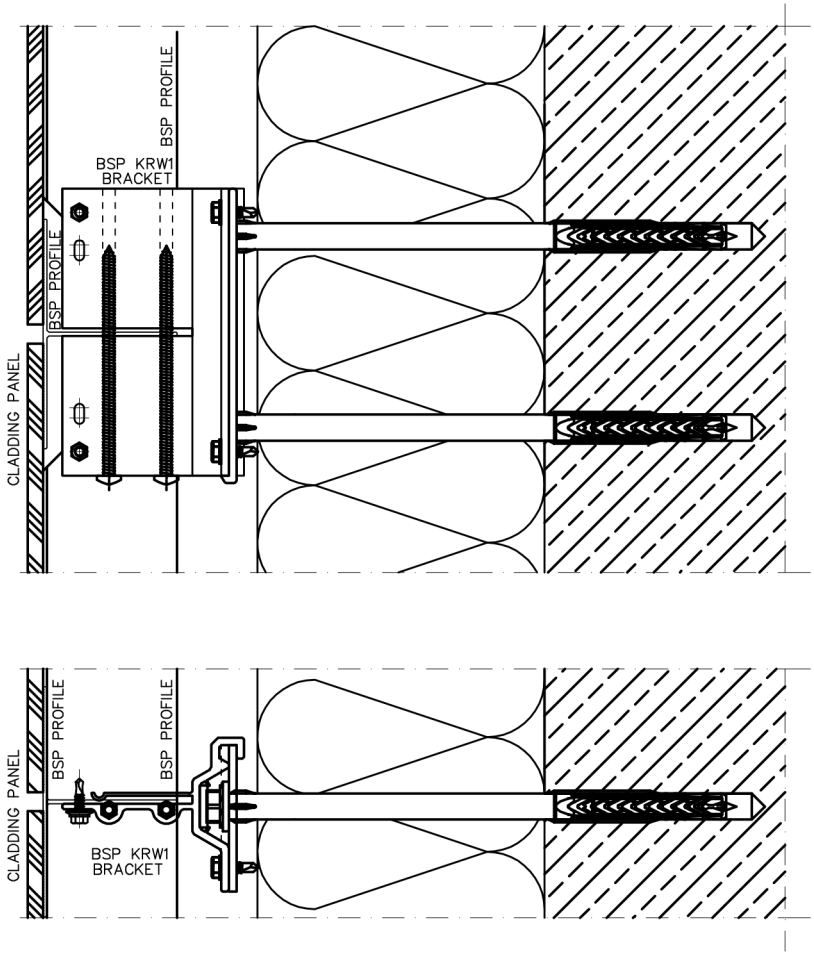


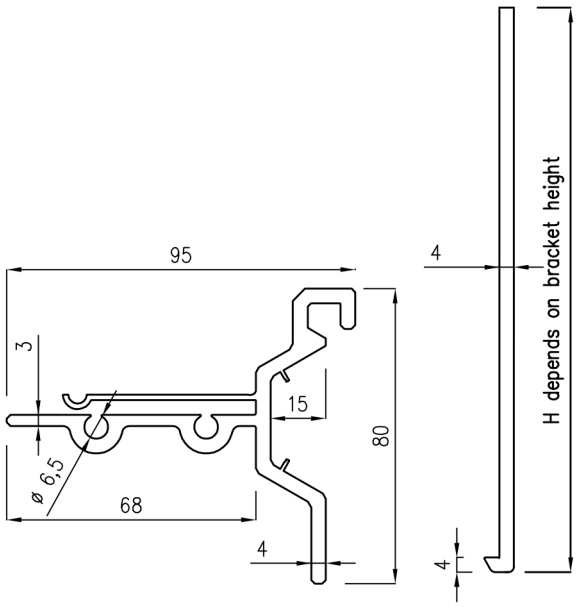
KRW SYSTEM

The KRW rod-based system has been designed for uneven walls, soft insulation and high technical requirements. The main advantage of the system is that installation is completed after wool application. The system consists of two aluminum elements installed with a screw/plug. The aluminum elements do not puncture or rest on insulation. The entire load capacity comes from screws/plugs. Once the appropriate diameters are selected, even the heaviest panels can be hung.

PASSIVE SOLUTIONS

BRACKET – KRW1

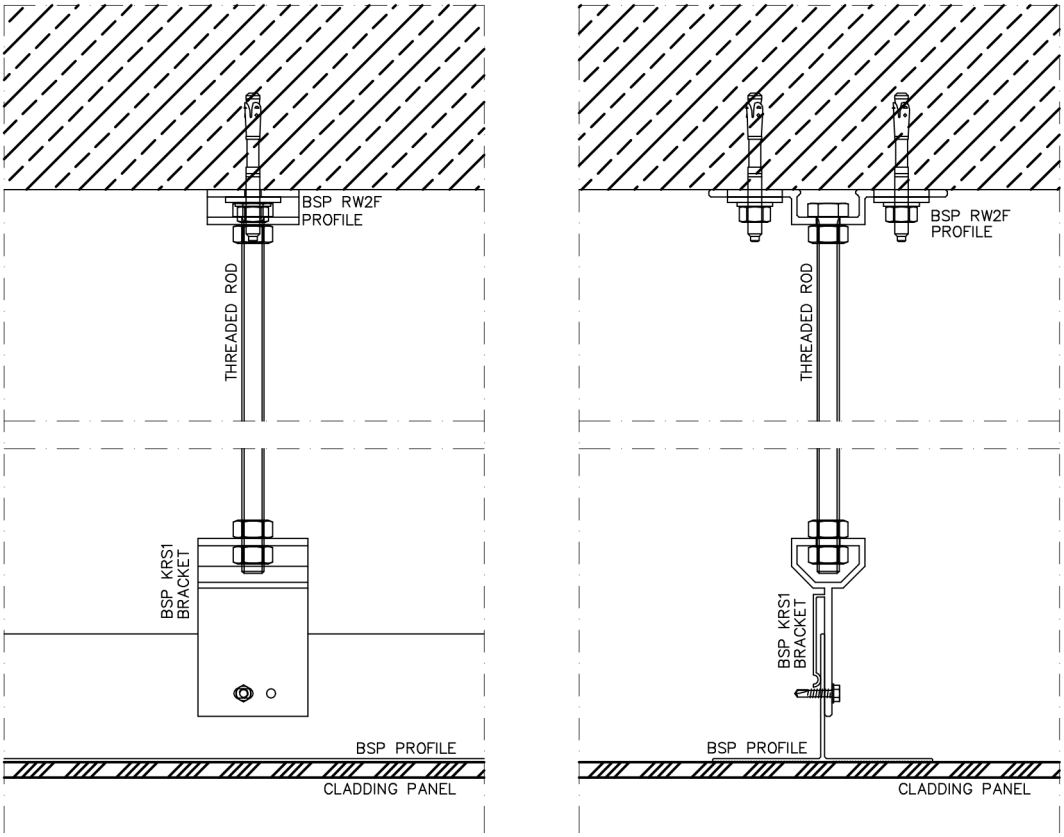




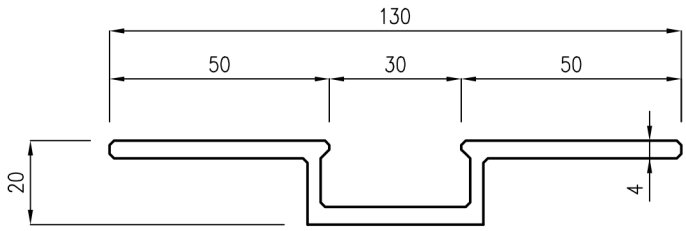
KRS SYSTEM

The BSP aluminum substructure in the KRS system is perfect for installation of suspended ceilings. The following drawings show suspended ceiling panels profiles fixed with threaded rods. The presented system can be used for both short and long suspensions (exceeding 2 m.)

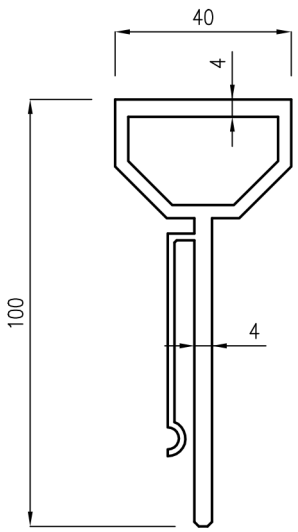
PASSIVE SOLUTIONS

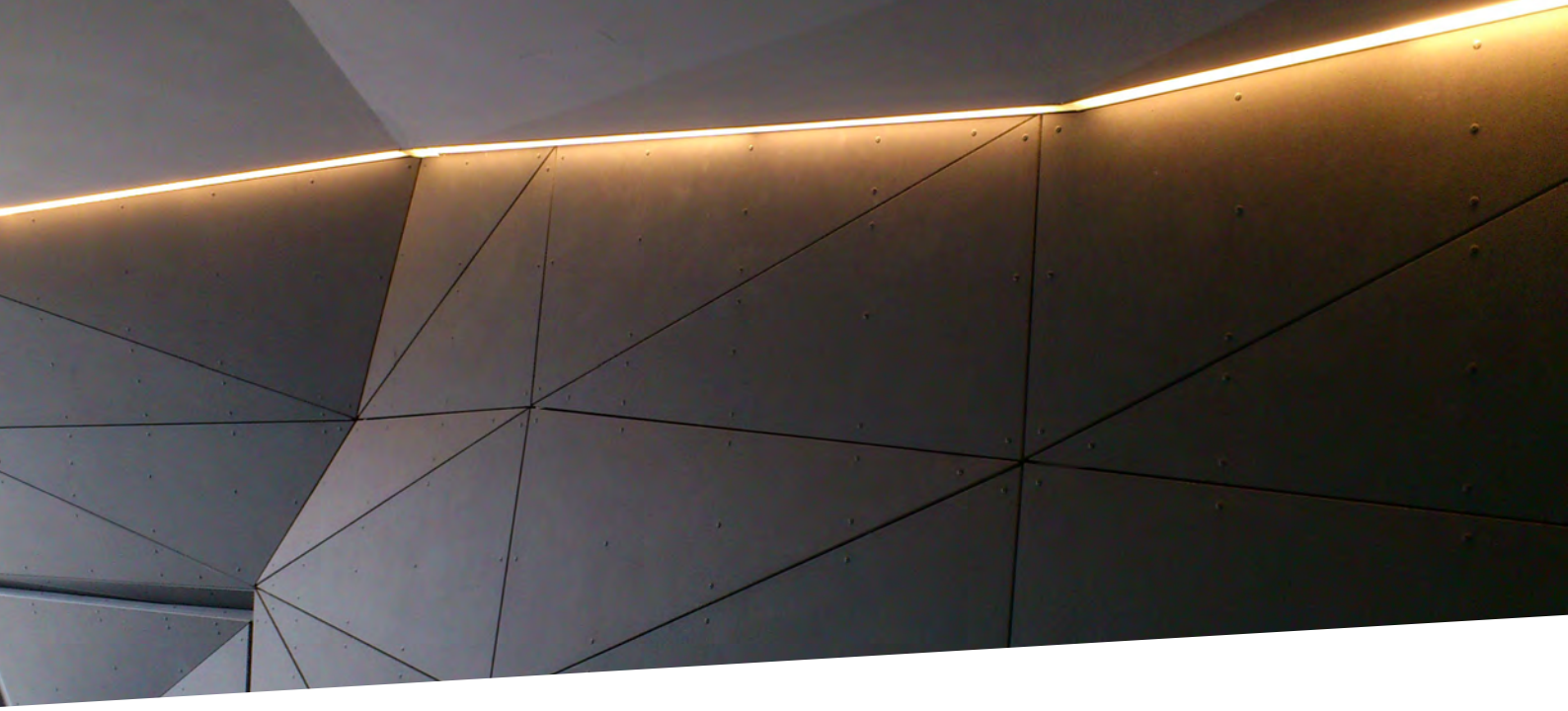


PROFILE – RW2F



BRACKET – KRS1





INTERNAL LININGS

More and more often, architects and investors design cladding panels inside buildings. For this purpose, BSP has developed a few systems for internal installation. Whether panels are installed on old plastered or newly-constructed walls, it is possible to use systems ensuring plane adjustment. Depending on panel mass, it is possible to mix various systems or use only one.

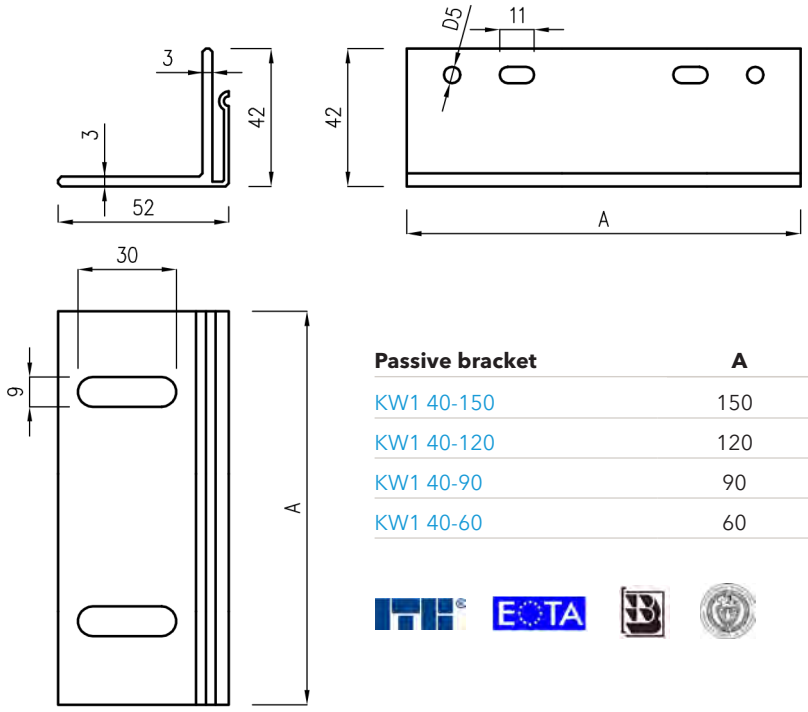
BSP offer includes three internal fixing systems:

1. KW1 system – KW1/40 bracket + KWR5 and KWR8 profiles.

2. Omega system (featuring different outreaches) installed directly on the wall.

3. The KWRW system is fixed directly on gypsum plasterboards or to the substructure.

BRACKET - KW1



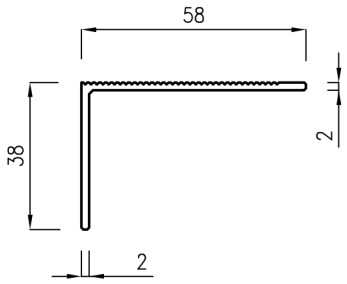
Passive bracket	A
KW1 40-150	150
KW1 40-120	120
KW1 40-90	90
KW1 40-60	60

The KW1/40-A bracket with the KWR5 and KWR8 profiles is used to fix internal panels in places where additional thermal insulation is not required.

The bracket with a profile provides outreach adjustment within 45 to 90 mm. With this solution, the panels can be fixed with rivets or adhesive.

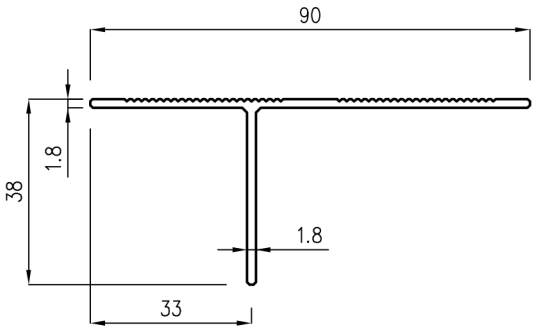
PROFILE - KWR5

Ix	2,305 cm^4
Wx	0,785 cm^3
Area	1,794 cm^2
Iy	6,454 cm^4
Wy	1,607 cm^3
Mass	0,486 kg/linear metre



PROFILE - KWR8

Ix	2,325 cm^4
Wx	0,741 cm^3
Area	2,164 cm^2
Iy	10,879 cm^4
Wy	2,236 cm^3
Mass	0,587 kg/linear metre

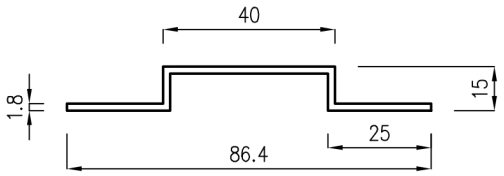


OMEGA PROFILES TYPE RW2

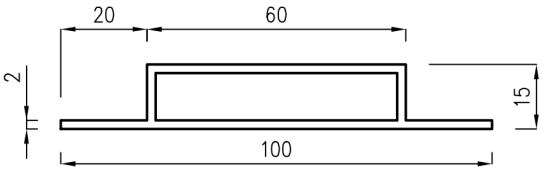
The RW2 profiles cannot be adjusted. If deviations of wall construction are sufficiently negligible so that an adjustable subframe is not required, the panels can be fixed directly to the RW2 profiles.

Omega profile	A	B	C	Thickness
RW2A	40	15	25	1,8
RW2B	60	15	20	2,0
RW2C	50	50	23	2,5/2,0
RW2D	30	25	15	2,0
RW2E	50	30	25	2,0

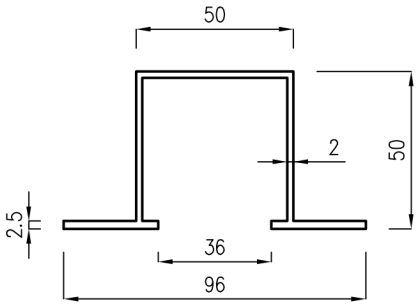
RW2A



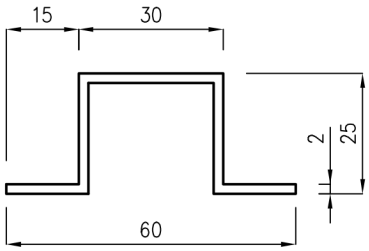
RW2B



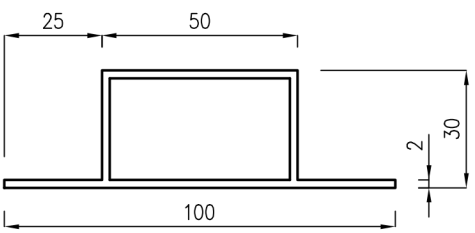
RW2C



RW2D



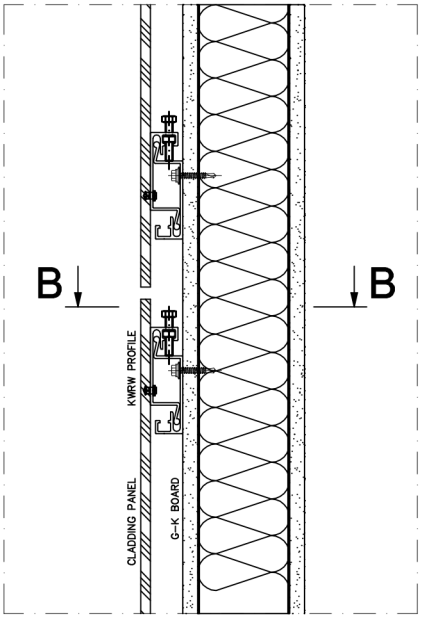
RW2E

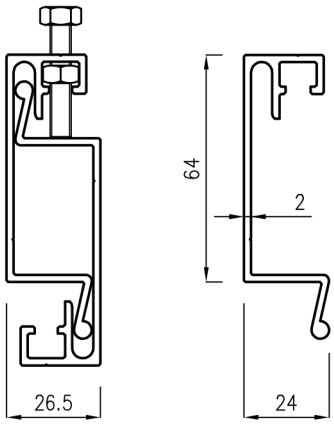


PROFILE – KWRW

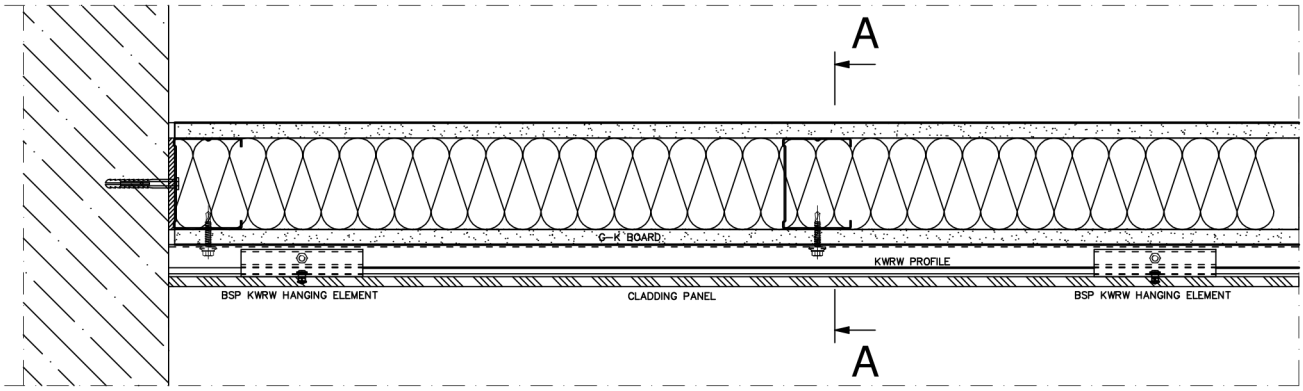
The KWRW profile is fixed directly to gypsum board walls or the wooden frame. It can be used to fix all types and sizes of panels without being restricted to the presence of the supporting wall structure. The installation of continuous elements to the wall in places of vertical structures stiffens the frame and provides very good support for the hanging element. The element can be fixed to panels with special anchors or adhesive systems. Suspended panels can be freely slid and removed to facilitate the installation. The panel can be fixed in place with a concealed screw. The system is used in shopping centres, offices, training facilities and at airports.

A-A





B-B

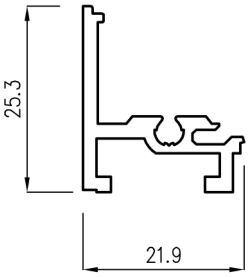


OTHER SOLUTIONS

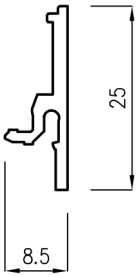
BALCONY PARTITION SYSTEM – KRP

The system, comprised of KRP1 and KRP2 aluminum profiles, is used to fix balcony partitions – both with HPL and glass filling. It can be used to fix the panel in an individually-designed stiffening structure in an aesthetic manner, without visible screws or rivets, using the snap fastener principle. Aluminum elements are optimised in terms of shape and mass, which results in a low cost and easy installation.

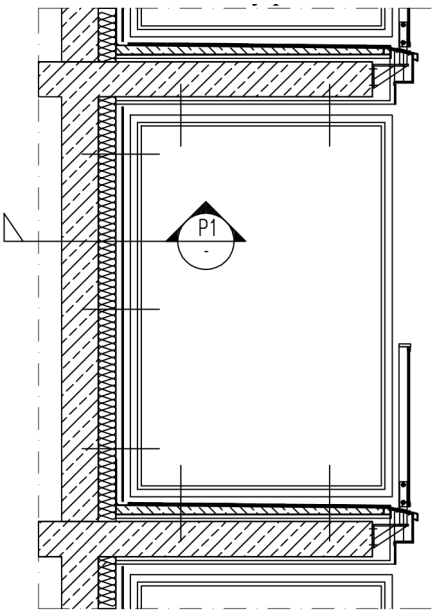
PROFILE – KRP1



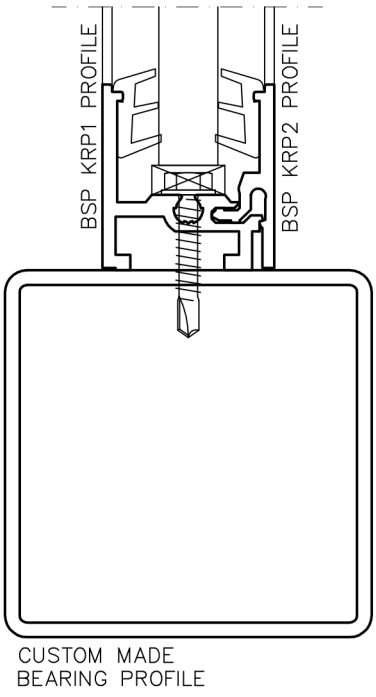
PROFILE – KRP2



VIEW OF THE BALCONY PARTITION



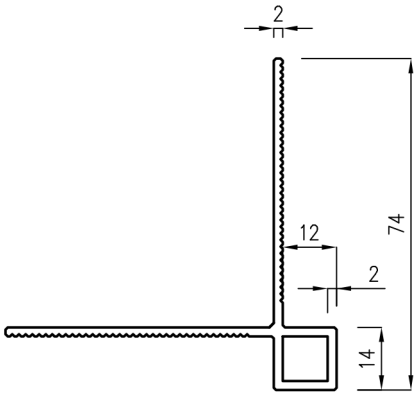
P1 CROSS-SECTION



PROFILE – KWN1

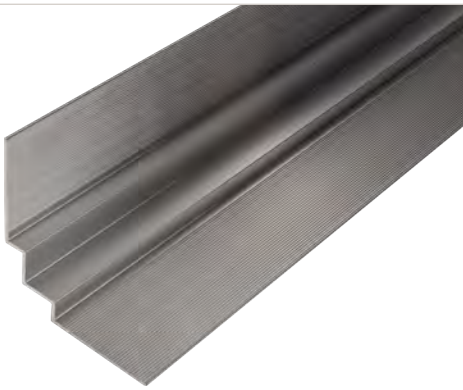
Outward corner

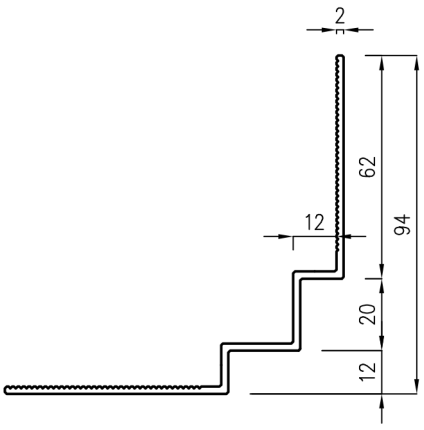
In all places requiring high aesthetics of corner decorative profiles are used to conceal expansion joints.



PROFILE – KWN2

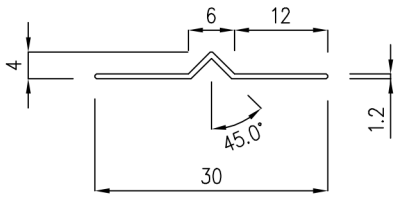
Inward corner



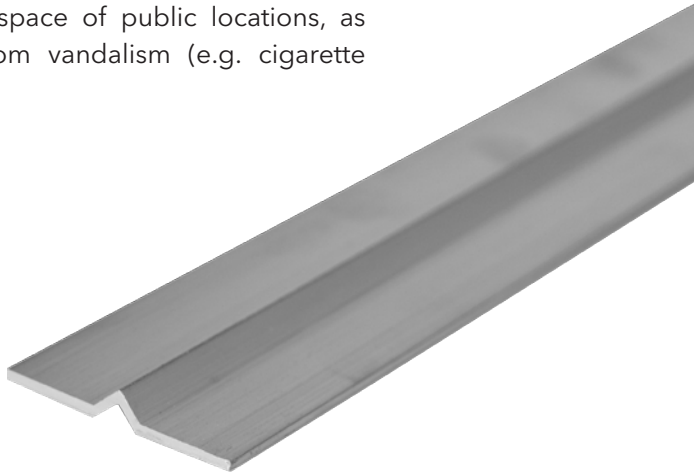


PROFILE – KWF1

Joint profile

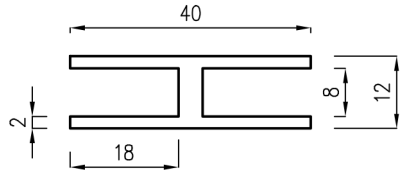


The joint profile is used to conceal joints in open-access space of public locations, as protection from vandalism (e.g. cigarette butts).



PROFILE – KWF2

Joint profile

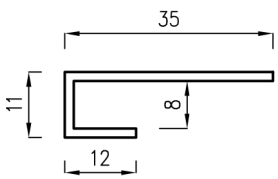


Apart from the decorative function, the joint profile also serves as protection from vandalism. When joint space is closed, it is impossible to throw small rubbish, cigarette butts etc. behind the panel. The profile is especially recommended for low parts of the façade, in open-access public places. The profile is usually painted in RAL colours or a colour similar to that of the panels. Anodising provides similarly durable coating and an interesting final effect.

PROFILE – KWF3

Closing profile

The closing profile provides an aesthetic complement to the KWF2 joint profile.



SOLAR SYSTEM

The system manufactured by **Sol Terra** is dedicated to mounting photovoltaic cells or solar collectors on building walls as an external ventilated façade. The system can be used to install an independent solar element and ensure harmonic arrangement within the ventilated façade, between standard cladding panels.

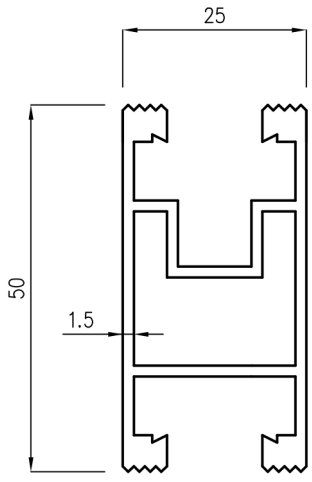
The system is suitable for securing fixing of all types of solar panels available on the market, designed for vertical operation.

Advantages of wall installation of PV cells compared to roof installation:

- Higher electricity generation, i.e. higher percentage amount of energy supplied by solar collectors compared to energy demand, depending on number of collectors and the accumulator size.
- Provision of proper constant cooling of PV cells by the stack effect, i.e. gravity flow of air in the ventilation gap between the solar panel and the building wall.
- Better access to panels for cleaning to improve efficiency.
- No risk of snow accumulation and full efficiency in winter.
- Smaller distance between the collector and the accumulator that is usually installed in the boiler room on the ground floor.

For more information, please visit www.solterra.pl

PROFILE – SM21



ENGINEERED HDPE INSULATING PADS

BSP engineered insulating pads are made of high-density polyethylene (HDPE) obtained by low-pressure polymerisation. This material is hard, strong and features both mechanical and chemical resistance.

1. The plates create physical separation of two different materials, i.e. aluminum and the material used to construct the building wall and, as such, corrosion protection is ensured as well.

2. As they are made of material with a very high thermal resistance, the plates significantly reduce the occurrence of thermal bridges, decreasing the thermal energy demand of a building.

   The pad is adapted to a specific bracket by proper cutting with a BSP knife.

PASSIVE SOLUTIONS

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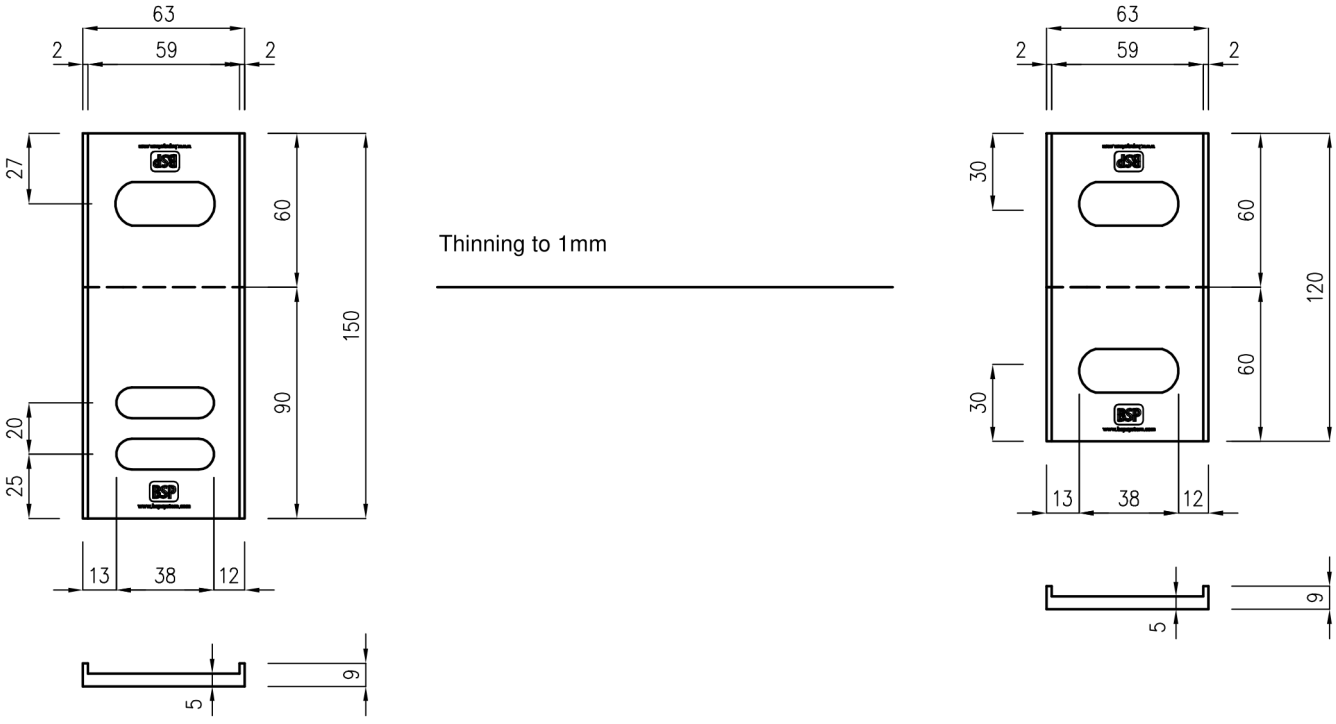
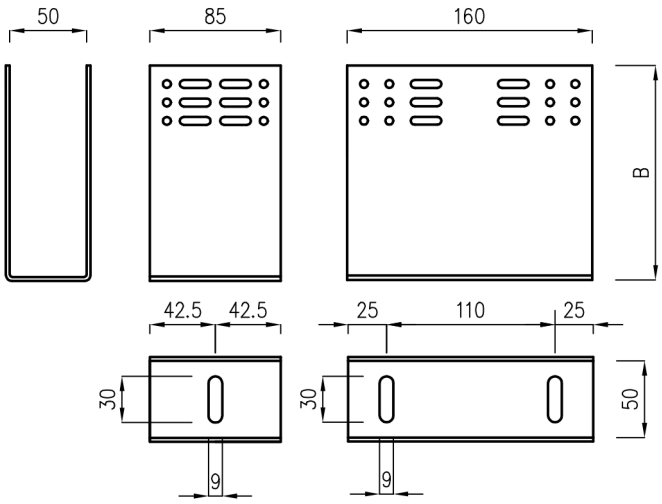


BRACKET – KWD

Additional elements of the wooden substructure

Bracket type	A	B
KWD 160-85	160	85
KWD 140-85	140	85
KWD 120-85	120	85
KWD 100-85	100	85
KWD 80-85	80	85
KWD 60-85	60	85
KWD 160-160	160	160
KWD 140-160	140	160
KWD 120-160	120	160
KWD 100-160	100	160
KWD 80-160	80	160
KWD 60-160	60	160

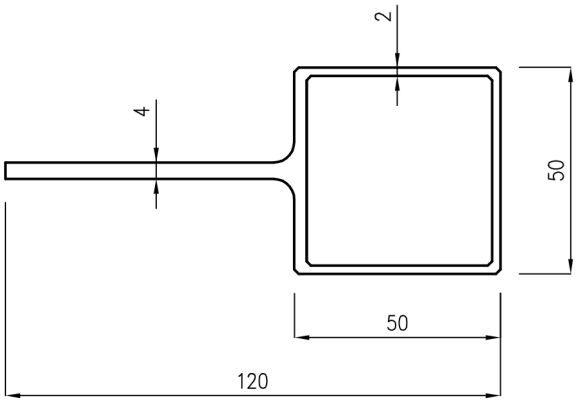


PROFILE – KWRW

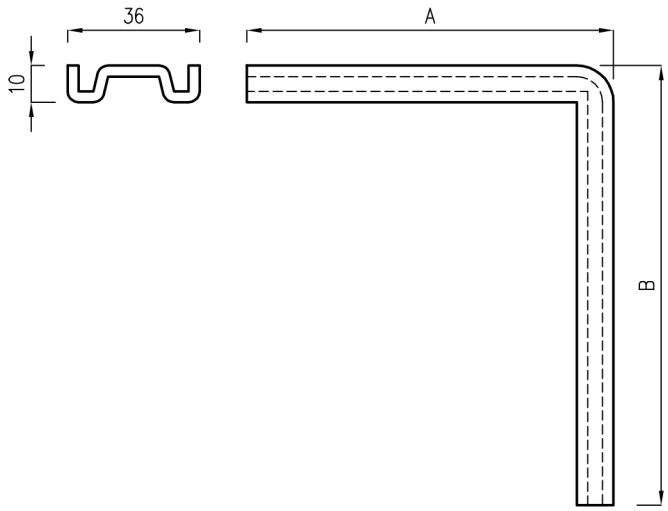
Special profile for fixing non-standard cladding

The system consists of the KWRK load-bearing profile with accessories used to fix stone panels or other façade cladding with non-standard thickness. For more details on accessories for fixing such cladding (hanging elements, etc.),

please visit www.bspsystem.com

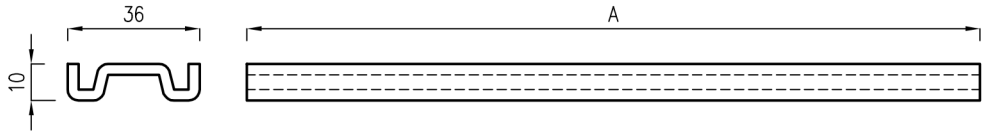


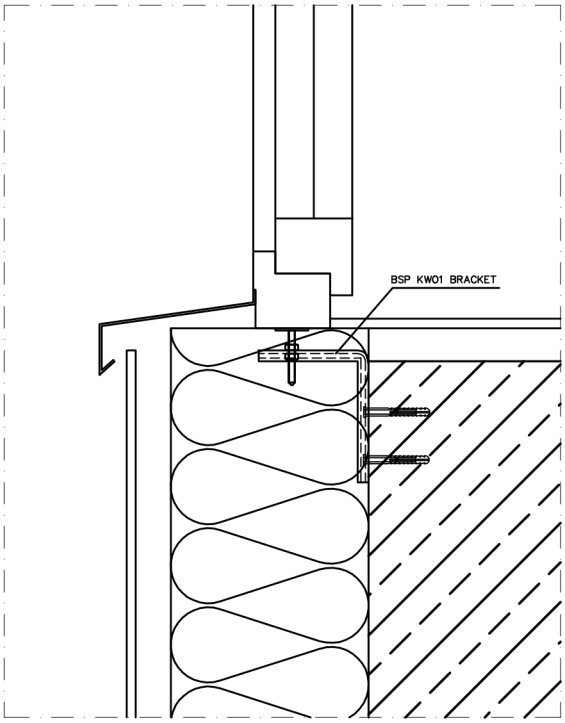
BRACKET – KWO

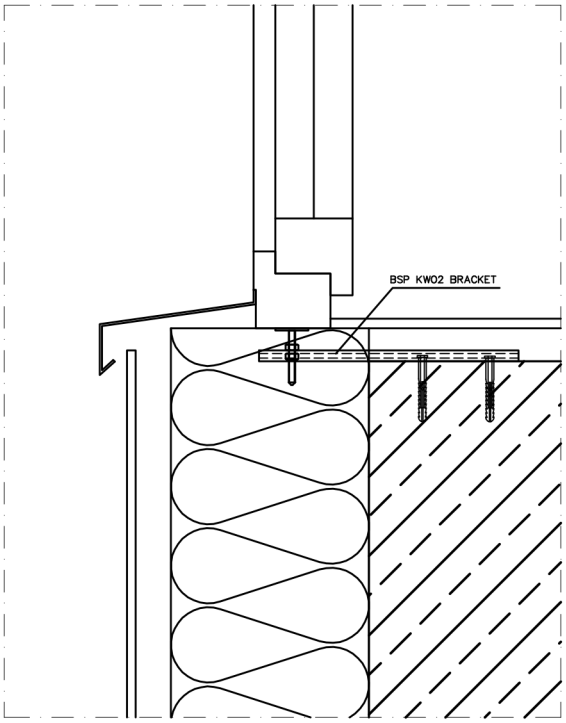


Using windows with a low heat transfer coefficient Uw may save a lot of energy consumed for building heating. Unfortunately, a thermal bridge is created between the window and the wall. This can spoil the desired effect, even if a great deal of money is invested in proper window joinery.

The KWO bracket is dedicated to all of those who aim at good insulation parameters of the building. The KWO bracket makes it possible to displace safely the joinery beyond wall face so that the frame is completely located in the thermal insulation layer, which increases the distance between the wall structure and the cold part of the window. As a result, heat loss from the heated wall outside a building is considerably reduced.



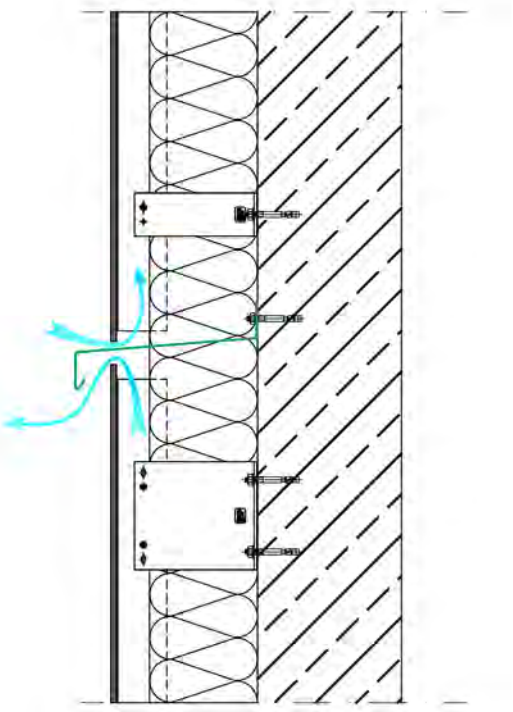




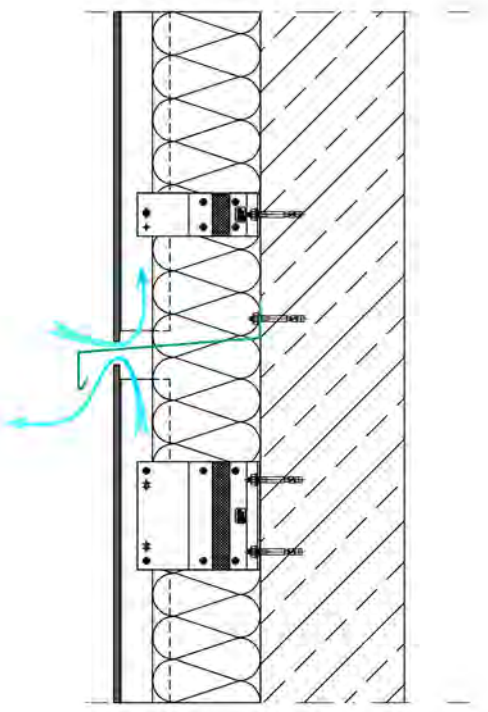
ELIMINATED STACK EFFECT IN CASE OF FIRE

Fire division by means of flashing.

BRACKETS – KW1

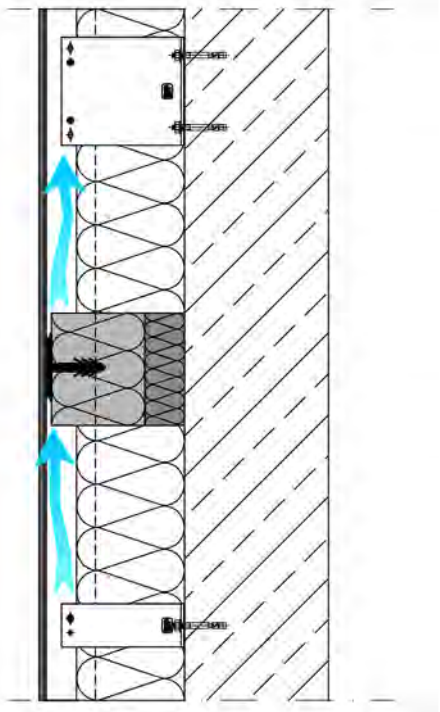


BRACKETS – KW1 PAS

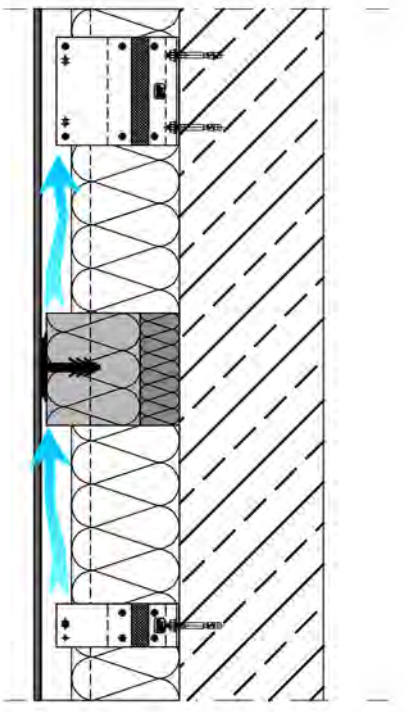


Fire division given as a wool strip with two elasticity values and a plastic spacer plug.

BRACKETS – KW1



BRACKETS – KW1

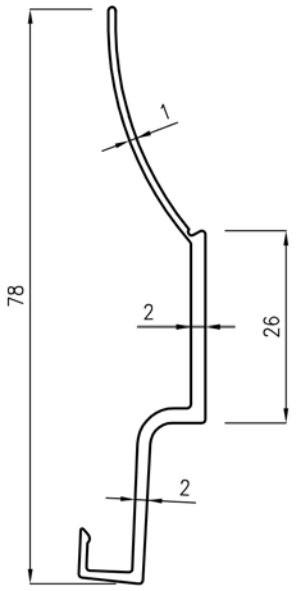


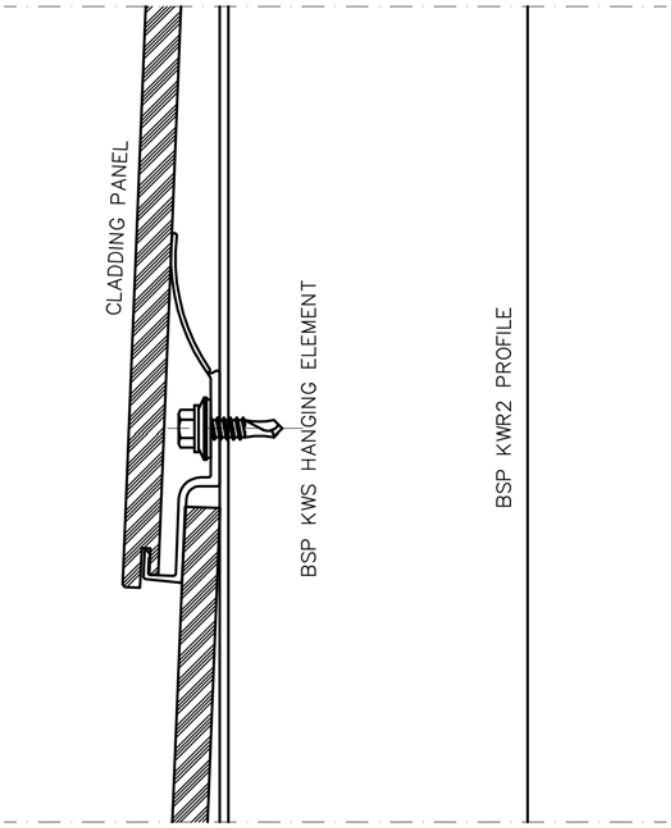
HANGING ELEMENT – KWS

The KWS system has been designed for the aesthetic and reliable mounting arrangement of sliding-type façade panels in the ventilated façade technology.

KWS is an extruded aluminum hanging element installed within the aluminum substructure. With the panel processed by milling, installation becomes practically invisible. The use of aluminum eliminates the risk of galvanic corrosion at the contact between the hanging elements and the support profile. In addition, the mechanical mounting arrangement with self-tapping screws or rivets is resistant to weather conditions.

The KWS hanging element can successfully be used to install louvres made of façade cladding.

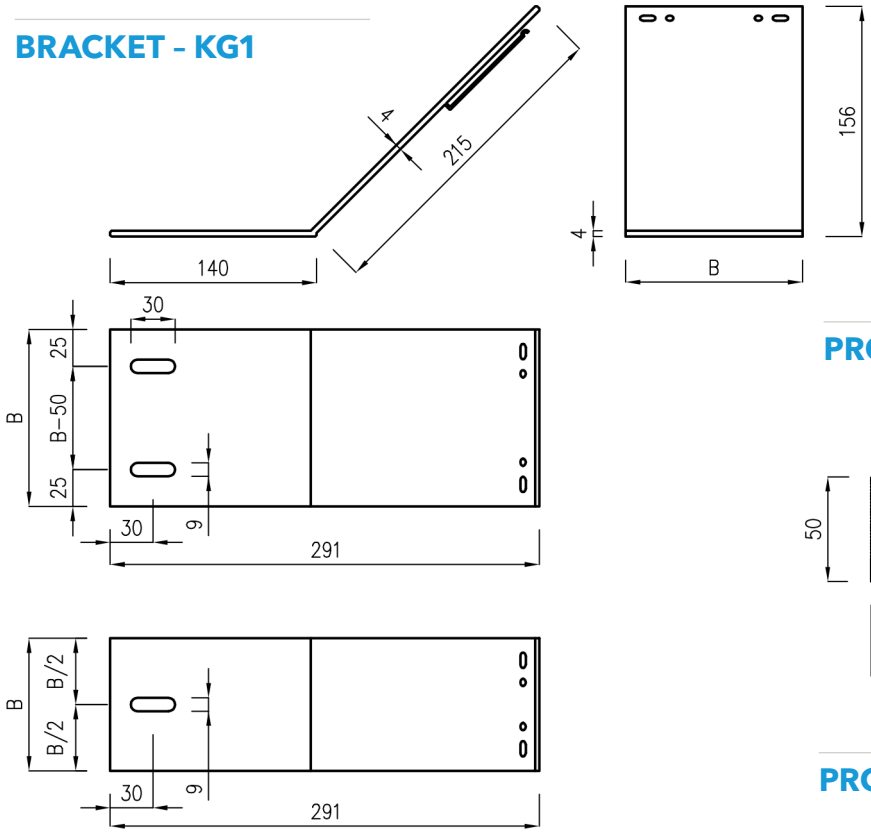




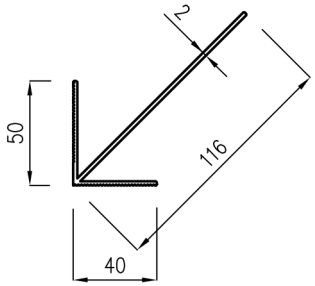
CORNER SYSTEM

The corner system is used to fix cladding panels at the required distance from the panel edge in façade corners. Additionally, KWN3 and KWN4 profiles support two cladding panels on both sides of the corner to reduce material consumption.

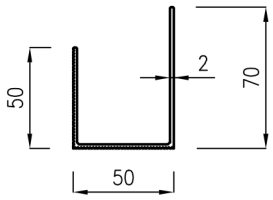
BRACKET – KG1

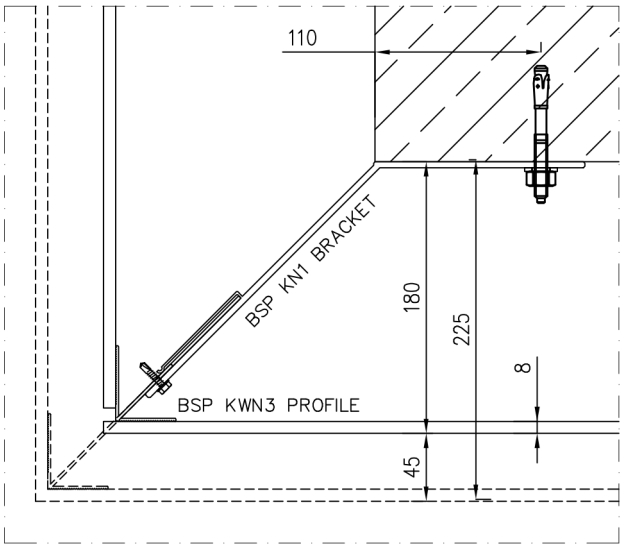


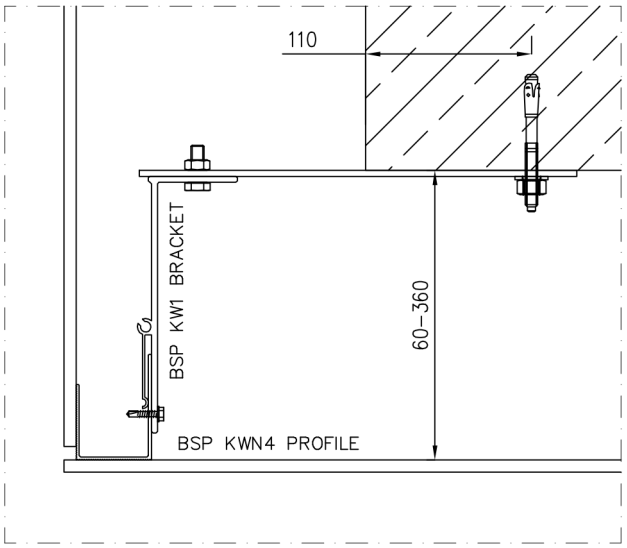
PROFILE – KWN3

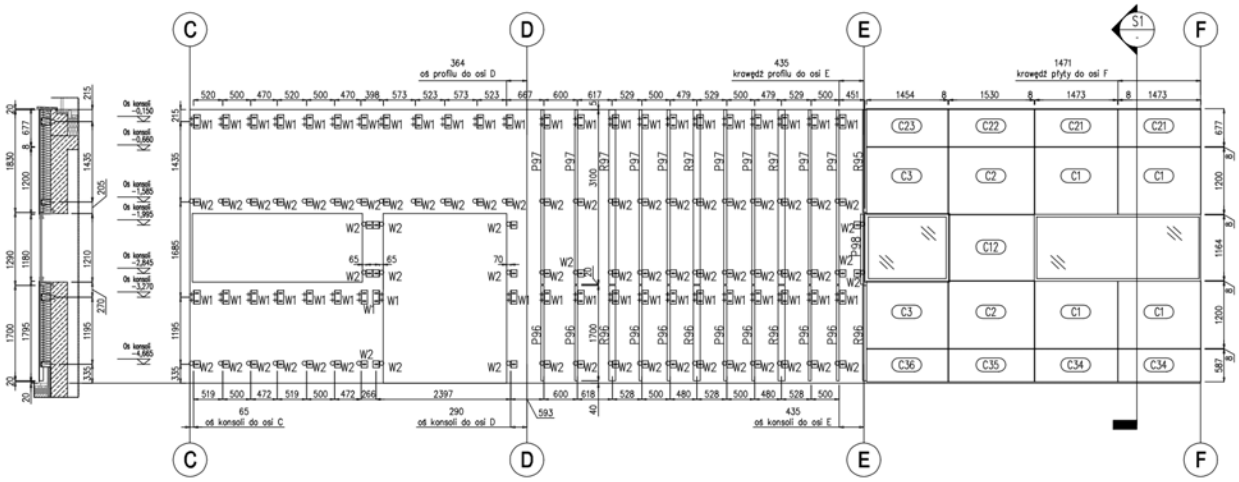


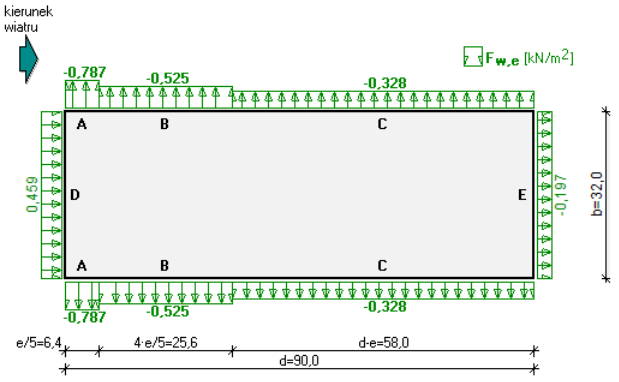
PROFILE – KWN4









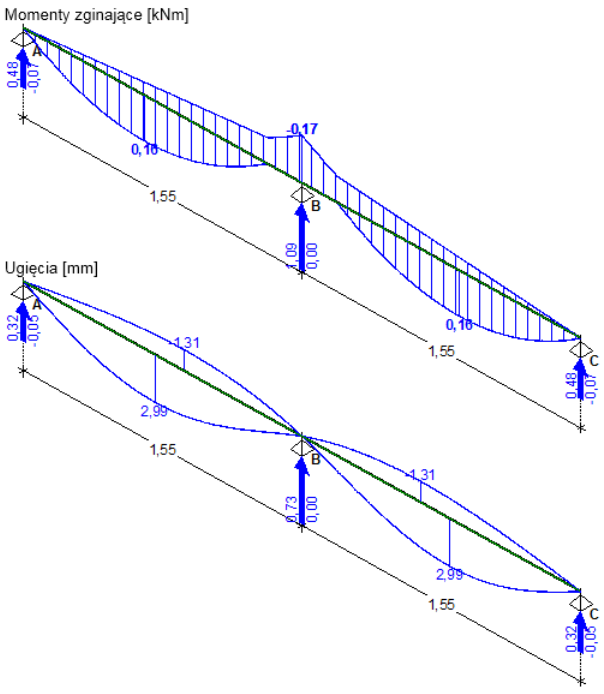


Elewacja boczna pole A:

- Budynek o wymiarach: d = 90,0 m, b = 32,0 m, h = 18,0 m
- Wymiar e = min(b,2·h) = 32,0 m
- Wartość podstawowa bazowej prędkości wiatru (wg Załącznika krajowego NA): strefa obciążenia wiatrem 1; A = 300 m n.p.m. → $v_{b,0}$ = 22 m/s
- Współczynnik kierunkowy: c_{dir} = 1,0
- Współczynnik sezonowy: c_{season} = 1,00
- Bazowa prędkość wiatru: $v_b = c_{dir} \cdot c_{season} \cdot v_{b,0}$ = 22,00 m/s
- Wysokość odniesienia: z_e = h = 18,00 m
- Kategoria terenu III → współczynnik chropowatości: $c_r(z_e) = 0,8 \cdot (18,0/10)^{0,19} = 0,89$ (wg Załącznika krajowego NA.6)
- Współczynnik rzeźby terenu (orografii): $c_o(z_e)$ = 1,00
- Średnia prędkość wiatru: $v_m(z_e) = c_r(z_e) \cdot c_o(z_e) \cdot v_b$ = 19,68 m/s
- Intensywność turbulencji: $I_v(z_e)$ = 0,244
- Gęstość powietrza: ρ = 1,25 kg/m^3
- Wartość szczytowa ciśnienia prędkości: $q_p(z_e) = [1+7 \cdot I_v(z_e)] \cdot (1/2) \cdot \rho \cdot v_m^2(z_e)$ = 655,9 Pa = 0,656 kPa
- Współczynnik konstrukcyjny: $c_s c_d$ = 1,000
- Współczynnik ciśnienia zewnętrznego $c_{pe} = c_{pe,10}$ = -1,2

Siła oddziaływania wiatru na powierzchnię zewnętrzną:

$F_{w,e} = c_s c_d \cdot q_p(z_e) \cdot c_{pe}$ = 1,000·0,656·(-1,2) = **-0,787 kN/m^2**



ADDITIONAL SERVICES

ASSISTANCE FOR DESIGNERS AND CONTRACTORS

BSP can offer services adapted to different customers:

FOR ARCHITECTS

- Comprehensive design engineering for ventilated façade
- Development of fixing details for façade cladding based on the selected system
- Development of non-standard design solutions
- Analysis of technical and strength related aspects of design assumptions
- Static calculations of the substructure and support elements
- Assistance during the selection of building materials (cost minimisation)
- Intermediate services in contacts with manufacturers of building materials
- Optimisation of panel cut-outs – minimisation of panel and substructure waste
- Comprehensive service

FOR GENERAL CONTRACTORS

- Comprehensive design engineering and workshop specifications of ventilated façades
- Design-related coordination with the architect
- Development of alternative design solutions
- Assistance in solving technical and design problems
- Static calculations of the substructure and support elements
- Optimised cutting of panels and profiles of the substructure
- List of materials and priced bill of quantities
- Assistance during the selection of building materials (cost minimisation)
- Intermediate services in contacts with manufacturers of building materials
- Consulting during selection of contractors
- Construction management
- Comprehensive service

FOR INSTALLERS

- Comprehensive design engineering and workshop specifications of ventilated façades
- Design-related coordination with the architect
- Development of alternative design solutions
- Assistance in solving technical and design problems
- Static calculations of the substructure and support elements
- Optimised cutting of panels and profiles of the substructure
- List of materials and priced bill of quantities
- Consulting during the selection of building materials (cost minimisation)
- Intermediate services in contacts with manufacturers of building materials
- Consulting during the selection of contractors
- Construction management
- Comprehensive service

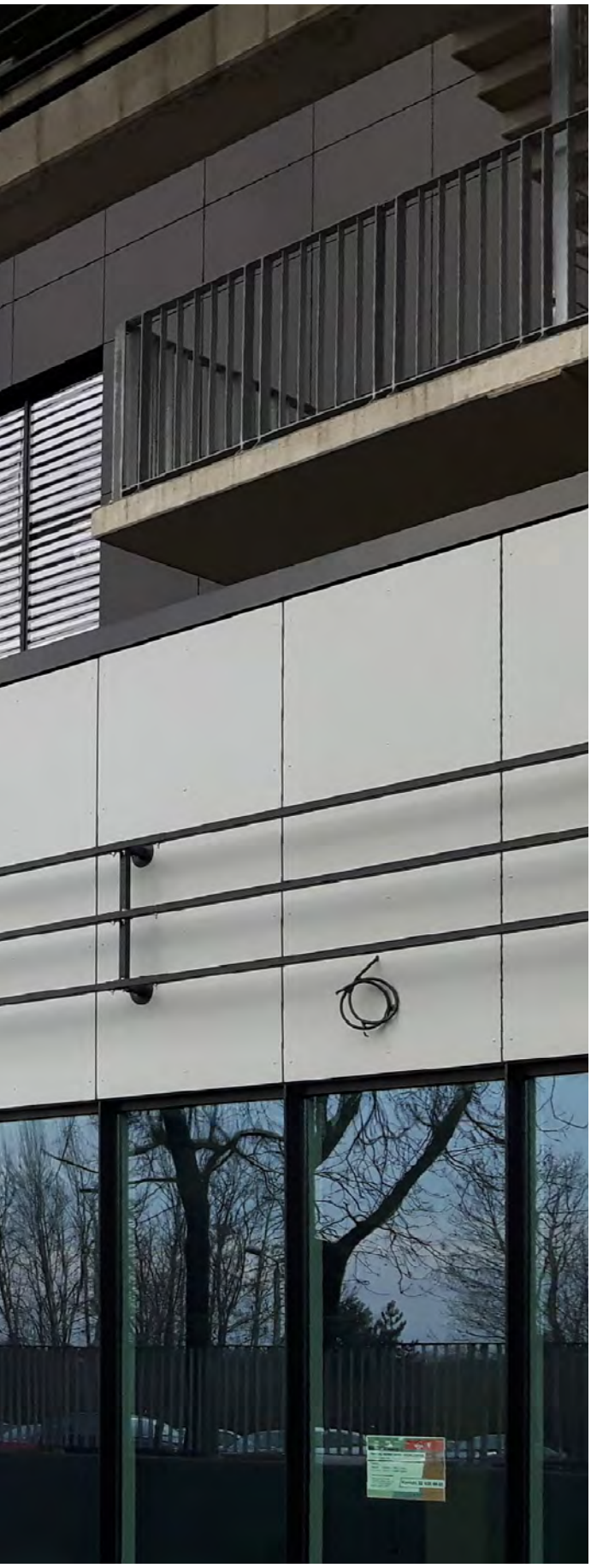
FOR MANUFACTURERS

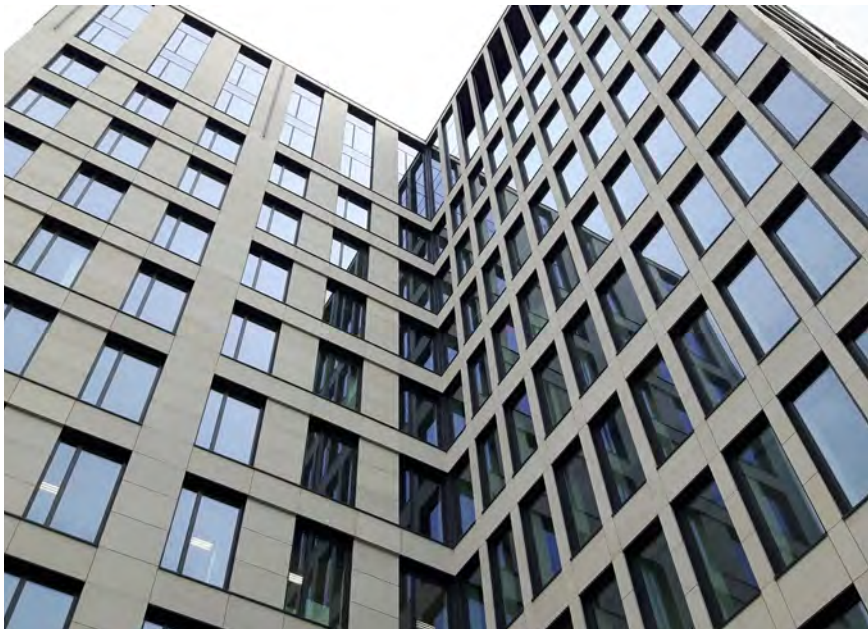
- Development of engineered system details
- Technical support for commercial operations
- Comprehensive service

OTHER SERVICES

- Painting to any RAL colour
- Anodic treatment
- Non-standard mechanical processing
- BSP sample display cases

PICTURES OF COMPLETED BUILDING STRUCTURES





SELECTED COMPLETED PROJECTS

2017

P.B. SIGMA S.C.
ORLEX Office Building, ul. Gościcina, 400 m2

GRAL Sp. z o.o.
Pivexin Technology, Nędza, 600 m2

China State Construction Engineering Corp. Ltd (CSCEC)
School building, Oran, Algeria, 6500 m2

Erbud S.A.
Arkadia shopping centre, Warsaw

Strabag S.A
Building of the Military University of Technology, Warsaw, 3800 m2

UNIBEP S.A.
Kapelanów II residential building, Warsaw, 2000 m2

Skanska S.A.
State Archives, Białystok

SKANSKA S.A.
Swimming pool, Białystok, 1400 m2

BUDREM -RYBAK Sp. z o.o.
Residential building located at ul. Malczewskiego, Sopot, 600 m2

WODPOL Sp. z o.o
Nursery school, Żywiec, 500 m2

SKANSKA S.A.
SPARK office building, Warsaw, 2000 m2

Euro-Pol Grunt Sp. z o.o.
Single-family building, Złotniki, 1500 m2

CIROKO Sp. z o.o.
Sports hall, Szczecin, 2300 m2

MAL-BUD-1 Sp. z o.o. Sp.k.
Residential building located at ul. Radiowa, Warsaw, 200 m2

PORR Polska Construction S.A.
DEO PLAZA residential building, Gdańsk, 5000 m2

Mostostal Zabrze – Tranziem Kraków
GEMINI Park Tychy shopping centre, Tychy, 4300 m2

UNIBEP S.A.
SASKA housing estate, stage IV, Warsaw

ALLCON BUDOWNICTWO Sp. z o.o.
Residential building located at ul. Malczewskiego, Gdańsk, 500 m2

Jakon Sp. z o.o.
Housing estate located at ul. Biskupińska, Poznań,

Different companies
McDONALD's restaurant, Stargard Szczeciński, Piaseczno, Komorniki,

Robyg S.A.
VILLA NOBILE residential building, Warsaw, 1000 m2

P.K.O.B. Wegner Sp. z o.o.
Office and warehouse building, Komorniki, 700 m2

PBM Południe S.A.
PORT PRASKI housing estate, Warsaw, 1400 m2

P.H.U. A&D Suwałki Sp. z o.o.
Apartment ZŁOTA residential building, Katowice, 1700 m2

Technological centre PCTNTB, Rzeszów

EastWave Building Company Sp. z o.o.
DIAMOND BUSINESS PARK URSUS II, Warsaw, 1100 m2

Private investor
Residential development located at ul. Trakt Lubelski, Warsaw, 300 m2

SPS Construction Sp. z o.o.
AURA residential building, Gdańsk, 500 m2

UNIBEP S.A.
MOZAIKA MOKOÓW housing estate (stage IV), Warsaw

RAGENT
TREND service building, Rzeszów, 700 m2

PORR Polska Construction S.A.
Hotel located at ul. Twarda, Warsaw, 2000 m2

2016

Port Praski shopping centre, Warsaw, 800 m2

Karmar S.A.
Centauris IV-V, Wrocław, 3000 m2

UNIBEP S.A.
ul. Powązkowska, Warsaw, 2000 m2

STRABAG SP. z o.o.
TRUMPF, Warsaw

Mostostal Warszawa S.A.
Water park, Tychy, 2700 m2

Budimex S.A.
Drewnica Hospital, Warsaw, 3500 m2

BUDREM-RYBAK
City Hall, Reda, 900 m2, ALDI KRAKÓW, Cracow

P.H.U. Łukasz Pałuska
School, Suwałki, 2200 m2

SKANSKA S.A.
British Secondary School, Warsaw

HOCHTIEF Polska S.A.
ZJS, Poznań, 7000 m2

SKANSKA S.A.
Kłodzka Nursery School, Wrocław, 2600 m2

Mosty Łódź S.A.
Widzew Stadium, Łódź,

Mostostal Warszawa S.A.
Police station, Gdańsk, 1240 m2

UNIBEP S.A.
Osiedle Nad Skarpą residential estate, Warsaw, 1300 m2

Spec Bau Polska,
Libet, Wrocław, 1700 m2

HOLDUCT Sp. z o.o.
Swimming pool, Oświęcim, 900 m2

SKANSKA S.A.
City Hall, Świdnik, 1500 m2

Eiffage Budownictwo Mitex S.A.
Building located at ul. Gajowa, Poznań, 5500 m2

ESJOT Stanisław Janowski s.k.
Pallas Boras, Sweden, 2000 m2

P.P.U. HEGOR Sp. z o.o.
WAT, Warsaw, 2391

VISOTEC SOCHA Sp. z o.o.
McDonald Citywest, Ireland, 300 m2

Barkley Group
Vista housing estate, London, England

UNIBEP S.A.
Aura Sky residential building, Warsaw

UNIBEP S.A.
Vista Mokotów residential building, Warsaw, 2018 m2

UNIBEP S.A.
Wiatraczna residential building, Warsaw, 2800 m2

Inpro S.A.
Harmonia Oliwska B and C, Gdańsk, 1250 m2

2015

OHL Obrascón Huarte Laín, S.A.
Kaponiera roundabout, Poznań, 1200 m2

UNIBEP S.A.
Mozaika Mokotów residential estate, Warsaw, 1700 m2

Mazur Construction Firm
Tauron office, Jaworzno III branch, Jaworzno, 5000 m2

MIRBUD S.A.
Kaufland, Wrocław, 4300 m2

BUDNER S.A.
Łopuszańska shopping centre, Wrocław, 600 m2

EastWave Building Company Sp. z o.o.
DIAMOND BUSINESS PARK URSUS, Warsaw, 1300 m2

PORR Polska Construction S.A.
FERIO shopping centre, Warsaw, 3200 m2

INENERGIA Sp. z o.o. Sp.k.
Lower secondary school with gym, Dopiewo, 1600 m2

Different companies
Centauris (stage II and III), Wrocław, 1600 m2

UNIBEP S.A.
"360" housing estate, Warsaw, 1000 m2

FSB TASBUD S.A.
KADR COMMUNITY CENTRE, Warsaw, 600 m2

SKANSKA S.A.
OCEAN, Warsaw, 3600 m2

DOMBUD S.A.
Hospital, Piekary Śląskie, 1000 m2

UNIBEP S.A.
Royal Park, Warsaw, 6000 m2

Motoplast
Production building, Niepruszewo, 500 m2

BGR Bau Sp. z o.o.
Police Headquarters, Jarocin, 400 m2

PRZEDSIĘBIORSTWO PRZEMYSŁU BETONÓW PREFABET BIAŁE BŁOTA S.A.
District Police Headquarters, Tuchola, 1600 m2

HOSSA S.A.
Military garrison (building C and D), Gdańsk, 1500 m2

MILIMEX S.A.
ALDI, Zabrze, 300 m2

HARAS Sp. z o.o.
Archives of Wrocław University of Technology, Wrocław, 2300 m2

AWBUD S.A
HASCO, Wrocław, 4200 m2

Bielskie Przedsiębiorstwo Budownictwa Przemysłowego S.A.
Police headquarters (building A and B), Bielsko-Biała, 3000 m2

Pro-Invest S.A.
Gymnasium, Nowy Dwór, 2000 m2

PB Dombud S.A
City Stadium, Zabrze, 1100 m2

Budimex
Residential building located at ul.Niemcewicza,Warsaw,1000m2

TYNK-BUD 1
Residential building located at ul. Szturmowa, Warsaw

STARSZE

Karmar S.A.
IKEA Targówek Shopping Centre, Warszawa

Iławskie Przedsiębiorstwo Budowlane Sp. z o.o.
Amphitheatre building, Iława

Tulcon
Zink Power Wielkopolska galvanising shop, Krągolia near Konin

1000 m2

Prefabryka Sp. z o.o.
Modular nursery school, Warsaw

Eiffage Budownictwo Mitex S.A.
Oxygen office building, Szczecin

Warbud S.A.
Museum of Contemporary Art, Cracow, 1500 m2

Budimex S.A.
Wielka Krokiew Sports Centre, Zakopane

Unibep S.A.
Philharmonic hall building, Kielce

Dorbud S.A.
Building of Institute of Aviation, Warsaw

Unibep S.A.
Saska housing estate, Warsaw

INVESTOR - Mera-Pnefal S.A.
Mera office building located at ul. Bysławska, Warsaw, 2500 m2

PeKaBud Sp. z o.o.
Tunnel construction at Warsaw Chopin Airport, Warsaw

Budimex S.A.
Academy of Art, Łódź, 3000 m2

A&D Suwałki Sp. z o.o.
Theatre building, Suwałki

Termatex Sp. z o.o.
Jantar shopping centre, Słupsk, 5000 m2

Karmar S.A.
Physics Faculty (CeNT II) at University of Warsaw, Warsaw

Budoplan Sp. j.
Cotex Office, Płock, 4000 m2

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