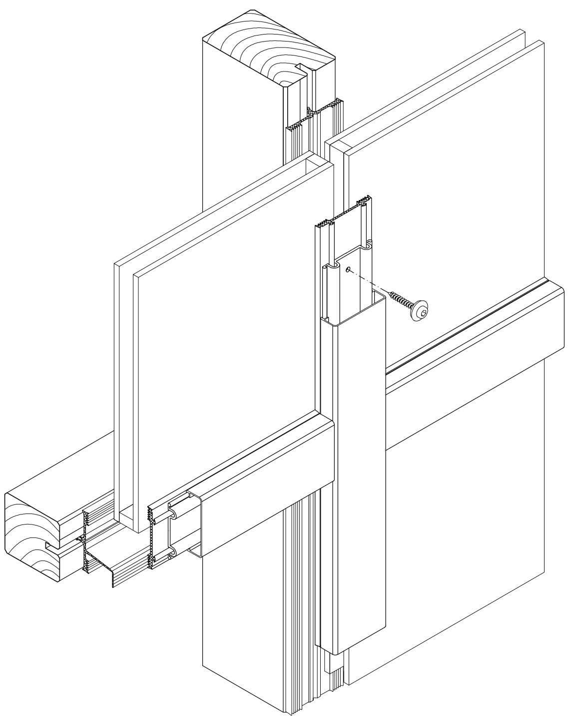
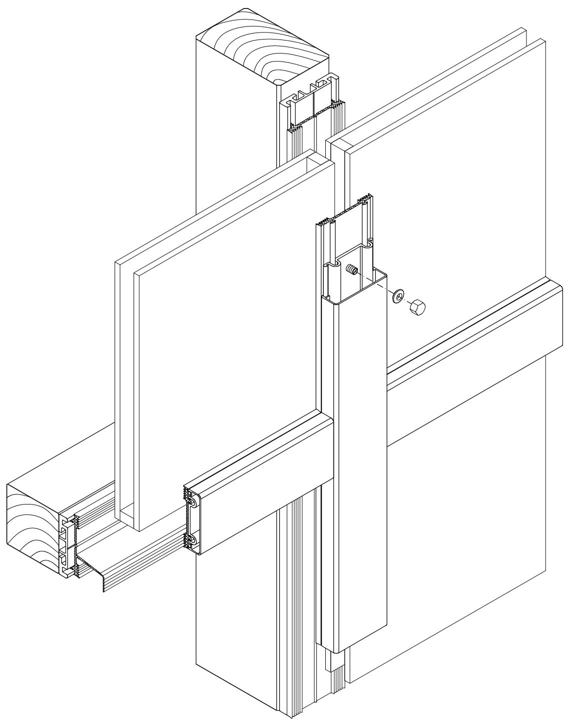
STABALUX

Stabalux
Timber Systems

Stabalux H



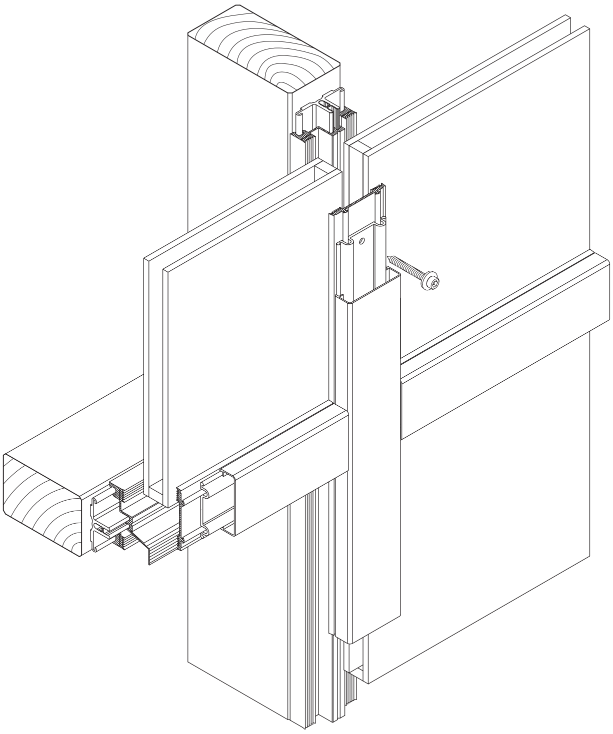
Stabalux ZL-H



Stabalux
Timber Systems

STABALUX

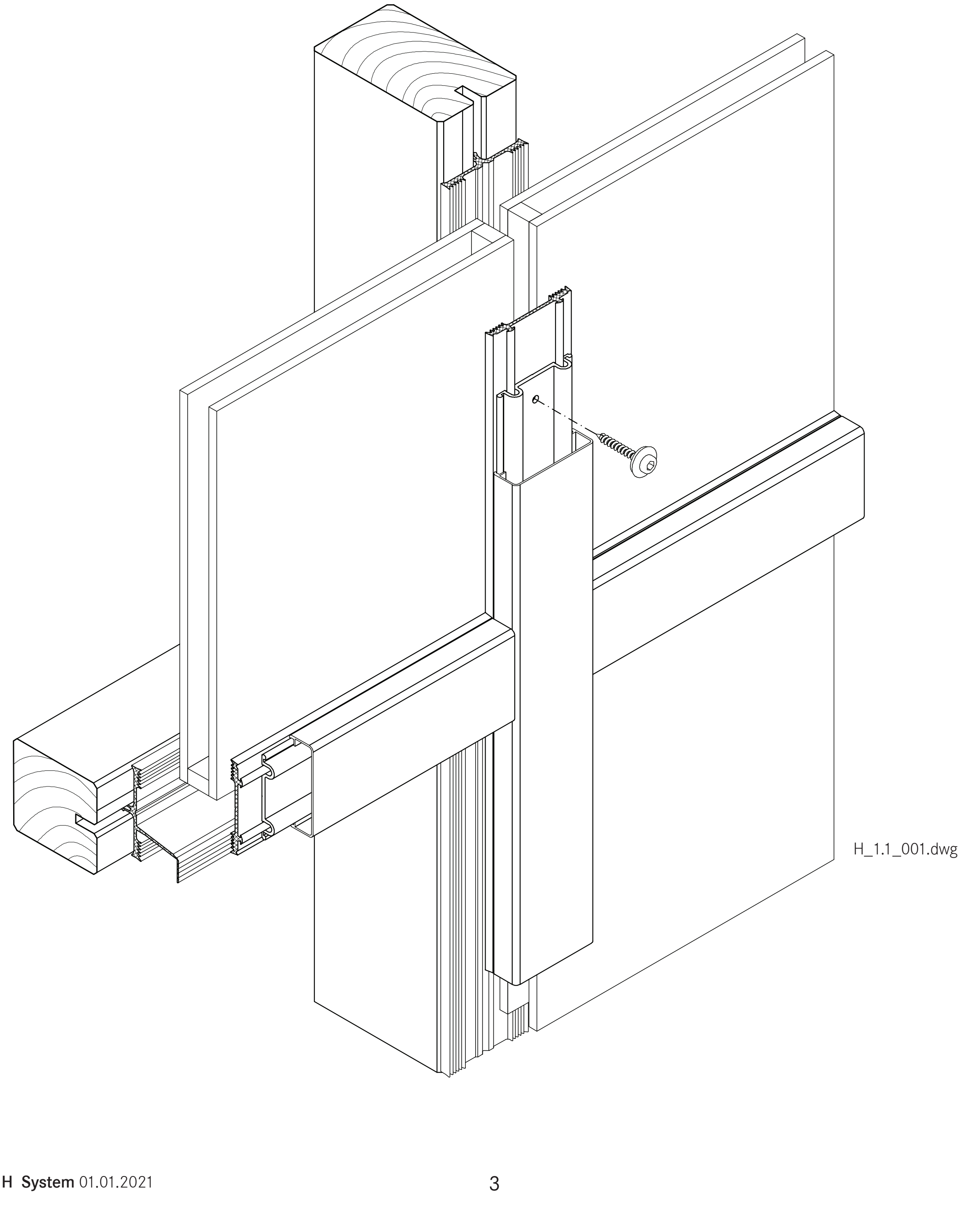
Stabalux AK-H



Stabalux H

System properties

Timber facade system with direct screw fittings



System properties

Stabalux H

- The Stabalux System H provides a complete range of products in 50, 60 and 80 mm widths to produce vertical and inclined glazing on a supporting timber substructure.
- Stabalux H is characterised by direct screw fittings and the milled central groove.
- The inner seal is pressed directly into the transom groove on the mullion and guarantees precise guidance of the sealing section.
- The outer seal of the clamping strip is screwed directly on to the timber construction.
- The homogeneous glazing system satisfies all technical and aesthetic standards.
- The certificate 'Mullion and transom facade components to passive house standard' was issued for the Stabalux H system widths 50 and 60 mm.

Specifications:		**Facade 5 mm sealing height**	**Facades with inclinations up to 20°; overlapping inner seals**	**Roof ≥ 2° inclination**
System widths		50, 60, 80 mm	50, 60, 80 mm	50, 60, 80 mm
Air permeability EN 12152		AE	AE	AE
Watertightness EN 12154/ENV 13050	Static Dynamic	RE 1650 Pa 250 Pa/750 Pa	RE 1650 Pa 250 Pa/750 Pa	RE 1350 Pa*
Resistance to wind load EN 13116	Permitted load Increased load	2 kN/m² 3 kN/m²	2 kN/m² 3 kN/m²	2 kN/m² 3 kN/m²
Impact resistance EN 14019		E5 / I5	E5 / I5	**Increased requirements in accordance with Cahier 3228 du CSTB Méthode d'essai de choc sur verrière Weight 50 kg Head 2.4 m**
Glass weight		≤ 670 kg	≤ 670 kg	≤ 670 kg
Burglar resistance DIN EN 1627		RC2	RC2	

*the test was carried out using a water volume of 3.4l/(m²min) - above the amount required by the standard

Fire protection approval:

System width 60	G30 / facade 5 mm sealing height F30 / facade 5 mm sealing height	Approval Z-19.14-1283 Approval Z-19.14-1280

Passive house certificates:

Passivhaus Institut Dr. Feist

Frame size 1.20 x 2.50 m	**U_{cw} value** W/(m²K)	**Spacers/Glass carriers**
System width 50	U_{cw} = 0.79 W/(m²K) U_{cw} = 0.78 W/(m²K)	Swisspacer V/Glass carrier ALU Swisspacer V/Glass carrier GFK
System width 60	U_{cw} = 0.79 W/(m²K) U_{cw} = 0.78 W/(m²K)	Swisspacer V/Glass carrier ALU Swisspacer V/Glass carrier GFK

System properties

Certifications, authorisations, CE mark
(Section 9)

The tests we have carried out provide contractors and planners with certainty as well as the ability to use the test results and product passports. For example, they might use this information to issue the CE mark.

Permeability/Safety

- The Stabalux sealing geometry prevents moisture ingress.
- Condensation is guided away in a controlled manner.
- Stabalux offers slotted and overlapping sealing systems for vertical glazing. Overlapping systems have been tested for inclined facades up to 20°.
- Seal flaps increase the safety and impermeability of the installation on vertical glazing.
- For roof glazing, a special Stabalux sealing system with offset sealing sections is used. This keeps the supporting structure level during planning and production processes.
- Sealing the transom rebate allows flat roofs to be created with an incline of ≥ 2°.
- Creation of the required drainage takes place at the construction site by pushing together the seals in the facade or slotting together the offset sealing sections in the facade or roof.

Insulation/Thermal Separation (Section 9)

The Stabalux System H has excellent thermal properties. A heat transfer coefficient of U_f for frames of up to 0.6 W/(m^2) are achieved.

Noise insulation of the glass facade
(Section 9)

The noise insulating properties of a facade depend on a variety of factors, each of which affects the properties in a different way. The task of the planner is to expertly select the optimum design on a case-by-case basis. Different combinations of frame profiles, glazing systems and noise reducing glass have vastly different effects on noise insulation. Investigations and measurements performed by us are just examples of a huge range of possibilities and serve only as a guideline.

Fire protection (Section 9)

Outstanding fire protection properties are achieved by small additions to the system and the use of fire-resistant glass. The Stabalux H in G 30 and F 30 have general approvals by the building authorities in Germany in accordance with DIN 4102 Part 13.

The following applies to fire-resistant glass following authorisation:

- Mandatory use of Stabalux stainless steel pressure strips or Stabalux stainless steel cover strips.
- Identical sealing geometries; individual seal types (different materials) must be selected according to the authorisation.
- All requirements defined in the authorisation must be adhered to.

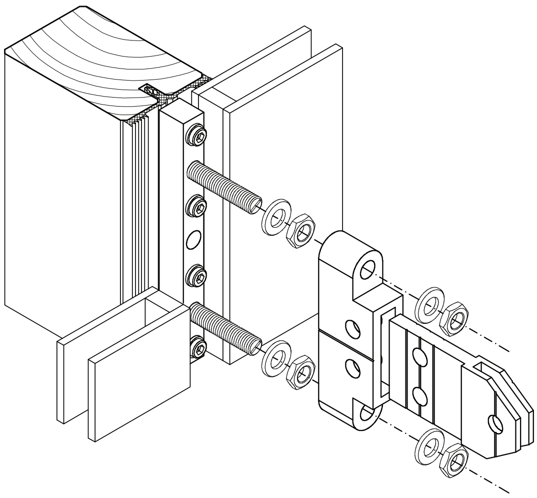
Burglar resistance (Section 9)

The Stabalux System H has burglar resistant properties. The test was performed according to DIN EN 1627. Facades in resistance class RC2 can be mounted on the system widths 50 mm, 60 mm and 80 mm.
Class RC2 is classified as a moderate risk. It is recommended for use in residential, commercial and public buildings.
Very few constructive measures are needed to achieve the burglary-resistant properties; tested panels must also be installed.
The appearance of burglar-resistant facades using Stabalux System H is the same as the normal construction. All benefits of using threaded tubes are preserved. The benefits of direct screw fittings in the central groove are preserved.

System properties

Stabalux SOL sun protection (Section 6)

Alongside the usual measures to prevent glare and excessive energy irradiation, we offer a specially developed system of outside lamellae. Particular attention has been paid here to ensure attachment and assembly of these can be done easily with Stabalux systems whilst meeting architectural and climatic requirements. Glass panes and clamping strips are not subject to any load from application of the sun protection. Assembly and sealing are simple and efficient.



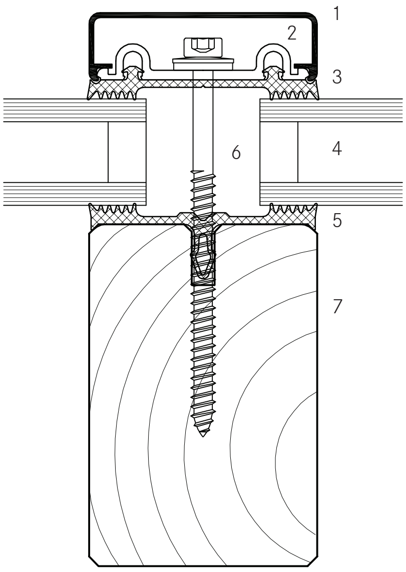
H_1.1_002.dwg

STABALUX

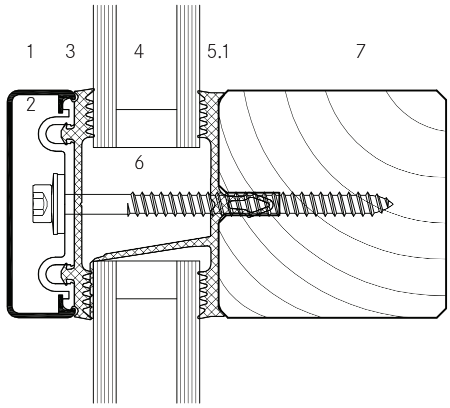
System cross sections and inner seals - facade

Inner seal 5 mm tall / 1 drainage level

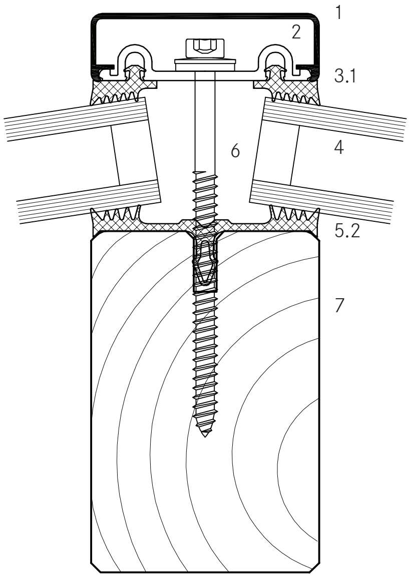
Vertical glazing mullion



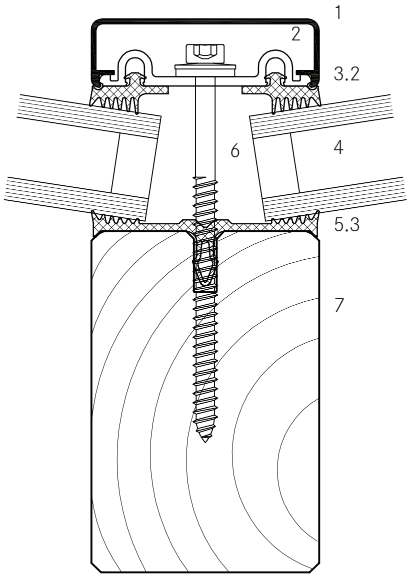
Vertical glazing transom



Polygonal glazing mullions - convex 3° - 15°



Polygonal glazing mullions - concave 3° - 10°



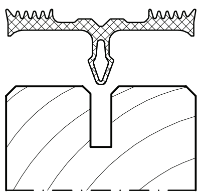
H_1.1_003.dwg

1	Cover strip
2	Pressure profile
3	Outer seal
3.1	Outer seal convex polygonal glazing
3.2	Outer seal concave polygonal glazing
4	Glass / panel
5	Inner seal
5.1	Inner sealing using a seal flap
5.2	Inner seal convex polygonal glazing
5.3	Inner seal concave polygonal glazing
6	System screw fittings
7	Timber profile

System cross sections and inner seals - facade

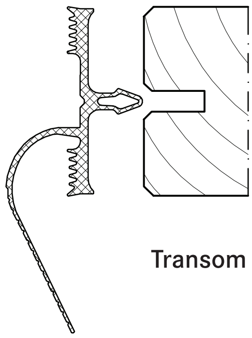
Inner seal 5 mm tall / 1 drainage level

System 50 mm



GD 5201

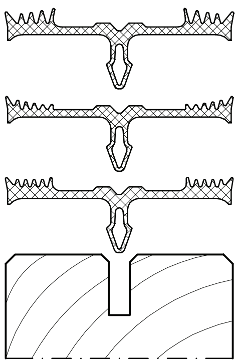
Mullion



e.g. GD 5204

Transom

System 60 mm

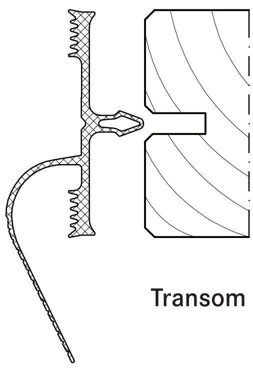


GD 6210
Polygonal/convex

GD 6211
Polygonal/concave

e.g. GD 6202*

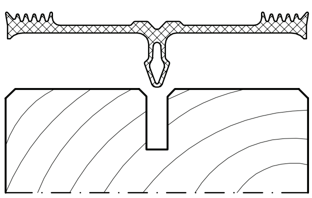
Mullion



e.g. GD 6204*

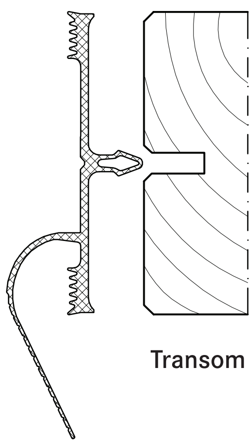
Transom

System 80 mm



GD 8202

Mullion



GD 8204

Transom

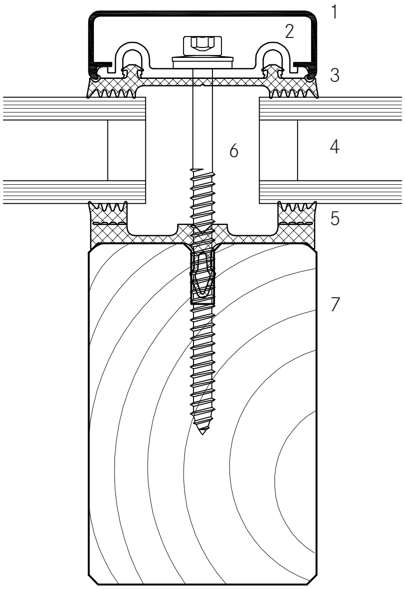
H_1.1_004.dwg

*seals for different requirements have the same geometries. They are distinguished by their different designations, e.g. G30 or F30 to match the corresponding classifications and fire-resistant glass.

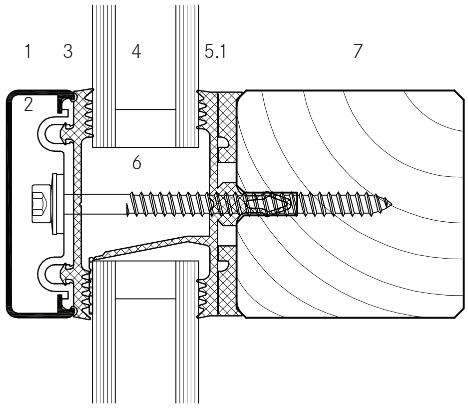
System cross sections and inner seals - facade

Inner seal 10 mm tall / 2 overlapping drainage levels

Vertical glazing mullion - 2nd level*



Vertical glazing transom -1st level*



H_1.1_003.dwg

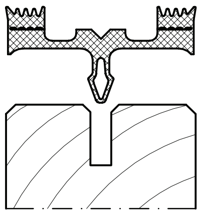
1	Cover strip
2	Pressure profile
3	Outer seal
4	Glass / panel
5	Inner seal 10 mm
5.1	Inner sealing using a seal flap 10 mm
6	System screw fittings
7	Timber profile

* tested system for vertical facades and facades with an incline up to 20°

System cross sections and inner seals - facade

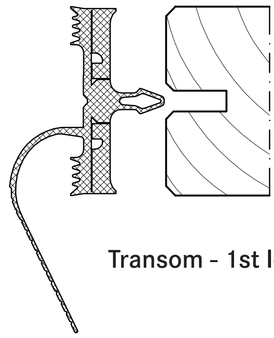
Inner seal 10 mm tall / 2 overlapping drainage levels

System 50 mm



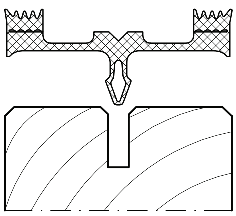
GD 5205

Mullions - 2nd level



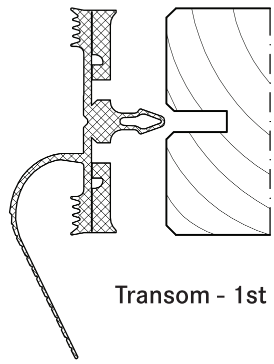
Transom - 1st level*

System 60 mm



GD 6206

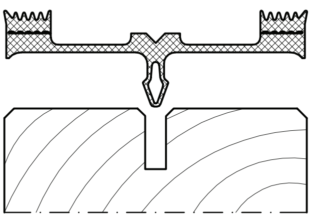
Mullions - 2nd level



GD 6303

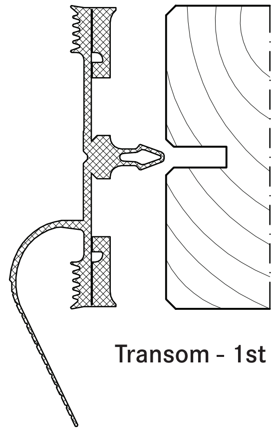
Transom - 1st level

System 80 mm



GD 8206

Mullions - 2nd level



GD 8303

Transom - 1st level

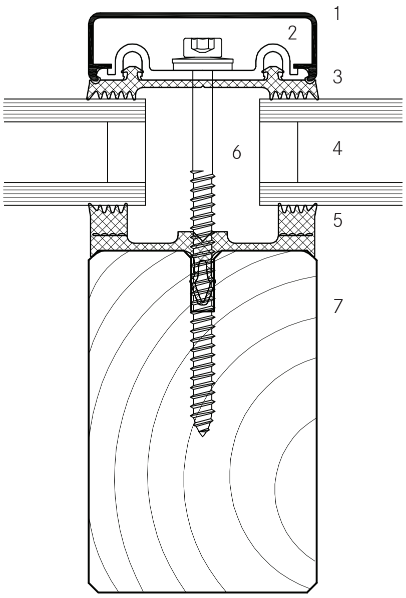
H_1.1_004.dwg

*System 50 mm upon request

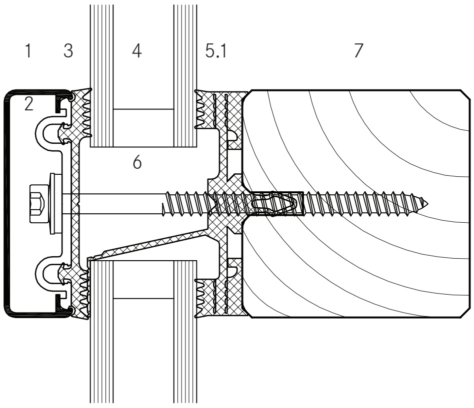
System cross sections and inner seals - facade

Inner seal 12 mm tall / 3 overlapping drainage levels

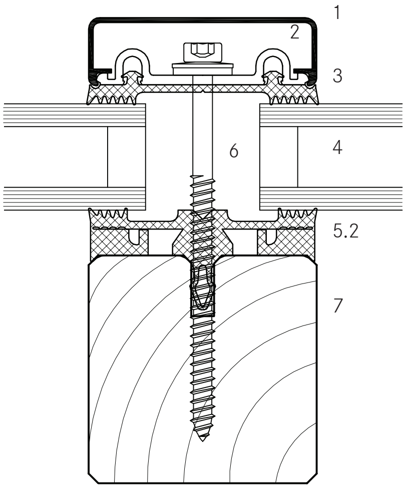
Vertical glazing main mullion - 3rd level*



Vertical glazing transom - 2nd level*



Vertical glazing secondary mullion - 1st level



H_1.1_003.dwg

1 Cover strip
2 Pressure profile
3 Outer seal
4 Glass / panel

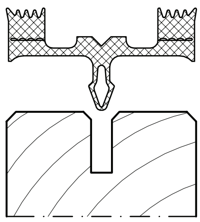
5 Inner seal 12 mm main mullion
5.1 Inner seal using a seal flap
5.2 Inner seal 12 mm secondary mullion
6 System screw fittings
7 Timber profile

* tested system for vertical facades and facades with an incline up to 20°

System cross sections and inner seals - facade

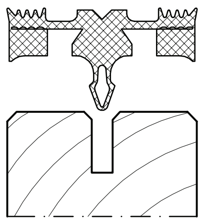
Inner seal 12 mm tall / 3 overlapping drainage levels

System 50 mm



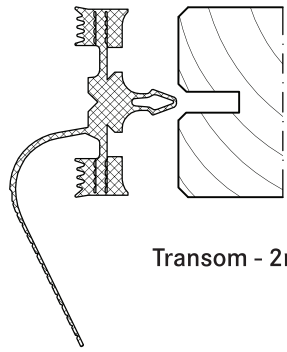
GD 5314

Main mullion - 3rd level



GD 5315

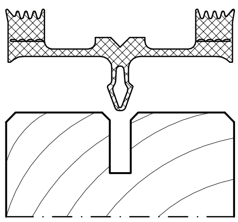
Secondary mullion - 1st level



GD 5317

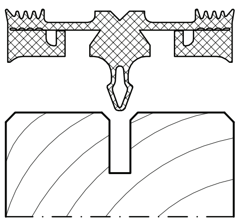
Transom - 2nd level

System 60 mm



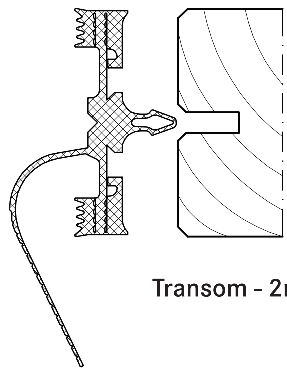
GD 6314

Main mullion - 3rd level



GD 6315

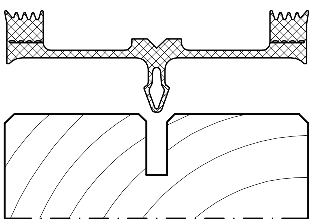
Secondary mullion - 1st level



GD 6318

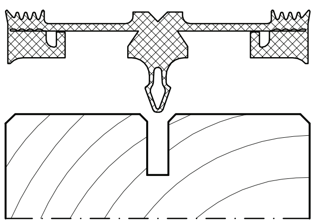
Transom - 2nd level

System 80* mm



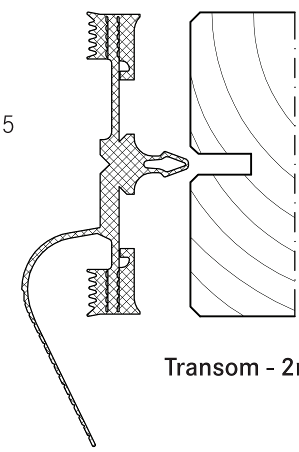
GD 8314

Main mullion - 3rd level



GD 8315

Secondary mullion - 1st level



GD 8318

Transom - 2nd level

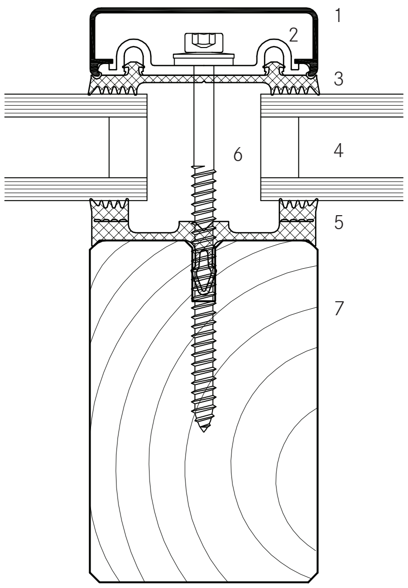
H_1.1_004.dwg

*System 80 mm upon request

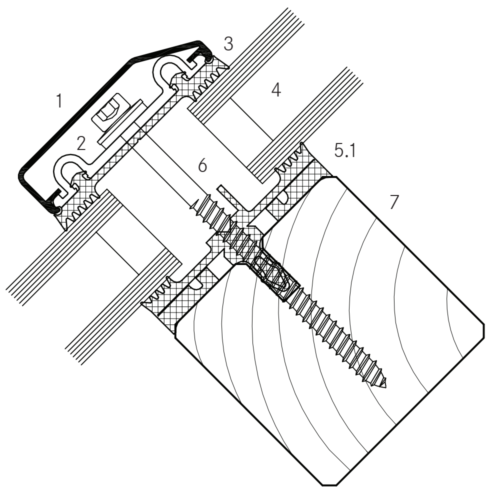
System cross sections and inner seals - roof

Inner seal 10 mm tall / 2 overlapping levels

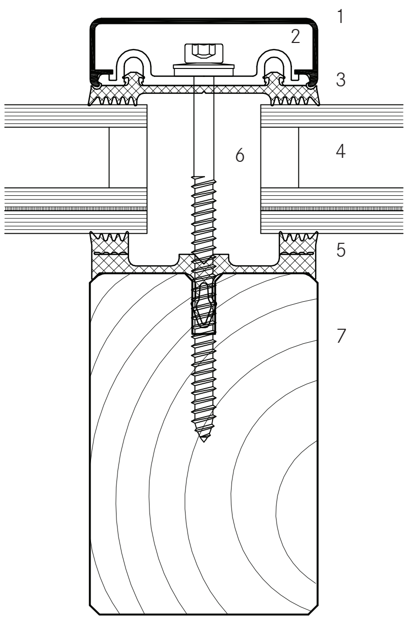
Inclined glazing rafter



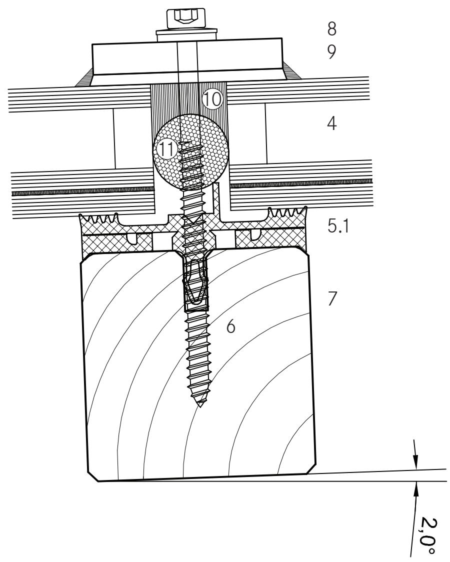
Angled glazing transom



Angled glazing rafter ≥ 2° inclination



Angled glazing transom ≥ 2° inclination



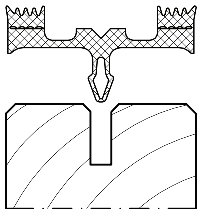
H_1.1_003.dwg

1	Cover strip	6	System screw fittings
2	Pressure profile	7	Timber profile
3	Outer seal	8	Hold-down clamp
4	Glass / panel	9	Washer
5	Inner seal 10 mm rafter	10	All weather silicone seal
5.1	Inner seal 10 mm transom	11	Rope seal

System cross sections and inner seals - roof

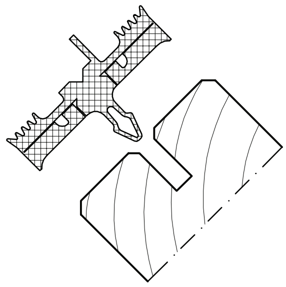
Inner seal 10 mm tall / 2 overlapping levels

System 50 mm



GD 5205

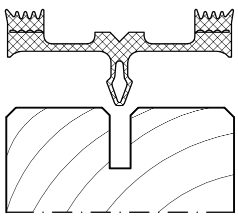
Rafter - 2nd level



GD 5207

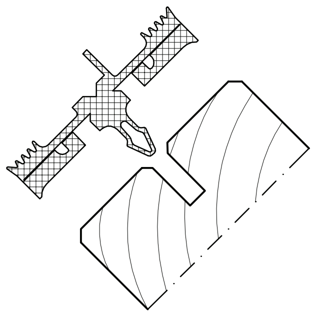
Transom - 1st level

System 60 mm



GD 6206

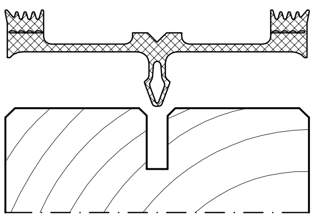
Rafter - 2nd level



GD 6208

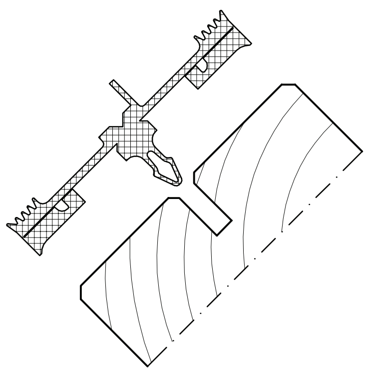
Transom - 1st level

System 80 mm



GD 8206

Rafter - 2nd level



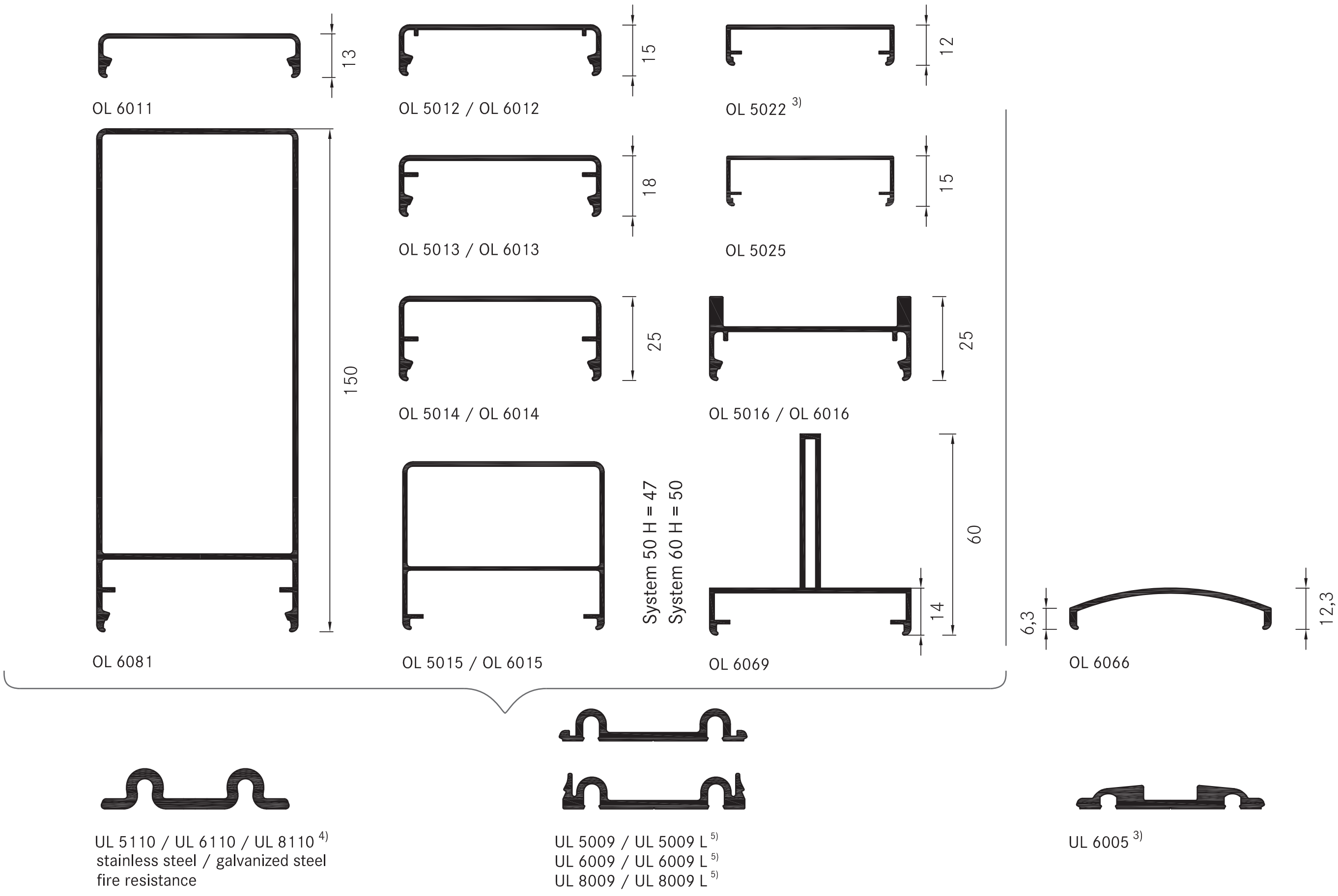
GD 8208

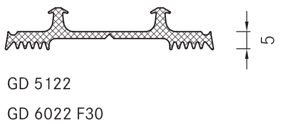
Transom - 1st level

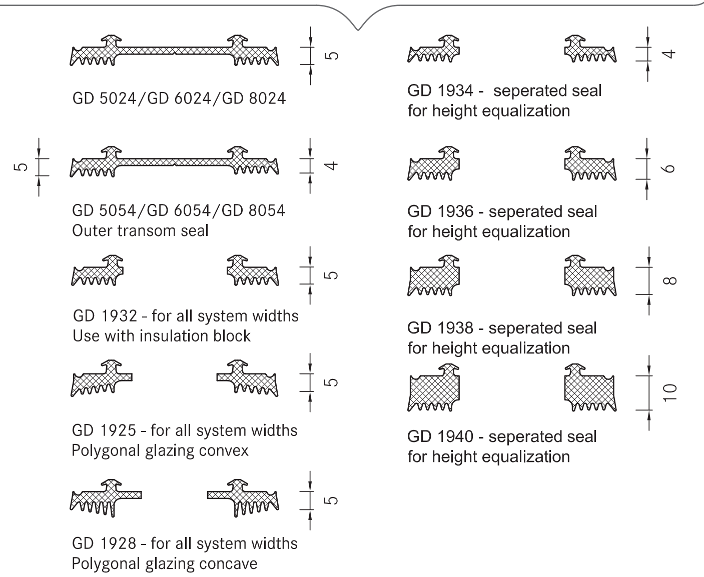
H_1.1_004.dwg

Cover strips and outer seals

Aluminium - concealed screw fittings







1) Seals for stainless steel pressure or cover strips satisfy different requirements with the same geometry. Refer to the designation: e.g. F30 fire protection

2) The corresponding sections, i.e. the general building approval, must be adhered to if specific requirements are placed in the facade in regard to fire protection.

3) Use screws without sealing washer OL 5022, possibly with PA washer Z 0033

4) System 80 mm upon request

5) The geometry of the clipping process is different for the 50, 60 and 80 mm widths

H_1.1_005.dwg

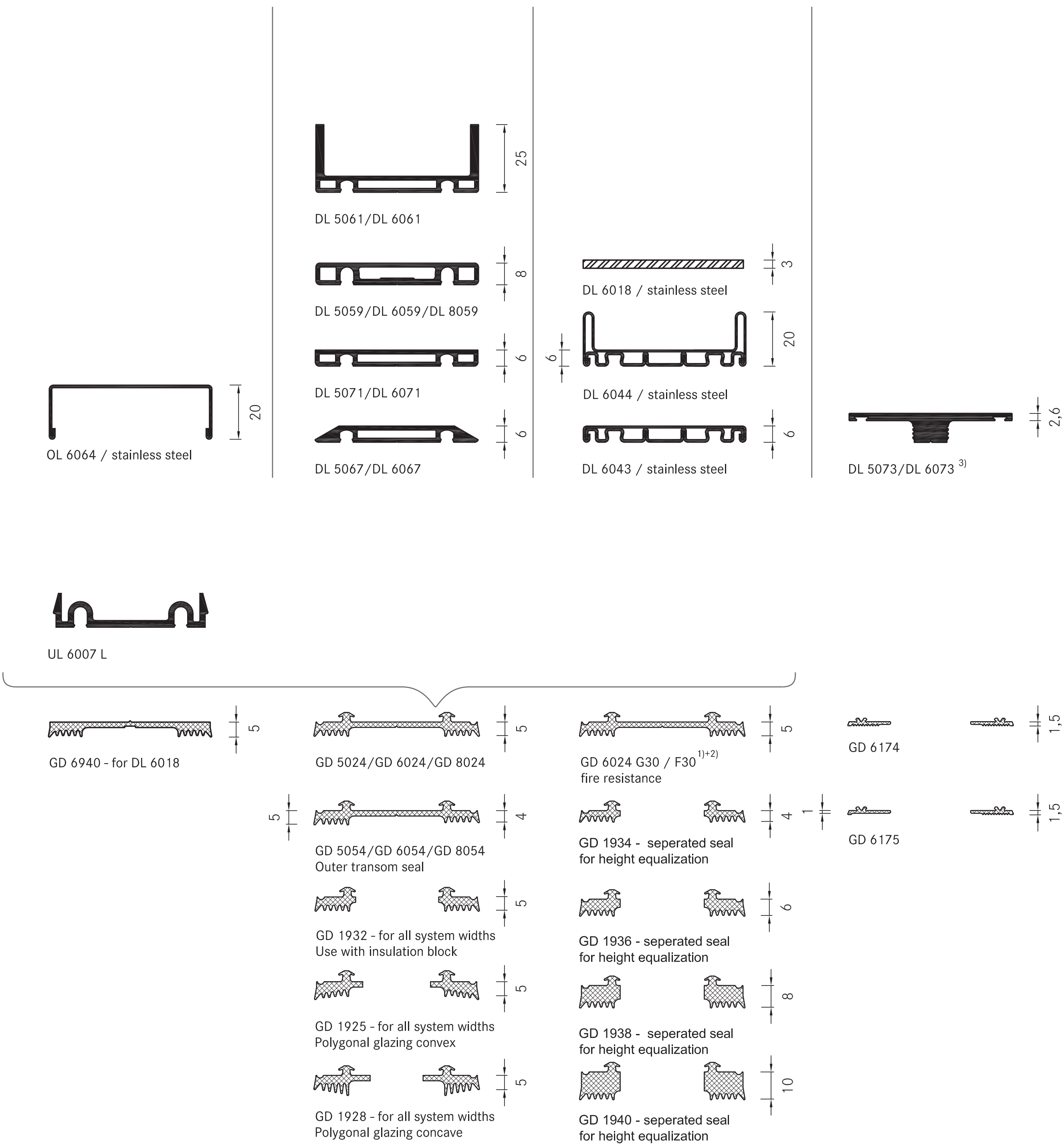
Cover strips and outer seals

Stainless steel - concealed screw fittings

Aluminium - visible screw fittings

Stainless steel - visible screw fittings

Flat cover strip DL 5073/DL 6073



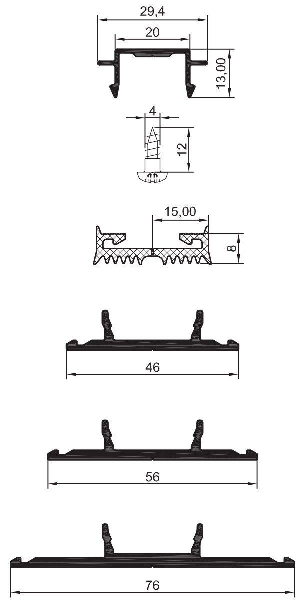
Cover strips and outer seals

Wood covering strips

Wooden cover strips can be easily mounted to mullions and transoms using aluminium top or lower bars. The pressure profile UL5003/UL6003/UL8003 acts as a clamping strip.
Assembly: apply the two-piece GD 1903 outer seal to the upper strip attach to the system using screws. Divide the OL 1903 into 80 mm long pieces and attached centrally using 3 screws to the wooden cover strip at 300 mm intervals and then clip to the upper strip.

The wooden cover strip to be provided by the customer is a supplement to the Stabalux Systemware and, if necessary, mechanically due to the natural properties of wood weathering to secure. Guidelines for the use of exterior wood should be followed.

(Please see section 1.2.5 on assembling the outer seal)



OL1903

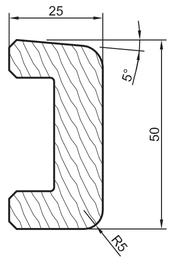
GD1903 (2-teilig)

UL5003

UL6003

UL8003

Transom

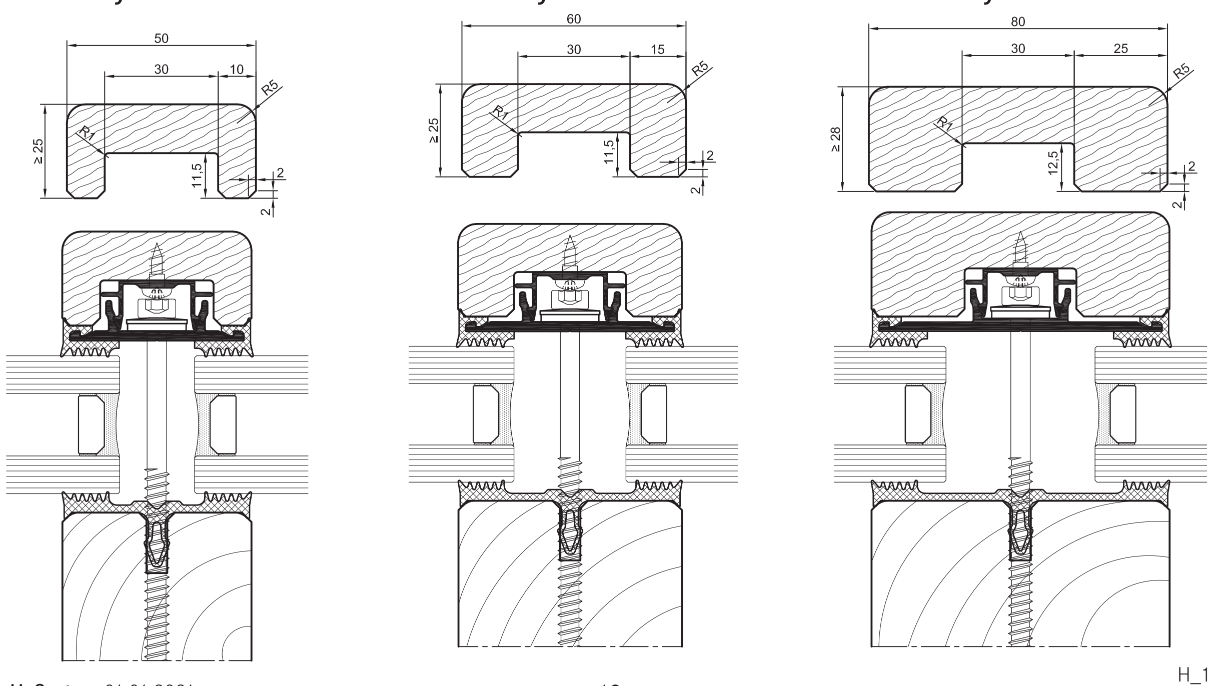


Set the wooden upper strip in the transom with an incline of 5°.

Example: System 50 mm

Mullion

System 50 | System 60 | System 80



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Material information

Wood type and quality

The wooden load-bearing substructure is used for mounting the glazing and must meet all load and suitability requirements. The profile dimensions and choice of materials are key. The type of wood chosen depends on the client, architect and/or processor.

All wood materials are produced using wood types permitted by the current Eurocode 5 (DIN EN 1995-1) standard. Alongside the mature solid wood sections and laminated solid timbers, facade construction is increasingly using a multi-layer construction method. Due to its stability against deformations, we recommend using plywood sections. The following minimum requirements must be met for all wooden materials:

- Softwood, strength class C24
- Laminated timber, strength class GL24h
- For fireproof glazing, pay attention to the specifications given in the relevant authorisations.

The use of comparable hardwoods is also permitted.

Wood type	Strength class	Elastic modulus $E_{0,mean}$ [kN/cm²]
Spruce, fir	C16	800
Pine, larch, spruce, fir	C24	1100
Douglas fir, southern pine	C30	1200
Western Hemlock	C35	1300
Yellow Cedar	C40	1400
Oak, teak, keruing	D30	1100
Beech	D35	1200
Beech, azalea, intsia	D40	1300
Angelique (Basralocus)	D40	1300
Azobé (Bongossi)	D60	1700
Laminated timber made using wood from class:		
C24	GL24h	1160
C30	GL28h	1260
C35	GL32h	1370
C40	GL36h	1470
Laminated veneer:		
Kerto Q		1000-1050
Kerto S		1380
Kerto T		1000
Multiplex sheets:		
(plywood)		900-1600

The woods and values mentioned here are examples for guidance only. Exact values for your choice should be determined with the supplier and according to applicable standards.

Seal profiles

Stabalux seals are organic natural rubber materials based on EPDM and conform to the DIN 7863 standard, non-cellular elastomer sealing profiles for window and facade construction. Compatibility with contact media should tested by the processor, particularly when using plastic glazing and making structural joints with non-Stabalux products. Fire seals are special products; their specific data are filed with DIBt (German Centre of Competence for Construction).
Sealing the rebate with all weather silicone seal is possible.

All weather silicone seal

Only certified materials may be used for sealing the rebate with all-weather silicone. Pay attention to all information provided by the manufacturer and the sealing work must be carried out by trained persons. It is recommended that a licensed and certified specialist contractor is hired for this purpose. We further refer you to the DIN 52460 standard and IVD data sheets (Trade Association for Sealants).
The compatibility of the materials is particularly important when using all-weather silicone. In this case, the compatibility of the sealant with the edge bonding of the glass and the backfill of the joints. If self-cleaning glass is used, the compatibility must be established in advance. Glass sealants and edge bonding must be UV-resistant. The incline of roofs should also be taken into account. Information about UV-resistance can be requested from the manufacturer. Silicone edge bonding generally provides better UV-resistance than polysulfide-based materials. The advantage of silicone lies in its high vapour sealing properties which is particularly useful when using more volatile argon fillings.
Highly elastic, weatherproof and UV-resistant seals meet the widest range of demands for reliable joints.

Aluminium profiles

The aluminium profiles we supply are generally made from EN AW 6060 according to DIN EN 573-3, T66 according to DIN EN 755-2.

Material information

Coating the aluminium

Alongside anodic oxidation, with the corresponding pre-treatment, conventional coating methods such as air-drying multi-layer coating systems (wet coating) or thermosetting coatings (stove enamelling / powder-coating) can be used. By using different mass distribution, longitudinal shadow formation is possible with cover strips DL 5073 and DL 6073. Resulting actions are to be taken with the agreement of the coater.

Longitudinal expansions in aluminium profiles exposed to temperature stress

When cutting the cover and pressure profiles from aluminium, allowance should be made for temperature-induced longitudinal expansion.
The theoretical rod lengths ℓ should be shortened by:

$\Delta\ell = \alpha^T \cdot \Delta T \cdot \ell$

Example:

$\Delta\ell = 24 \cdot 10\text{-}6 \cdot 40 \cdot 1000 = 0.96 \approx 1.0$ mm

$\alpha T \approx 24 \cdot 10\text{-}6$ 1/K	Coefficient of thermal expansion for aluminium
ΔT = 40 K	Assumed temperature difference of aluminium dependent on the colour and amount of solar radiation
ℓ = 1000 mm	Rod length
$\Delta\ell \approx$ 1 mm	Longitudinal expansion

further examples:

$\Delta\ell = 24 \cdot 10^{-6} \cdot 60 \cdot 1000 = 1.44 \approx$ **1.5 mm**
$\Delta\ell = 24 \cdot 10^{-6} \cdot 100 \cdot 1000 = 2.4 \approx$ **2.5 mm**

A rod with a system length of ℓ = 1000 mm should be shortened by 1 mm for a temperature difference of ΔT = 40 °C. A rod of length ℓ = 3000 mm should be shortened by 3 mm.
For ΔT = 100 °C (often occurs in roof areas and south-facing facades), a rod of length ℓ = 1000 should be shortened by 2.5 mm.

Rod length ℓ (mm)	Temperature difference ΔT	Longitudinal expansion $\Delta\ell$ (mm)
1000	40°C	1
3000	40°C	3
1000	60°C	1.5
3000	60°C	4.5
1000	100°C	2.5
3000	100°C	7.5

Note:

We recommend shortening the pressure profile by ≈ **2.5 mm per** ℓ = 1000 mm of length. When doing so, ensure to use the correct length of the outer seal.
When using cover strips in roof area, it is recommended that holes for screwing on the cover strip are created with a diameter of d = 9 mm.

Stainless steel profile

Pressure profiles and bottom sections of cover strips are made from 1.4301 stainless steel for visible screw fittings. The surface conforms to classification 2B according to DIN EN 10088-2.
Cover strips using 1.4401 stainless steel. The surface has a ground finish (grain 220, DIN EN 10088-2). The upper parts of the cover strip are made from 1.4571 stainless steel with ground finish (grain 240, DIN EN 10088-2). To protect the surface, a film has been applied to one side whose edge can be seen on narrow side.

Other items

All system items are produced according to applicable standards.

Maintenance and care

The information sheets WP.01 – WP.05 from the Association of Window and Facade Producers (VFF) must be observed. The address can be found in the address section. Further information can be found in section 9.0 - Cleaning / Maintenance.

Profile design

System with direct screw fittings in the central groove

The type of wood chosen depends on the client, architect and processor according to the following considerations:

- Softwood, strength class C24
- Laminated timber, strength class GL24h
- For fireproof glazing, pay attention to the specifications given in the relevant authorisations.

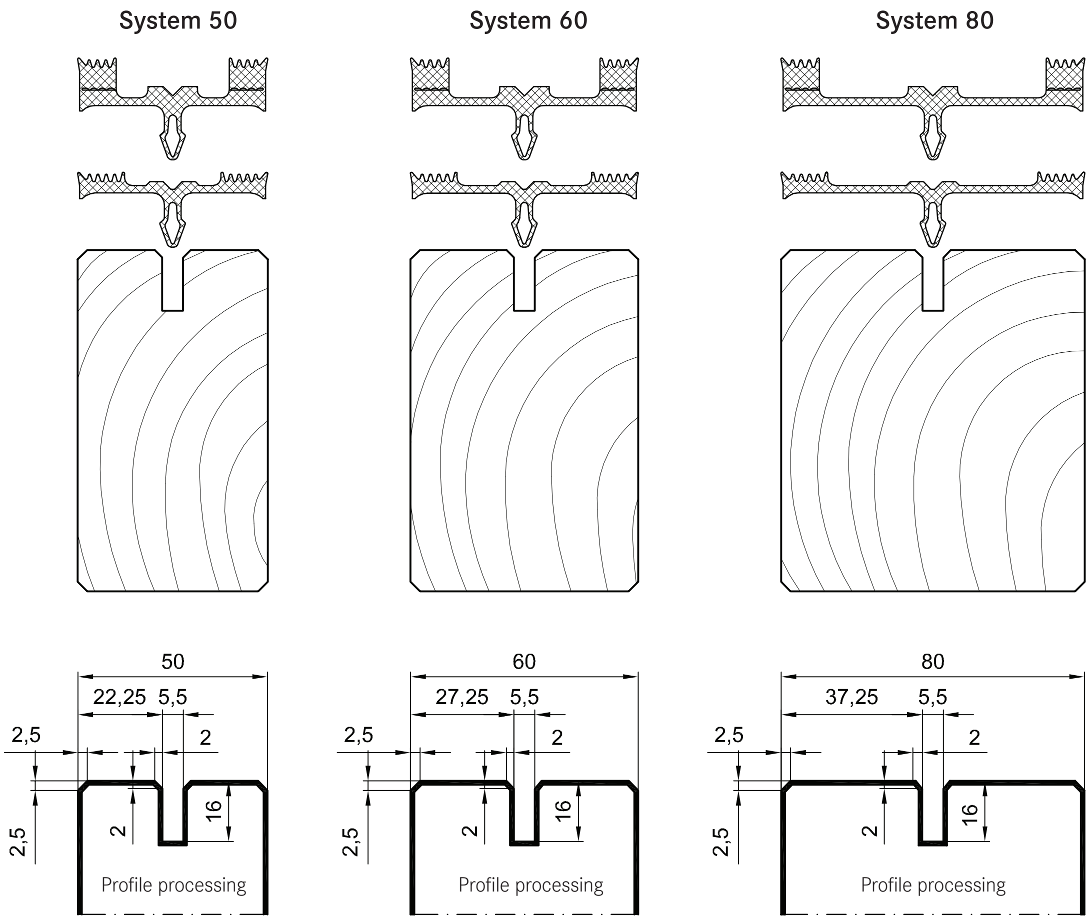
The use of comparable hardwoods is also permitted.

We prescribe the necessary geometry around the seal support and in regard to the screw fittings required for our systems.

Note:

Worked grooves and edges must be free of shavings and imperfections.

When using hardwood cylinders for glass supports GH 5053 and GH 5055, you must not make a groove in the cylinder. The sealing base is removed around the cylinder.



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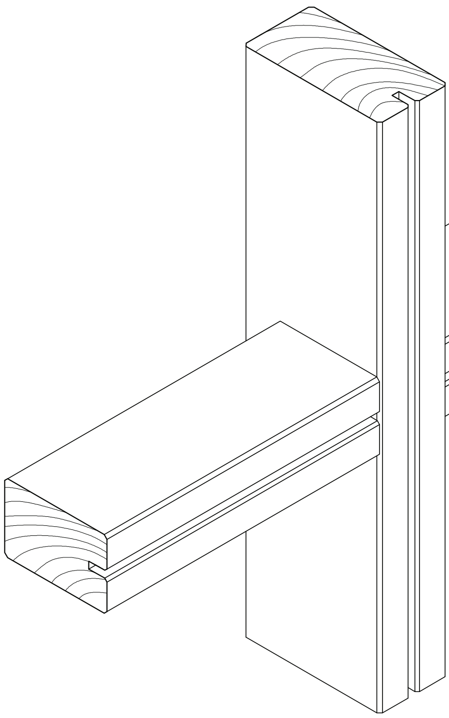
Mullion-transom joint

Principle

- Attachment of the transoms to the mullions must match the static base system of the mullion-transom design selected.
- Load bearing capacity and suitability are to be statically demonstrated on site. In doing so, the design and technical processing experiences of the processor can be considered.
- Designs are to be chosen that can be considered regular joints for the intended purpose and meet the standards of the Eurocode 5 (DIN EN 1995) or are covered by general building approvals.
- The solutions presented by us are purely examples. A range of designs are possible depending on the shape of the wood and different jointing options.



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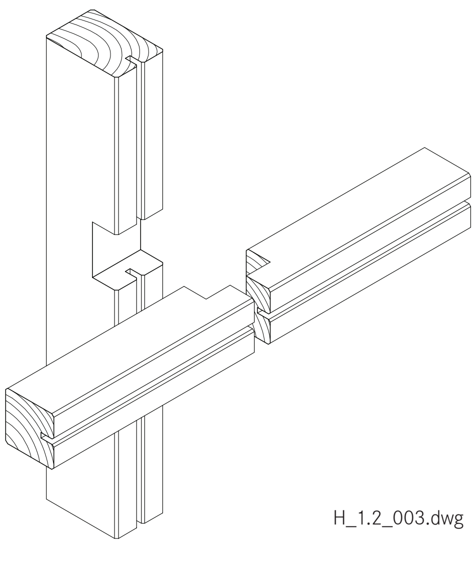

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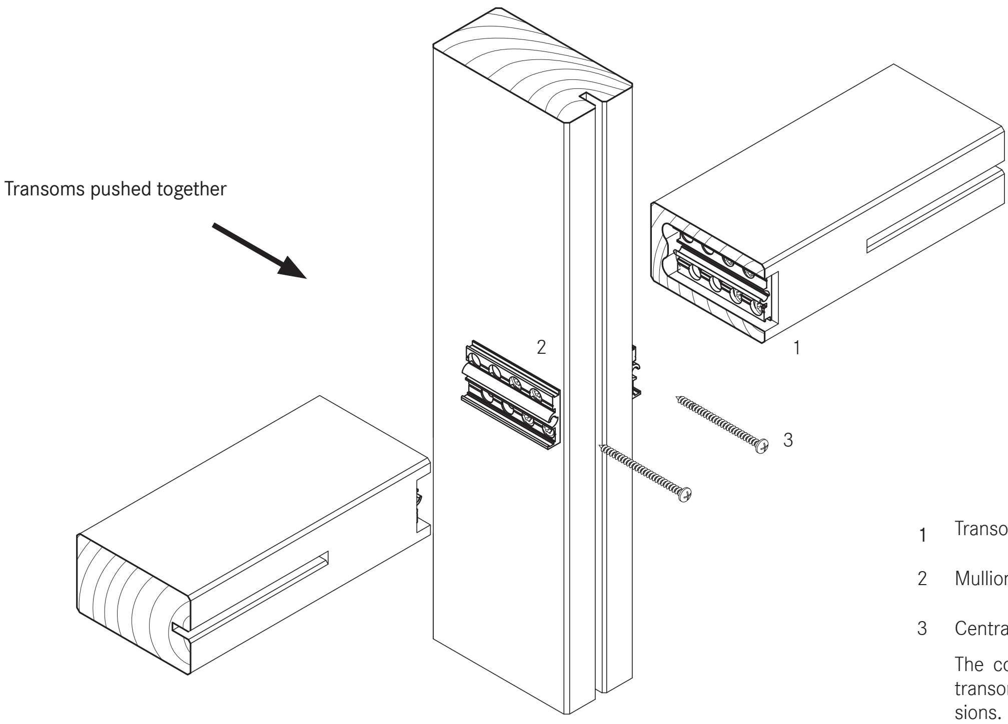
Mullion-transom joint

RHT transom connector for wood systems

- The RHT links wooden mullion and transom constructions with a visible width of 50–80 mm.
- The two identical connector parts are mounted to mullions and transoms and linked with one another by pushing together the transoms.
- A connecting screw locks the connection in all three dimensions.
- The clamping foot on the transom inner seal must be disengaged in the area of the mullion-transom joint.
- When attaching the clamping strips to the system, take care to place the screws outside of the mullion-transom connection in order to avoid a collision with the RHT connector screw fittings.
- The central wooden groove in the transom should begin approx. 80 mm before the end of the transom.
- The glass support should be mounted approx. 100 mm from the end of the transom to prevent any collision between the RHT screws in the transom.



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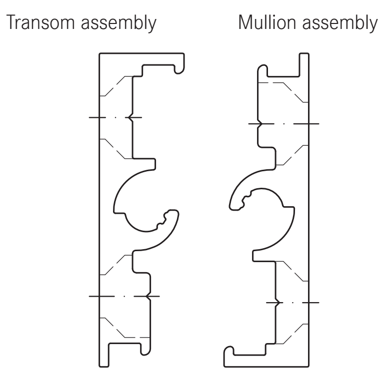
1 Transom assembly

2 Mullion assembly

3 Central connecting bolt

The connecting bolt tensions the transom holder in all three dimensions.



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STABALUX

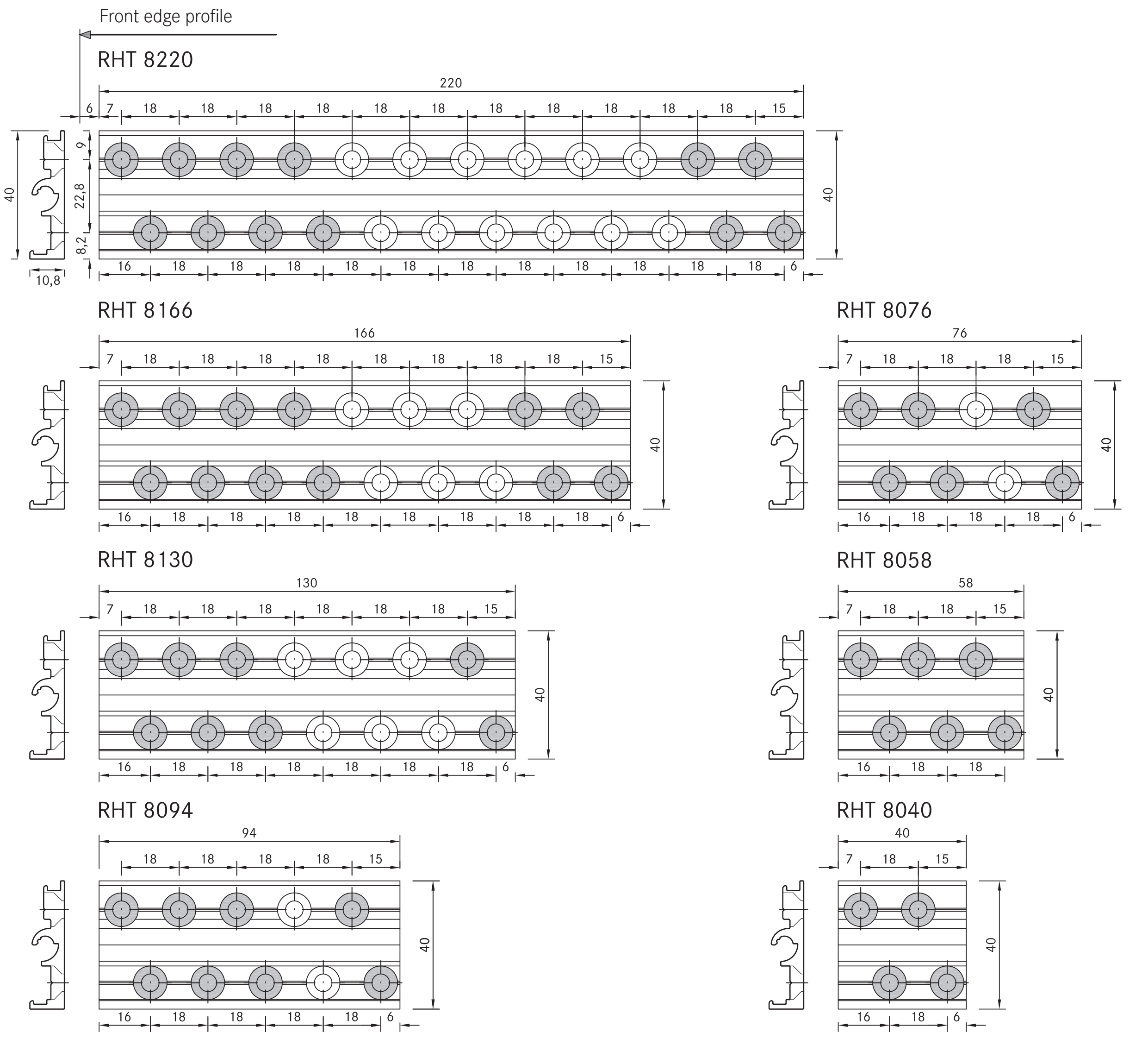
Mullion-transom joint

1.2
3

RHT for wood systems - types

- The range comprises 7 RHT types with different lengths and therefore different load-bearing capacities.
- The screw group comprising a larger number of screws (shown in the diagram) is positioned toward the front edge of the mullion and transom (glass side).

Connector types
Standard screw fittings



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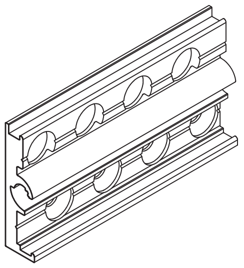
Mullion-transom joint

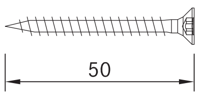
Assembly on the mullion

- The front edge of the connector lies 6 mm behind the front edge of the mullion.
- Z 0126 screws in length 5/50 are always used for attaching to horizontal timbers (mullions).
- When using hard woods or when working near the edge of the wood, a hole of 3 mm diameter should be pre-drilled.
- The number of screws varies for standard screw fittings , depending on the connector type. (Refer to the previous page)
- A combination of screws can be used and calculated case-by-case.

Mullion assembly

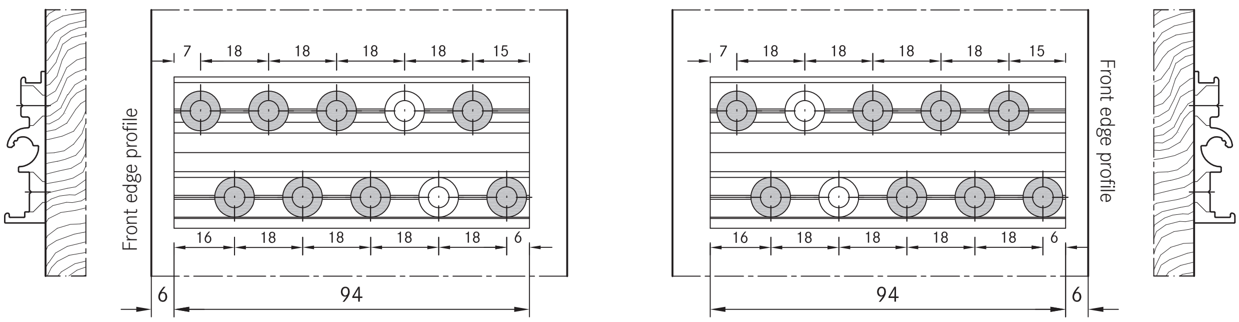


Screw fittings mullion Z 0126



Left mullion with connector e.g. RHT 8094

Right mullion with connector e.g. RHT 8094



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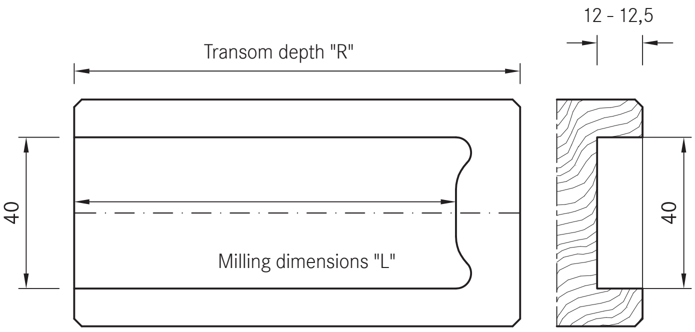
Mullion-transom joint

1.2
3

Assembly on the transom

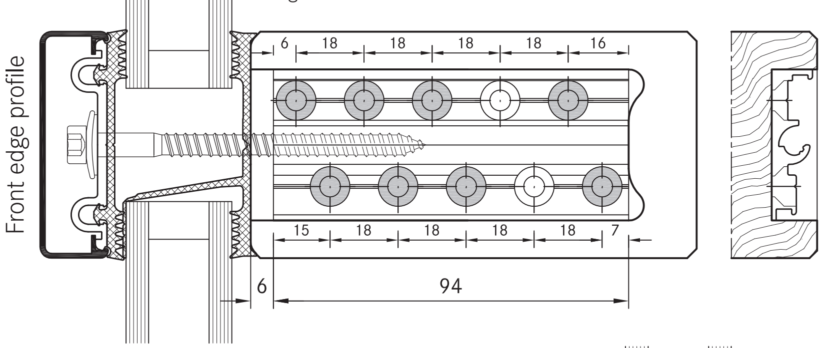
- A recess with 12-12.5 mm depth is milled into the (front of the) transom.
- The milling dimensions are:
  With x length x depth
  40 x (RHT length + 6) x 12-12.5 (mm)
- The milling can be carried out using a standard hand router.
- The front edge of the connector lies 6 mm behind the front edge of the transom.
- Z 0127 screws in length 5/80 are always used for attaching to longitudinal timbers (transoms).
- When using hard woods or when working near the edge of the wood, a hole of 3 mm diameter should be pre-drilled.
- The number of screws varies for standard screw fittings , depending on the connector type. (Refer to the previous page)
- A combination of screws can be used and calculated case-by-case.

Connector type	Transom depth R (mm)	Milling dimensions L (mm)
RHT 8040	55-73	46
RHT 8058	74-91	64
RHT 8076	92-109	82
RHT 8094	110-145	100
RHT 8130	146-181	136
RHT 8166	182-235	172
RHT 8220	236-300	226

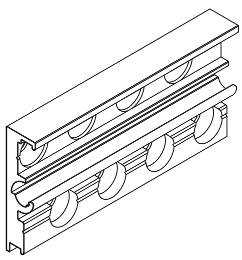


Front-side transom groove, depth 12-12.5 mm

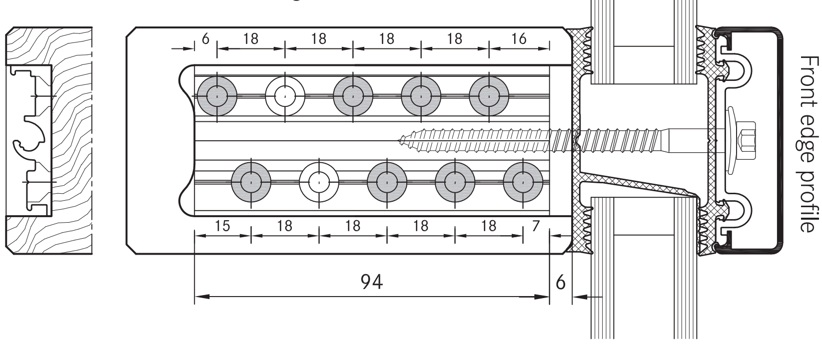
Transom with connector, right front side
e.g. RHT 8094



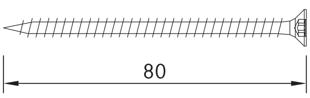
Transom assembly



Transom with connector, left front side e.g. RHT 8094



Screw fitting, transom Z 0127



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Mullion-transom joint

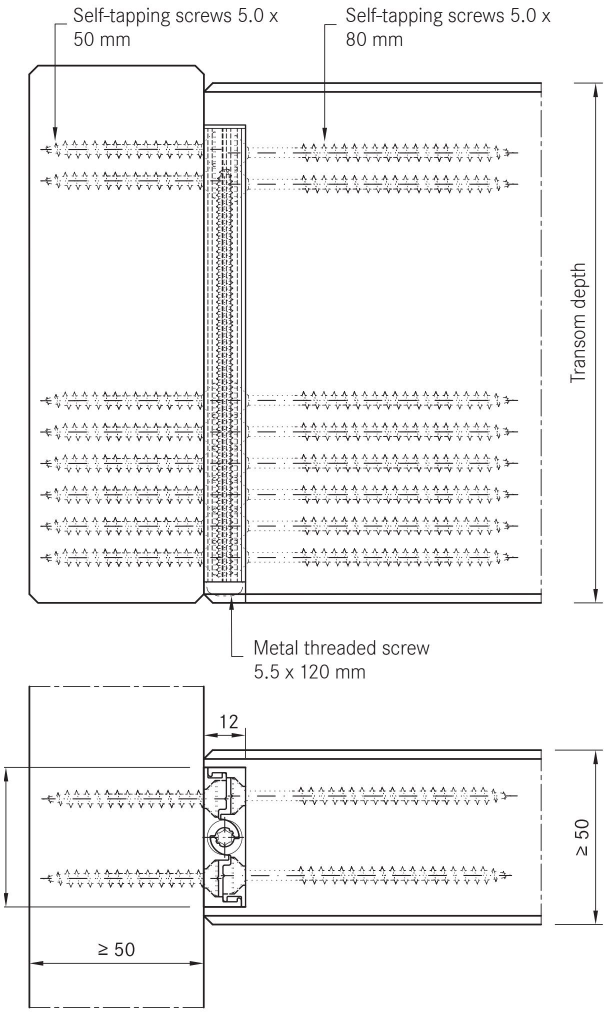
Constructing the timber joint

- The transom is pushed in from the inside to the outside.
- Screwing in the greased connecting screw allows the locked mullion-transom joint to be released in all three dimensions if necessary. This tightens the transom evenly to the mullion along the entire depth.

Linked connectors

- If the transom depth is over 300 mm, 2 connectors can be used along the entire length to improve tensioning of the mullion-transom joint.
- The connector type RHT 8220 is always used on the front edge of the profile. Another connector can be fitted on the RHT 8220 as required.
- A peg is inserted and positioned correctly by the into the connecting screw in order to improve tensioning of the second connector.
- The maximum load-bearing capacity of the RHT 8220 applies in regard to resilience.
- By request, a connector longer than 220mm can be produced. The maximum load-bearing capacity of the RHT 8220 is also valid here.

Example: RHT 8130 top and side views



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Tips for laying seals

Sealing system principle, general information about glazing seals

The Stabalux sealing system consists of the outer and inner sealing sections:

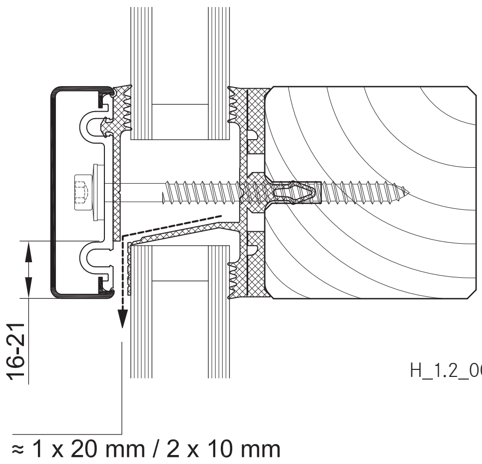
- The outer sealing section has the primary function of preventing the ingress of moisture. At the same time, the sealing section provides a flexible support for the glass panes.
- The inner sealing section acts to protect the inner space, water guiding section and elastic glass supports from moisture and vapour.

Both sealing sections must perform this function over a long period of time.

Seals should be adapted at the building site, but can be pre-cut to length in the factory and inserted into the support profiles, i.e. the camping strips, with proper consideration of the assembly instructions for the seals. Always ensure that seals are not bearing any loads once installed and are firmly pressed onto joints. All joints should be sealed as per the following descriptions.

Pressure equalisation and controlled drainage

Pressure equalisation is generally achieved via openings at the base, head and ridge points. Should additional ventilation be required in the area of the transom (e.g. where panes are only supported on 2 sides or where transom length is $\ell \geq 2$ m), then this ventilation should be created by placing holes into the cover strip and/or using notches on the lower sealing lips of the outer seal.



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The pressure equalisation openings also serve to extract moisture. The inner sealing section is formed in such a way that when the joints are properly sealed, any moisture that occurs and does not dissipate via the rebate ventilation will drain away downwards. In facades, water is guided via the seal flap into the mullions. There is a choice between using tested sealing systems with between 1 and 3 levels. With inclined glazing with 2 drainage levels, the higher sealing section of the transom overlaps the lower mullion seal. These principles must be consistently implemented down to the lowest point of the glazing so that the water-guiding level of the structure carries moisture to the outside. Film is placed beneath the seals accordingly. It must be ensured that the film will last for a long time.

Fire seals

Like all organic materials, elastomers are combustible if they are exposed to high temperatures for a sufficient period in the presence of oxygen. Inorganic substances are added to the seals in order to reduce their combustibility. The proportion of inorganic substances positively influences the flame-retardant properties, but they also make the products harder and reduce their mechanical strength. It is therefore imperative when fitting fire seals to ensure that the structure is absolutely flat and that the sealant joints connect precisely.
Depending on their geometry, it may be necessary to stretch fire seals into a mountable form, i.e. to leave them to settle into their mountable form, once they have been removed from their rolled packaging. Warm temperatures also make the seals more malleable and therefore facilitate installation.

Tips for laying seals

Inner sealing section

The structure of the inner sealing section is different for **vertical** facades and facades with an inward incline up to 20° as well as **roof glazing**.

Inner sealing for vertical glazing and glazing with an inward incline up to 20°:

- 5 mm high butt jointed seals with a drainage section for vertical facades (α=0°)

- 10 mm high seals with two drainage sections to safely guide away any moisture or condensation to the outside. These seals are created by overlapping the seal joints in which the higher sealing section of the transom goes underneath the lower level of the mullion. These seals can be used for vertical facades and facades with an incline up to 20°.

- 12 mm high seals follow the same principle, but allow an additional third drainage section for an intermediate mullion.

- The shaped seal flap protects the vulnerable area of the rebate and ensures that moisture is drained away via the vertical or up to 20° inwards inclined mullions.

Inner seals for glazed roofs:

- A special seal geometry for glazed roofs also allows for two-level stepped drainage. The 10 mm high seals are laid with overlapping joints.

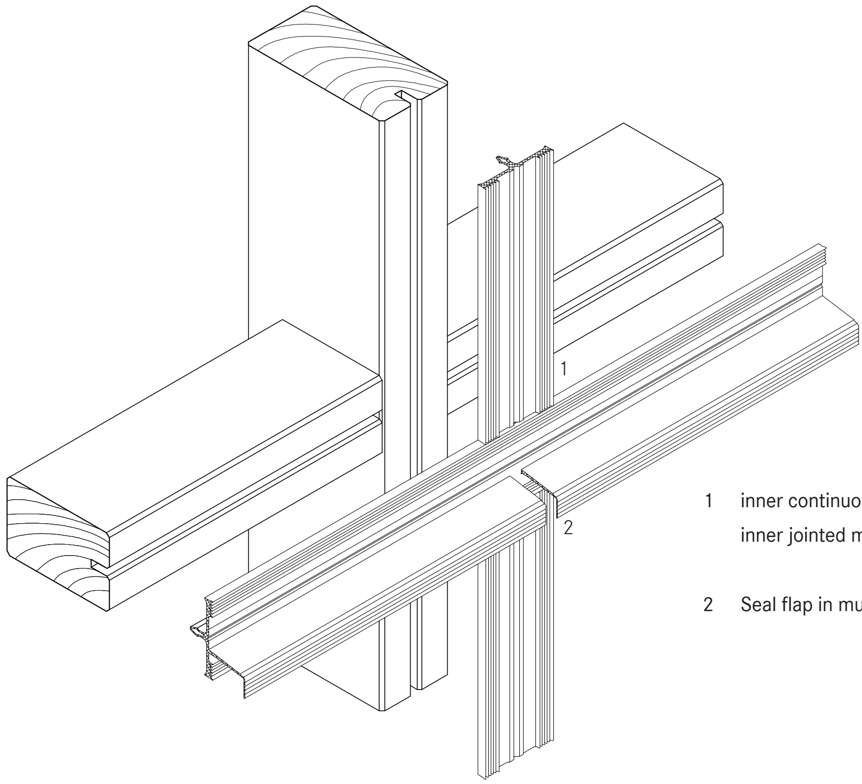
Some basic information for sealing and sticking down Stabalux seals

- All joints and seal penetrations must be waterproofed with the exception of the Stabalux screw fittings.
- Gasket joints should always be sealed using Stabalux sealant, regardless of whether they are butt joints or overlapping. (We recommend Stabalux connecting paste Z 0094. Pay attention to the directions provided by the manufacturer).
- For difficult to seal places we recommend first using a fixing adhesive such as the Stabalux quick fixing glue Z 0055.
- Before gluing, ensure all surfaces are free from moisture, dirt and grease.
- Weather conditions such as snow and rain prevent an effective seal.
- Temperatures below +5 °C are not suitable for fixing seals.
- The hardened connecting paste should not prevent level support of glass.

Seals - Facade

Assemble the inner seal on vertical facade glazing - 1 level join

- The horizontal transom seals are laid continuously across the mullion-transom joints. Ensure here that the clamping feet of the horizontal seal are released around the mullion.
- Mullion seals are butt jointed to the transom seals.
- The clamping foot on the transom seal must be disengaged in the area of the mullion-transom joint if wood connectors types RHT 0041 to RHT 0131 are used.
- The seal flaps should be released to a width of 10-15 mm at the mullion joint.
- The protruding length of the seal flap should be removed at the perforation once glazing is completed.
- In order to safely drain away moisture from transoms even at the edges of the facade, the inner transom seals must be laid into the released mullion seals. To release and remove the clamping feet we recommend using our release pliers Z 0078 for System 60 and Z 0077 for System 50.
- Ensure all joints are cleanly and solidly sealed. Excess sealant should be removed.



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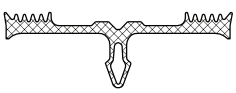
1 inner continuous transom seal, inner jointed mullion seal

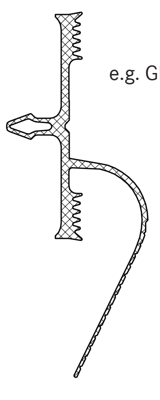
2 Seal flap in mullion area released

Inner seal mullions



e.g. GD 6202

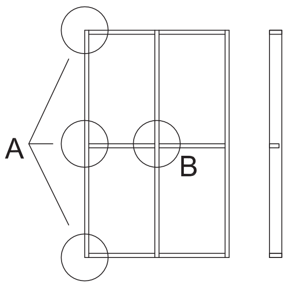
Inner seal transoms



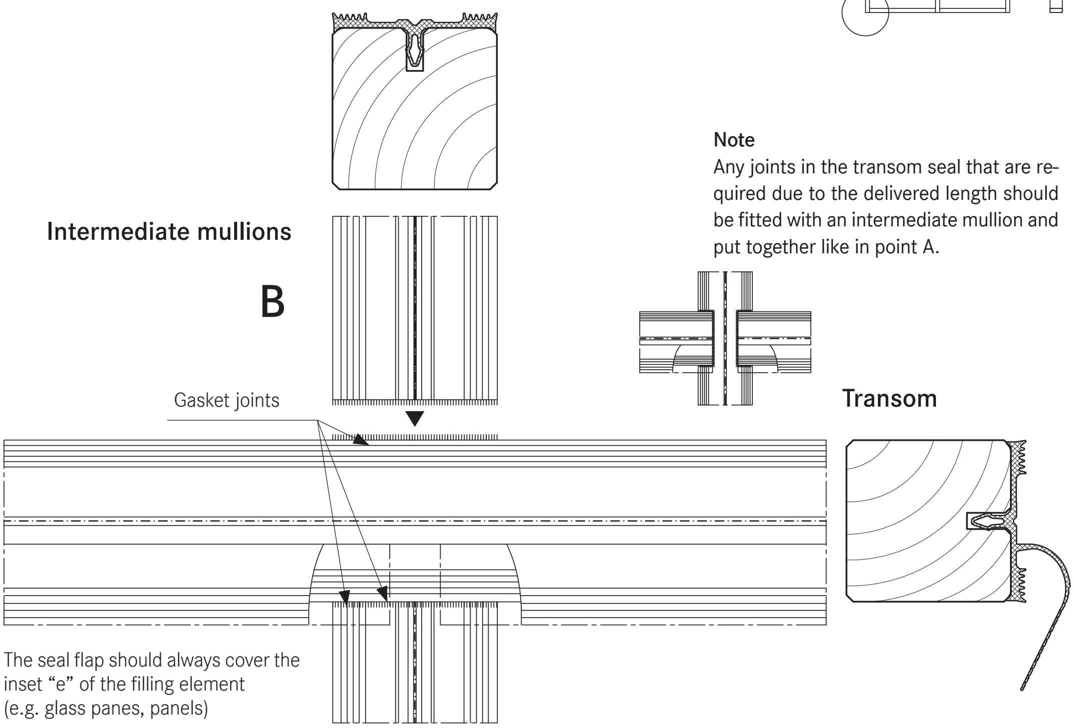
e.g. GD 6204

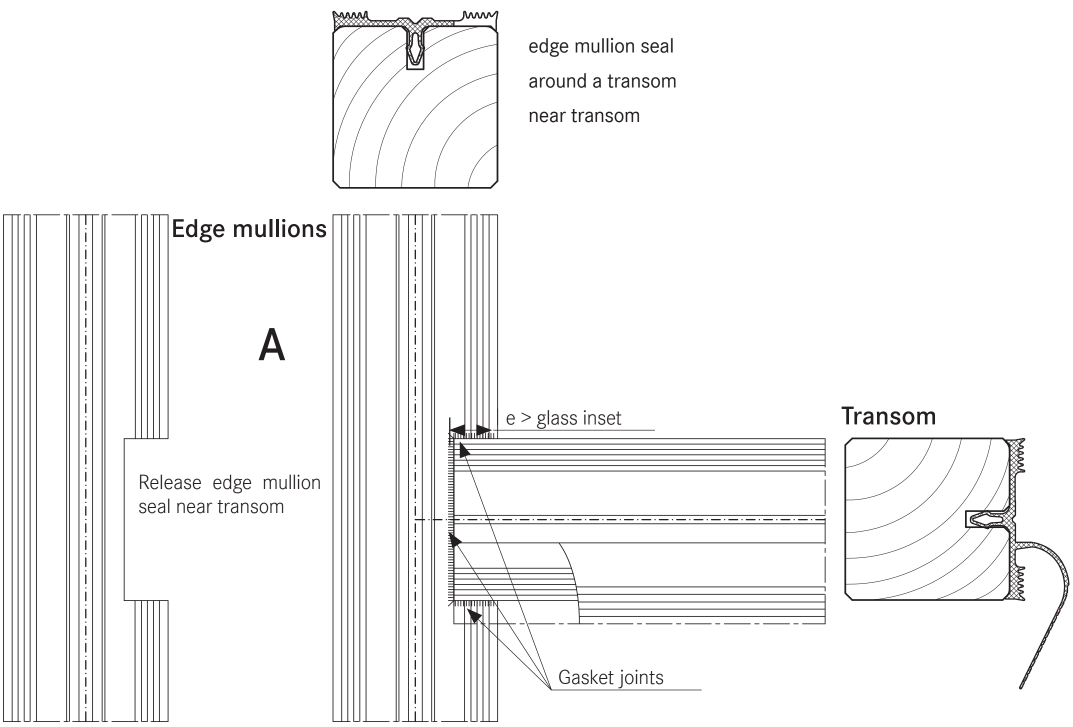
Seals - Facade

Assemble the inner seal on vertical facade glazing - 1 level join



Note
Any joints in the transom seal that are required due to the delivered length should be fitted with an intermediate mullion and put together like in point A.





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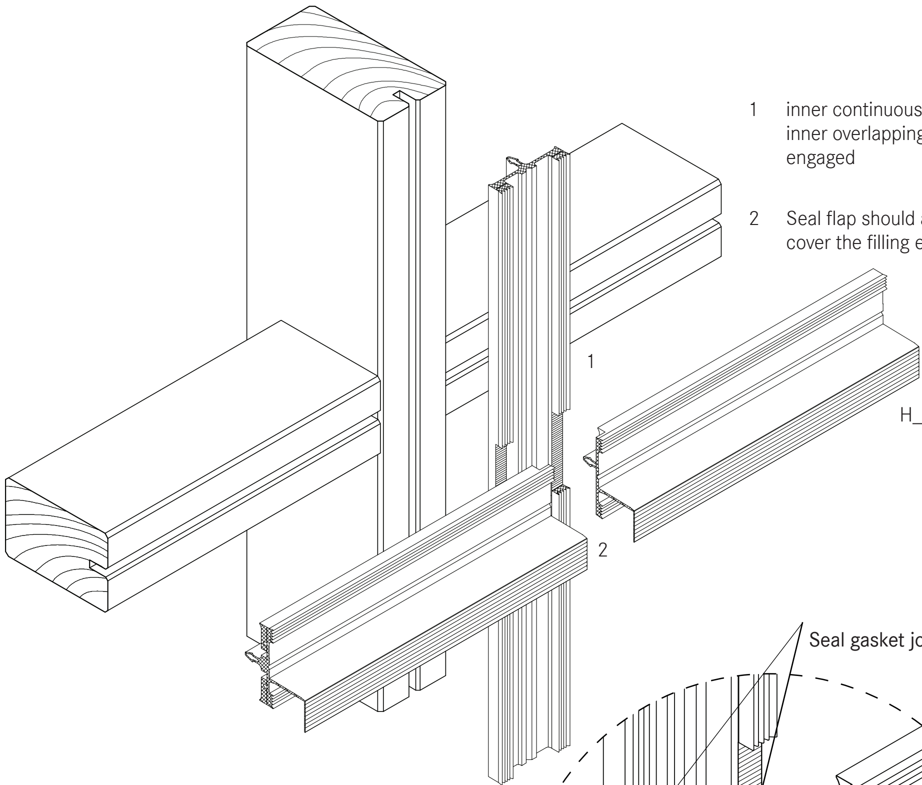
Seals - Facade

Assembly of the inner seal for vertical facade glazing and facade glazing with an incline of up to 20° - 2 overlapping sections

- The 10 mm high seals can be divided across their height to allow a simple overlap at critical transom joints.
- The vertical seals for the mullions (2nd drainage section) are laid continuously.
- The transom seals overlap the mullion seals.
- Moisture and condensation is guided away via the seal flap of the transom seal (1st drainage section) to the main mullion.
- The seal flap must always cover the inset depth of the glass panes and filling element.
- The protruding length of the seal flap should be removed at the perforation once glazing is completed.
- All joints must be sealed. Before laying seals, we recommend completely coating the support surfaces and edges with Stabalux connection paste.
- Ensure all joints are cleanly and solidly sealed. Excess sealant should be removed. Absolutely no unevenness in the glass support surface must occur from applying sealant too thickly.



1 inner continuous mullion seal, inner overlapping transom seal, engaged

2 Seal flap should always cover the filling element

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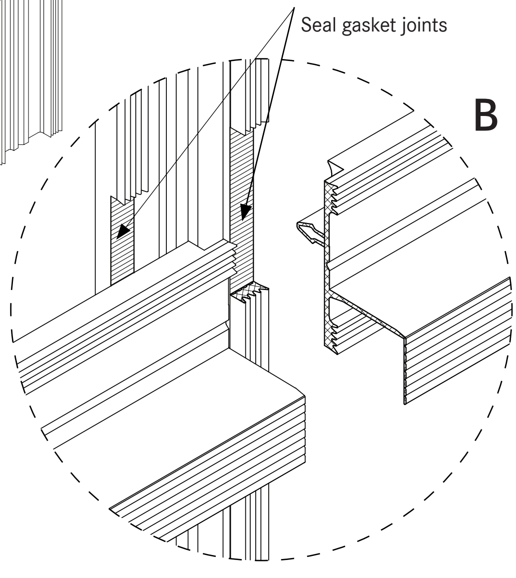
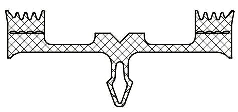
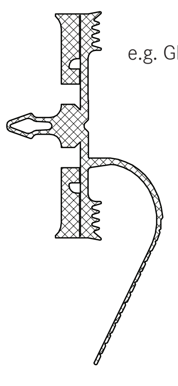


Inner seal mullions



e.g. GD 6206

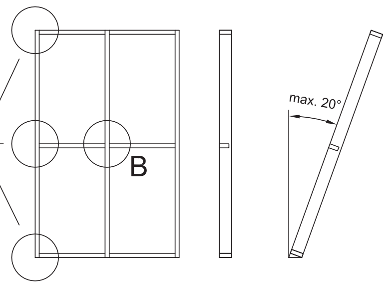
Inner seal transoms

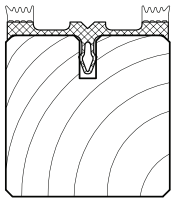


e.g. GD 6303

Seals - Facade

Assembly of the inner seal for vertical facade glazing and facade glazing with an incline of up to 20° - 2 overlapping sections

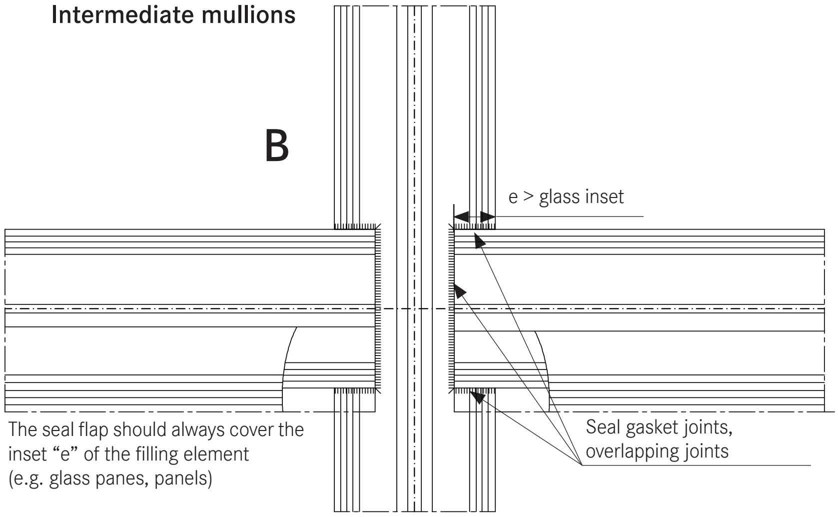




Mullion seals
around a transom upper section
to the width of the transom seal

Intermediate mullions

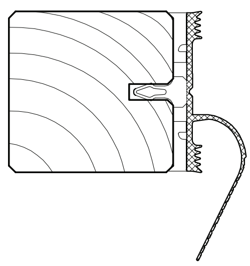
B

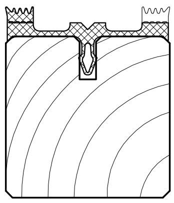


The seal flap should always cover the inset “e” of the filling element (e.g. glass panes, panels)

Transom

Transom seal
separate lower section at length of the overlap “e”

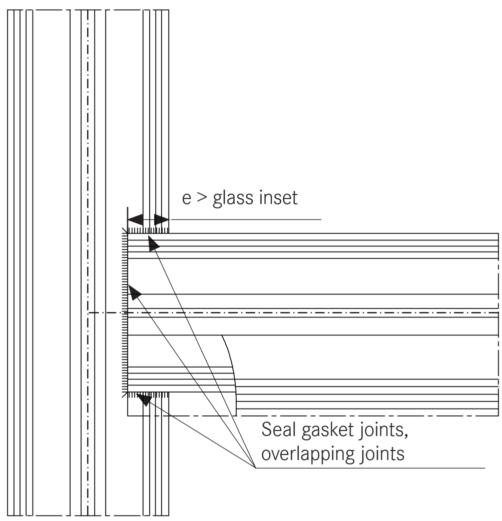




edge mullion seal
around a transom upper section
to the width of the transom seal

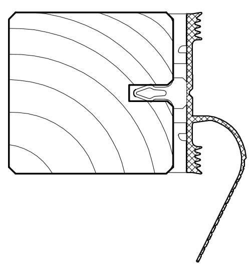
Edge mullions

A



Transom

Transom seal
separate lower section at length of the overlap “e”



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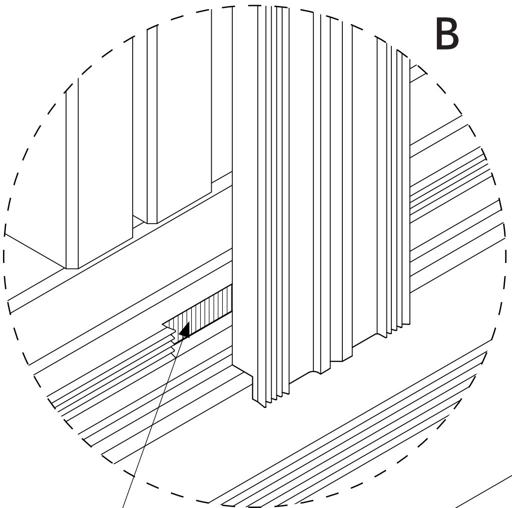
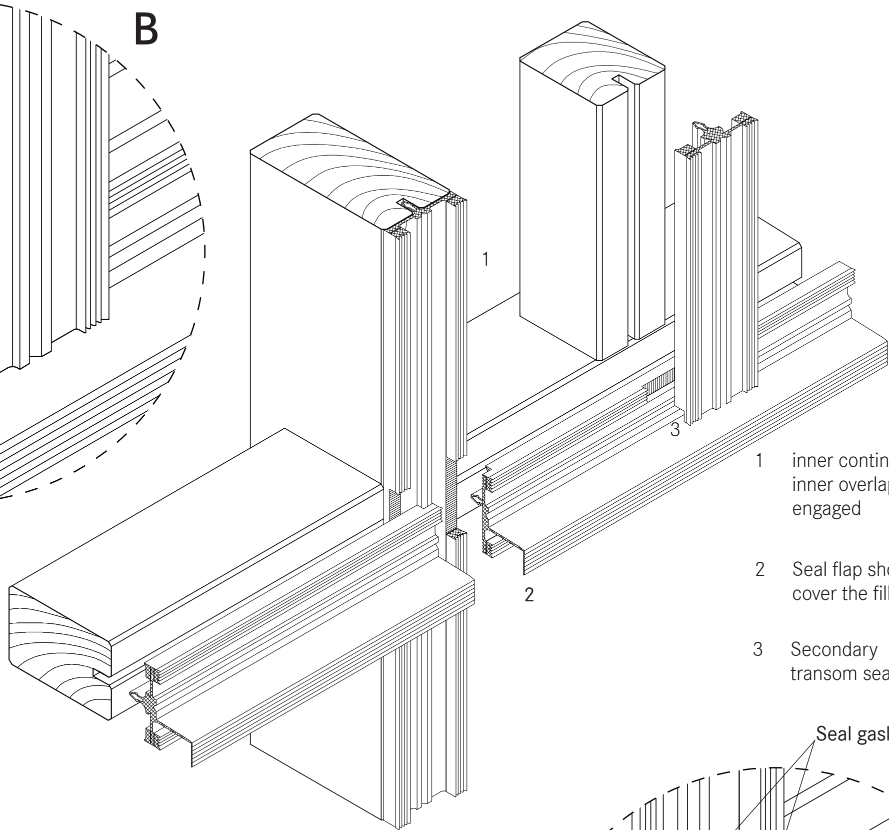
Seals - Facade

Assembly of the inner seal for vertical facade glazing and facade glazing with an incline of up to 20° - 3 overlapping sections

- Optionally, Stabalux seals with three offset water channels can be used in the facade area which safely drain any moisture or condensation to the outside.
- The 12 mm high seals can be divided across their height to allow a simple overlap at critical secondary mullion/transom joints and/or transom/primary mullion joints.
- The vertical seals for main mullions (3rd drainage section) drainage section) are laid continuously.
- The transom seals overlap the main mullion seals.
- Along a transom, seals must be laid continuously.
- Moisture and condensation is guided away via the seal flap of the transom seal (2nd drainage section) to the main mullion.



Seal gasket joints

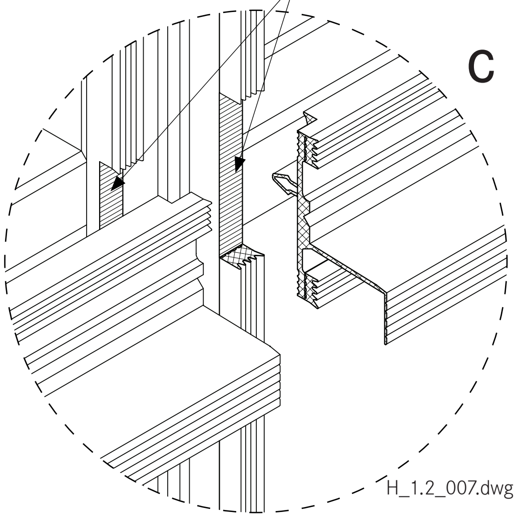


1 inner continuous mullion seal, inner overlapping transom seal, engaged

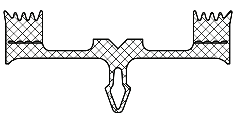
2 Seal flap should always cover the filling element

3 Secondary mullion seal overlaps the transom seal

Seal gasket joints

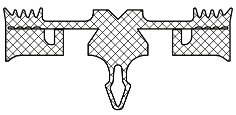


Inner seal main mullion



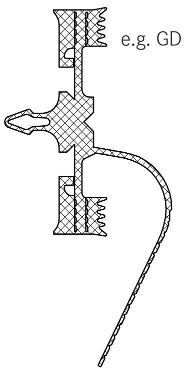
e.g. GD 6314

Inner seal secondary mullion



e.g. GD 6315

Inner seal transoms



e.g. GD 6318

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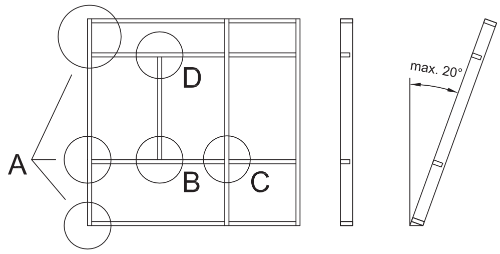
Seals - Facade

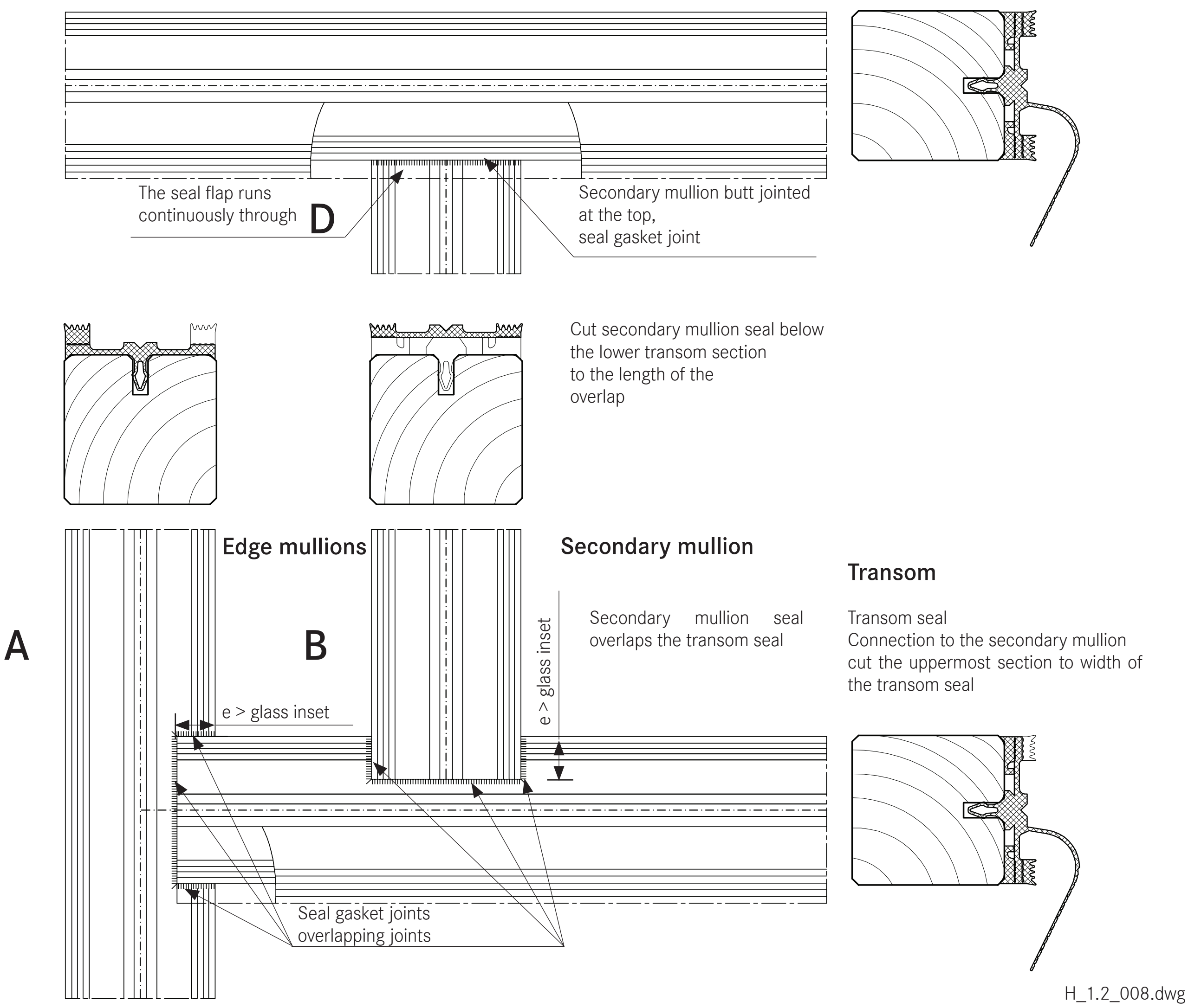
1.2
5

Assembly of the inner seal for vertical facade glazing and facade glazing with an incline of up to 20° - 3 overlapping sections



- The seal flap must always cover the inset depth of the glass panes and filling element.
- The protruding length of the seal flap should be removed at the perforation once glazing is completed.
- Vertical seals on the secondary mullion are butt jointed beneath the upper transom. The seal flap of the upper transom runs continuously in the upper part of the joint.
- Drainage of the secondary mullion (1st drainage section) is achieved by overlapping the seals of the secondary mullion with the seal of the upper transom.

Transom



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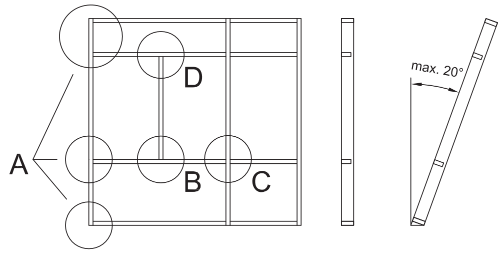
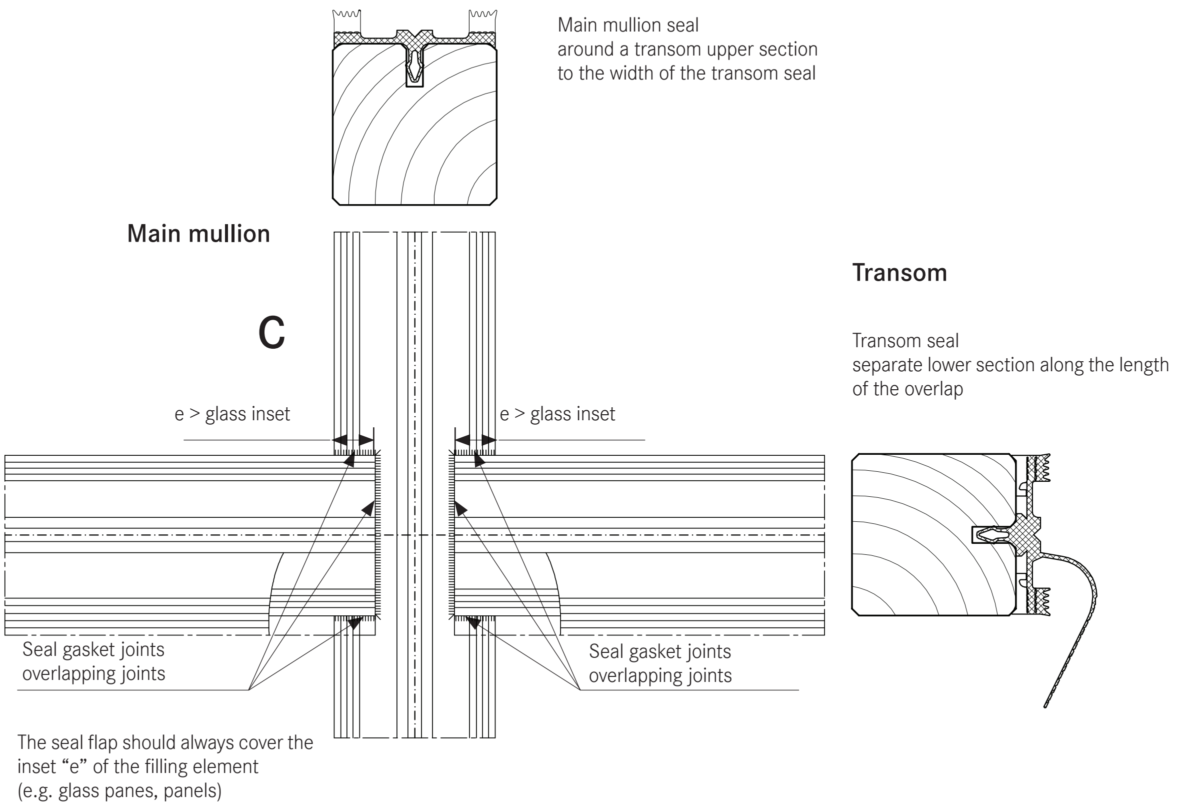
Seals - Facade



Assembly of the inner seal for vertical facade glazing and facade glazing with an incline of up to 20° - 3 overlapping sections

- All joints must be sealed. Before laying seals, we recommend completely coating the support surfaces and edges with Stabalux connection paste.
- Ensure all joints are cleanly and solidly sealed. Excess sealant should be removed. Absolutely no unevenness in the glass support surface must occur from applying sealant too thickly.



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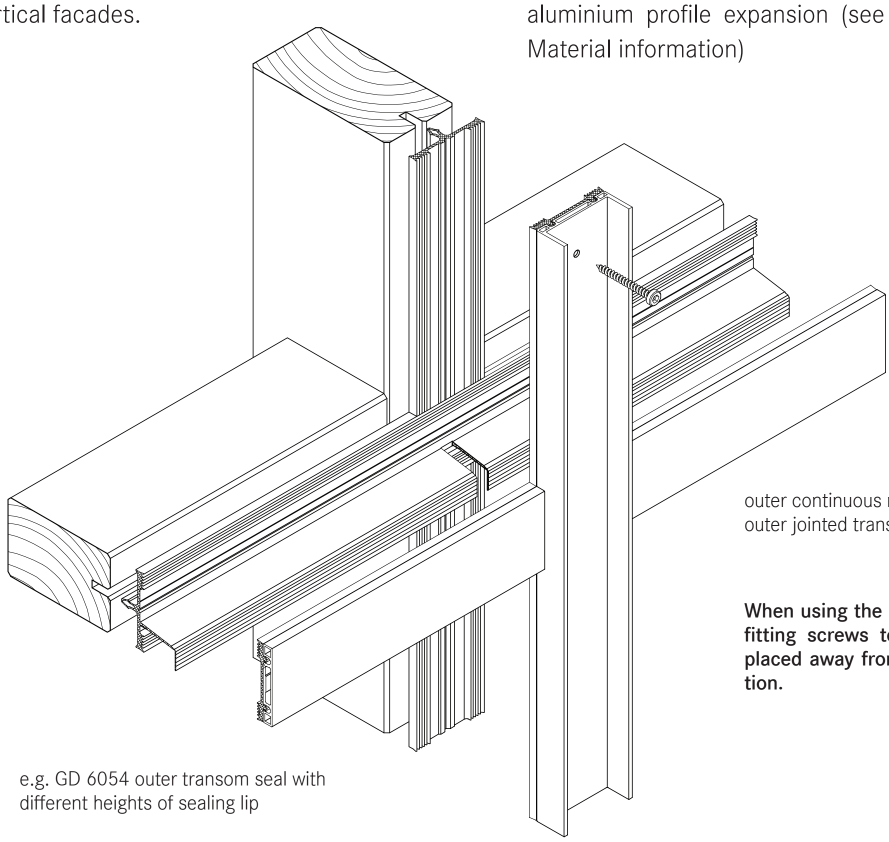
Seals - Facade

Assembly of the outer seal for vertical glass facades

- As well as gently clamping the glass in place, the outer sealing system has the primary task of protecting the rebate against moisture ingress.
- The outer sealing sections must be completely sealed except for the necessary openings for pressure equalisation and condensation dissipation.
- The outer mullion seals are laid continuously and the transom seals are joined.
- Sealant joints are to be laid flat with a slight excess in dimensions. Exact specifications depends on the situation in which the system is used.
- Tightly fitted sealant joints can be implemented without fixing the outer seal of the mullion-transom joint in vertical facades.
- The flag for the inner transom joint in combination with the outer seal creates additional safety.
- The seal flap should be separate at its perforations to match the thickness of the glass in order that this is clamped down and concealed under the outer seal.
- Different heights of sealing lips on the outer seal bridge the height different created by the seal flap in the outer sealing section.
- Differently high, split seals allow a balance between filling elements of different total thickness of up to 6 mm
- When mounting the clamping strips, be aware of aluminium profile expansion (see section 1.2.1 - Material information)



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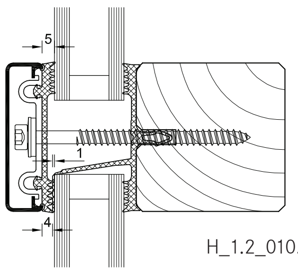
outer continuous mullion seal,
outer jointed transom seal

e.g. GD 6054 outer transom seal with different heights of sealing lip

When using the RHT connector, take care when fitting screws to ensure that the screws are placed away from the mullion-transom connection.



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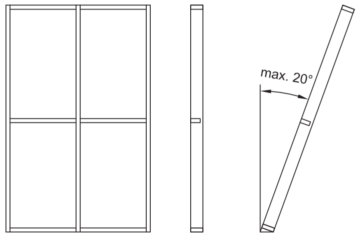
Expansion of aluminium profiles

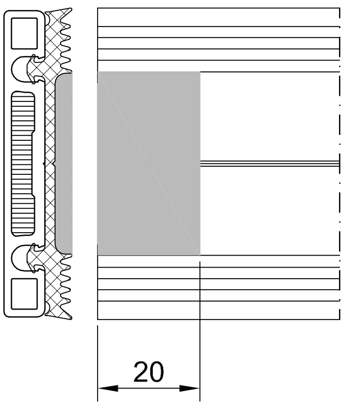
Rod length ℓ	Temperature difference	Longitudinal expansion
(mm)	ΔT	$\Delta\ell$ (mm)
1000	40°C	1
3000	40°C	3
1000	60°C	1.5
3000	60°C	4.5
1000	100°C	2.5
3000	100°C	7.5

Seals - Facade

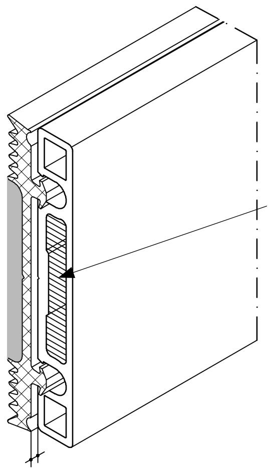
Assembly of the outer seal for facade glazing with an inwards incline up to 20°.



- If the facade is inclined inwards from the vertical (max. permitted incline 20°), the open ends of the outer transom seals must be closed up using Butyl.
- When constructing inwardly inclined facades (up to max. 20°), if flat cover strips are used in the transoms (e.g. DL 5059, DL 6059, DL 5061, DL 6061, DL 5067, DL 6067, DL 5071, DL 6071, DL 6043, DL 6044) and flat pressure and cover profiles (e.g. UL 6005 with OL 6066), then the central hollows at each end must be sealed with silicone.



Seal open ends of the transom seals with Butyl on inwardly inclined facades (up to max. 20°).



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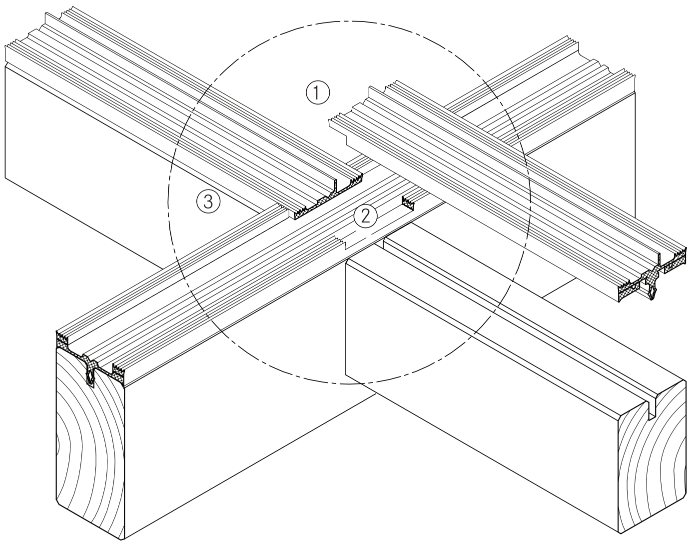
When using flat cover strips on inwardly inclined facades (up to max. 20°), the central hollow at each end should be sealed with silicone.

Trim the seal to be slightly larger than required.

Seals - roof

Assemble the inner seal for roof glazing

- Optionally, Stabalux seals with offset water channels can be used in the facade area which safely drain any moisture or condensation to the outside.
- The 10 mm high seals can be divided across their height to allow a simple overlap at critical transom joints.
- The transom seals are geometrically shaped so as to create a condensation channel.
- This channel drains from the overlapping transom joint in the rafters.
- Along a transom, seals must be laid continuously.
- All joints must be sealed. Before laying transom seals, we recommend completely coating the support surfaces and edges. Absolutely no unevenness in the glass support surface must occur from applying sealant too thickly.



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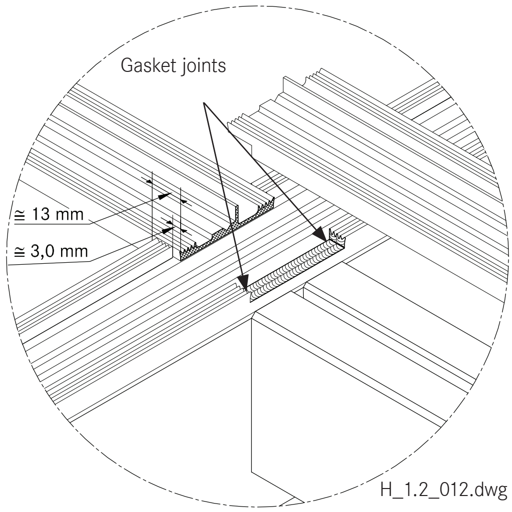
1 remove the lower perforated part and the clamping foot on the transom seal of the at around 15 mm

2 remove the upper perforated part on the rafter seals

3 length of transom seal = transom length + ≈ 13 mm per side



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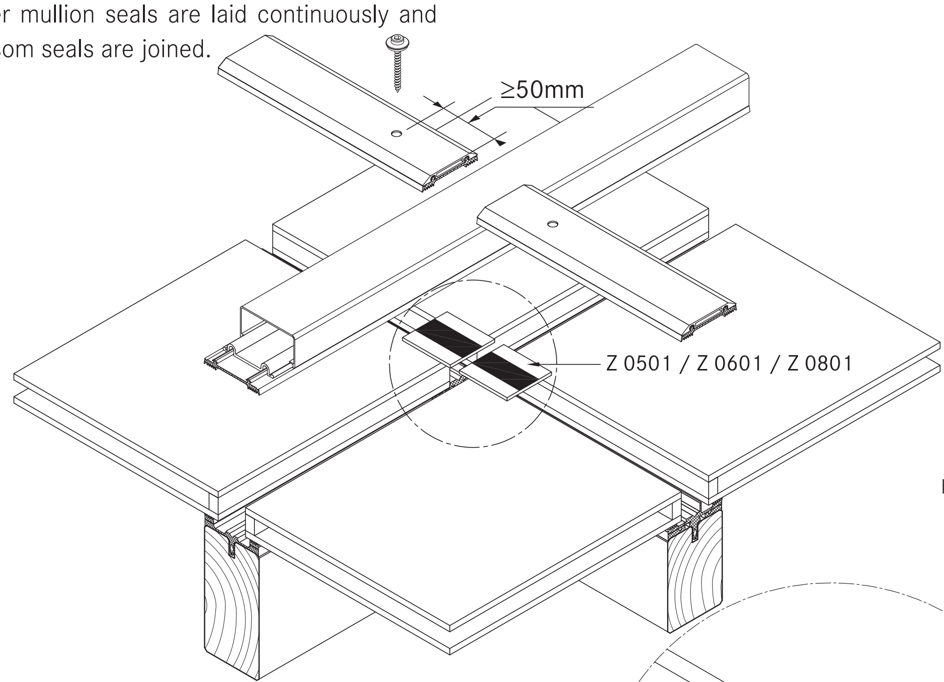
Seals - roof

Assembly of the outer seal for for glazed roofing

- These are laid in fundamentally the same way as for vertical glazing. Split seals such as GD 1932 are not suitable for transom seals in roofs. Split seals can only be installed in mullions in combination with slab insulation. Each installation situation will differ to some degree and always check how well sealed it is.
- For cross joints we recommend using our self-adhesive stainless steel sealing plates Z0801 for System 80, Z 0601 for System 60 and Z 0501 for System 50. The stainless steel sealing plates are attached to the edge of the glass panes parallel to the mullion axis.
- Butyl tape is not suitable as a sealing tape between the glass and the outer seal.
- The outer mullion seals are laid continuously and the transom seals are joined.
- Sealant joints are to be laid flat with a slight excess in dimensions. Exact specifications depends on the situation in which the system is used.

Note:

- Horizontal clamping strips prevent the free run off of rain water and dirt.
- Cover strips and upper strips with angled edges reduce the build up of water in front of the clamping strip.
- Shorten the clamping strips on the transoms by 5 mm in the area of the transom joins in order to improve drainage of water. Gasket joints, however, are to be laid flat with a slight excess in dimensions. Open ends of transom clamping strips (upper and cover strips) should be sealed.



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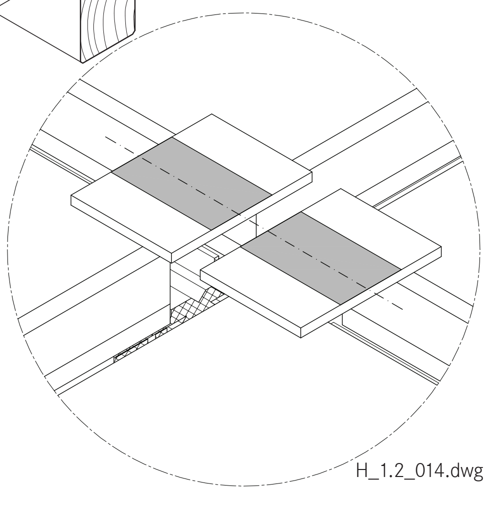
Detail of sealing plate Z 0501 = 60 x 40 mm
Z 0601 = 60 x 50 mm
Z 0801 = 70 x 70 mm

Attention: The sealing plates must be placed central to the transom axis!

For glass insets of 15 mm, the first screw fittings for the transom cover strip begin 50 mm from the end of the cover strip.



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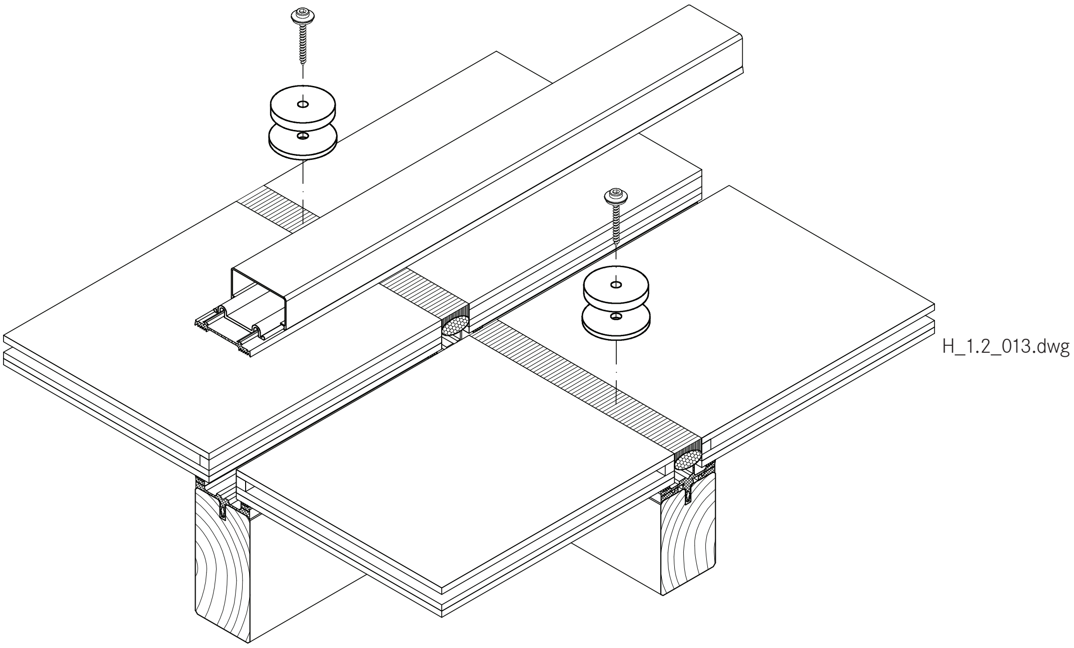
Seals - roof

Assembly of the outer seal for for inclined glazed roofing ≥ 2°.

- These are laid in fundamentally the same way as for vertical glazing. Split seals around the mullions in roofs such as GD 1932 are only suitable when using in combination with slab insulation. Each installation situation will differ to some degree and always check how well sealed it is.
- To ensure free run-off of rain water and dirt on roofs inclined ≥ 2°, we recommend not using clamping strips in the transoms.
- Instead, the rebate spaces should be sealed with all-weather silicone.
- Implementation of the outer sealing section around mullions is done in the same way as conventional roofs with an inclination up to 15°.
- At the high point or ridge area of the inclined glazing, it is recommended to also install and outer sealing section in the transoms with clamping strips.
- Only certified sealing materials may be used for sealing the transom rebate space.
- Pay attention to all information provided by the manufacturer and the sealing work must be carried out by trained persons. It is recommended that a licensed and certified specialist contractor is hired for this purpose. We further refer you to the DIN 52460 standard and IVD data sheets (Trade Association for Sealants).



Tips for all roof designs:

When using aluminium cover strips on roofs, take account of the expansion factor as a result of the high degree of heat absorption when selecting the length to use. Equally, the use of single-piece cover strips should be carefully considered. In this case it is recommended that holes for screwing on the cover strip are created with a diameter of d = 9 mm (refer to Section 1.2.1 - Material information).

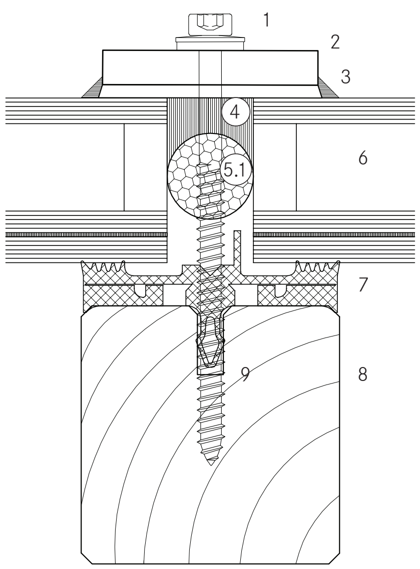
For wide spans we recommend using concealed screw fittings when selecting the clamping strips (lower + upper strip). This is the preferred option for rafters. Unused holes in the pressure profile must be sealed.
Some roof areas, such as the eaves, see the use of several different materials (glass, silicone, aluminium sheets, ...) each with different expansion coefficients. To avoid the formation of cracks, aluminium sheets should be installed with expansion joints.

Seals - roof

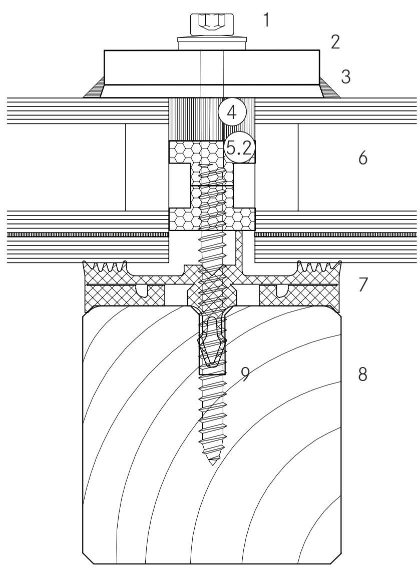
Assembly of the outer seal for for inclined glazed roofing ≥ 2°.

- The compatibility of the materials is particularly important when using all-weather silicone. In this case, the compatibility of the sealant with the edge bonding of the glass and the backfill of the joints. If self-cleaning glass is used, the compatibility must be established in advance.
- Glass sealants and edge bonding must be UV-resistant. The incline of roofs should also be taken into account. Information about UV-resistance can be requested from the manufacturer. Silicone edge bonding generally provides better UV-resistance than polysulfide-based materials. The advantage lies in its high vapour sealing properties which is particularly useful when using more volatile argon fillings.
- Highly elastic, weatherproof and UV-resistant seals meet the widest range of demands for reliable joints.
- If the silicone joint is created without additional mechanical safety devices, ensure that the glass is supported from two sides only. Selective installation of holding clamps can be used to achieve all round support for glass edges.
- The clamps are made from stainless steal with silicone washers and are screwed in the same as pressure strips. The hold-down clamp should be additionally sealed around the perimeter with silicone sealant. The design is based upon the dimensions of the glass as documented in the glass static analysis.

Transom inclined glazing ≥ 2° inclination with all-weather silicone and round section rope seal.



Transom inclined glazing ≥ 2° inclination with all-weather silicone and slab insulation.



1 Hold-down clamp
2 Silicone washer
3 Silicone sealant / seal around the clamp
4 All weather silicone seal
5.1 Round section rope seal
5.2 Slab insulation
6 Glass / filling element
7 Inner seal 10 mm transom
8 timber profile
9 System screw fittings

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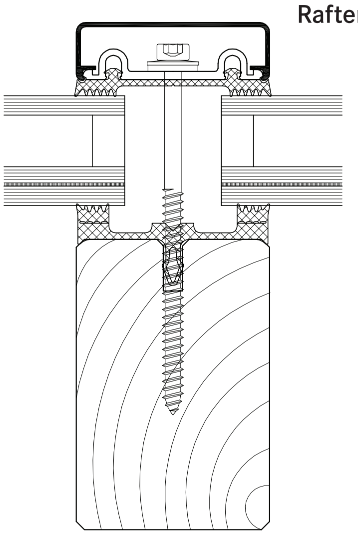
Seals - roof

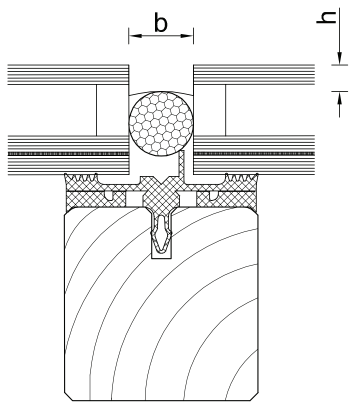
Assembly of the outer seal for for inclined glazed roofing ≥ 2°.

- The joint width and the joint height for Stabalux System H are defined as w x h = 20 mm x 10 mm. These measurements should always checked when selecting the sealing material and adapted if necessary. Generally: w : h = 2 : 1 - 3.5 : 1
- PE round section seals or Stabalux slab insulation is suitable as a back fill material.
- Silicone sealant should be applied before laying the mullion seals and cover strips.
- After the specified setting time, the seals and screw fittings can be installed in the areas around mullions.
- The mullion-transom joints around the clamps are then sealed.
- Before applying this second layer, the joints around transoms must have completely set.

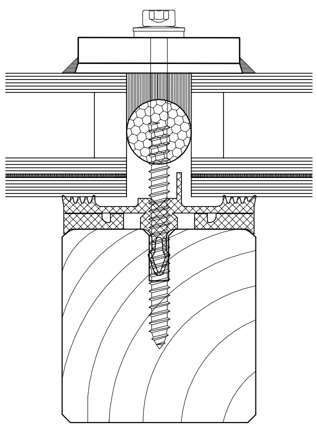


Rafters with clamping strips

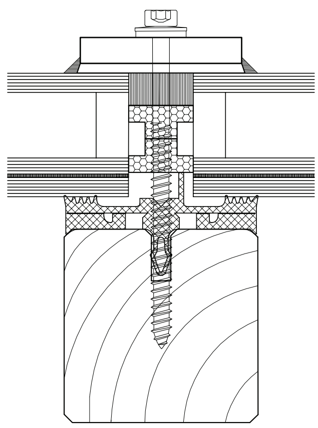
Joint design according to manufacturers specifications! generally: w : h = 2 : 1 - 3.5 : 1



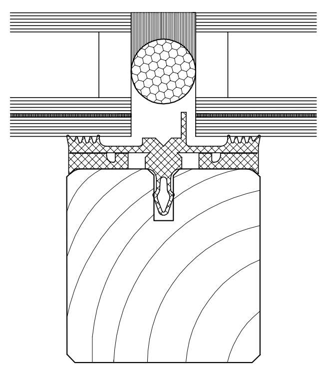
Transom with clamp, All weather silicone seal and round section rope seal



Transom with clamp, All weather silicone seal and slab insulation



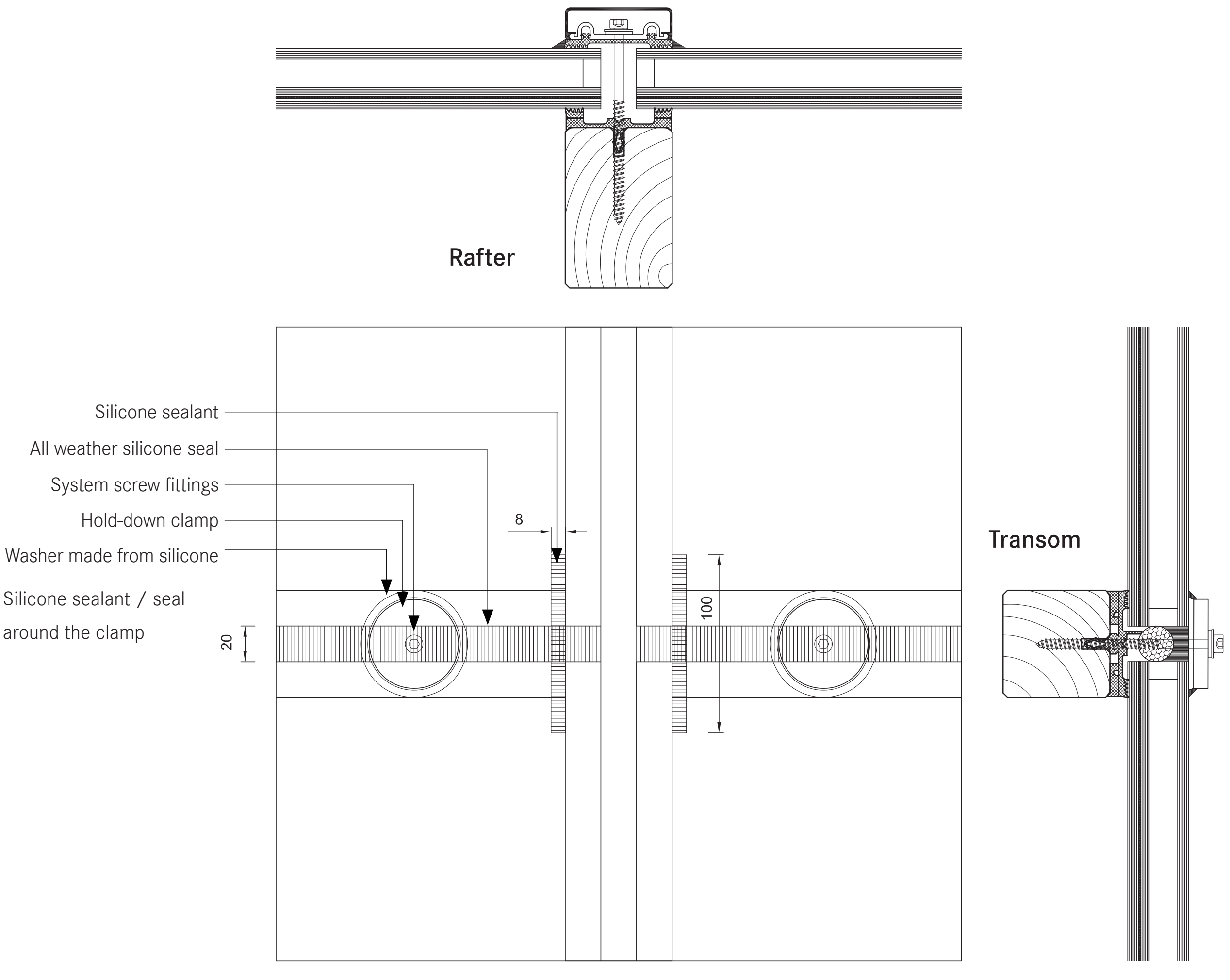
Transom with all-weather silicone and round section rope seal



Seals - roof

Steps for implementing the seal with silicone

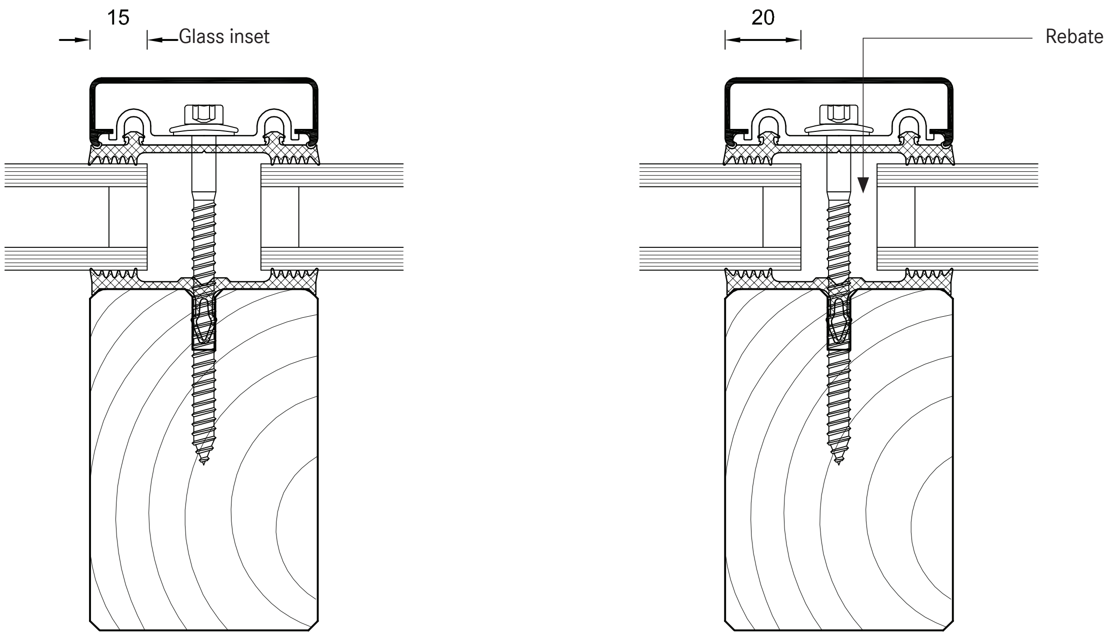
- Test silicone sealant and glass edge bondings and other contact surfaces (e.g. panels) for suitability.
- Clean edge bonding adhesive impurities from the surfaces to which sealant will be applied following manufacturer's directions.
- Fill the joints as per the joint dimensions using only non-water absorbent closed-cell PE profiles (no damage to the edge bonding).
- The remaining space in the glass rebate must be large enough that the pressure is able to equalise and a drainage level is available.
- Clean any impurities from the surfaces to which the sealing material is to be applied and any adjacent surfaces according to manufacturer's directions.
- Be particularly aware of any adjacent metal components. Prime according to manufacturer's directions.
- Seal joints without leaving any cavities or bubbles. Mask any adjacent components in advance where necessary.
- Smooth out the filled joints using the manufacturer's smoothing agents and conventional tools with as little water as possible. Remove adhesive tape.
- If two or more reactive sealants are used in combination, the first must completely set before the second is applied.



Glass inset and glass support

Glass inset

- Glass industry guidelines must be observed.
- The glass inset is generally 15 mm.
- An increase to 20 mm has a beneficial effect on the heat transfer coefficient U_f of the frame structure.
- Special conditions such as fire protection glass must be adhered to; the terms are stated in the general building approval.



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Glass inset and glass support

Glass support types and choosing the glass support

The Stabalux H system uses three different types and techniques for attaching glass supports:

- Glass support GH 5053 and GH 5055 with hanger bolts.
- Glass support GH 5053 and GH 5055 with hardwood cylinders and bolts.
- Crossing point reinforcement RHT with cylinder head screws Ø 6.5 mm. Crossing point reinforcement are used exclusively on fire-protection glazing. The precise details are stated in the general building approval.

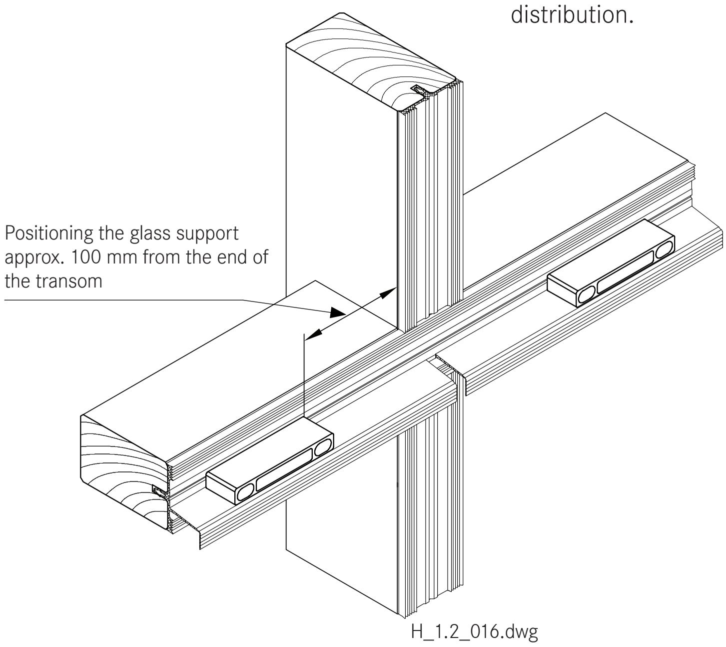
The glass supports used are determined by the type of wood, glass construction and glass weight (see section 9). A rigid mullion-transom connection is required, i.e. no twisting of the transom may occur at the connection that would cause further sinking of the glass support.

Mounting the glass supports

- Positioning the glass supports and glazing according to glass industry guidelines and guidelines of the Institute for Window Technology.
- The weight of the glass panes is distributed via the glass supports attached to the transoms.
- Glass supports should be attached at a distance of 100 mm from the end of the transom. When doing so, avoid a collision with the cover strip screw fittings at the end of the transom.

Glazing blocks

- Glazing blocks must be compatible with the edge bonding of the insulated glass panes.
- They should be stable under constant pressure and be able to withstand loads, aging and temperature changes.
- It is important that the blocks ensure circumferential pressure equalisation and that drainage of condensation is not obstructed as well as allowing the glass edges to be offset and small design tolerances to be accommodated.
- If the length of the glass support is more than 100 mm, blocks should be placed along the entire length of the glass support to ensure equal load distribution.



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Glass inset and glass support

1.2
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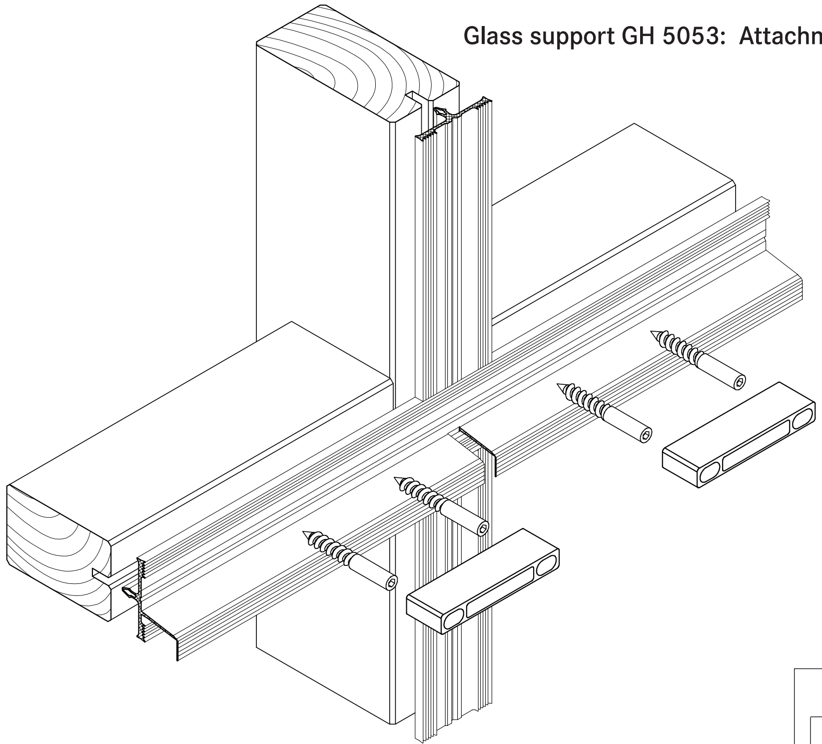
Glass support GH 5053 with hanger bolts.

- The certified system components consist of the glass support GH 5053 and 2 hanger bolts Ø 10 mm with a 45 mm wood thread and a shaft of a different length.
- The hanger bolts are screwed directly into the timber at intervals of 80 mm. A Ø 7 mm hole needs to be pre-drilled for this purpose.
- Screw fittings should be vertical to the transom axis.
- The depth for hanger bolts is at least 45 mm measured from the front edge of the timber.
- For glass support GH 5053, the required depths are delivered corresponding to the thickness of the glass and placed onto the hanger bolts.
- Blocks must be placed under the glass panes along the entire length of the glass supports.
- Details of the approved pane weights, geometries and classification of system components are provided in section 9.

Glass support GH 5053: Attachment with hanger bolts



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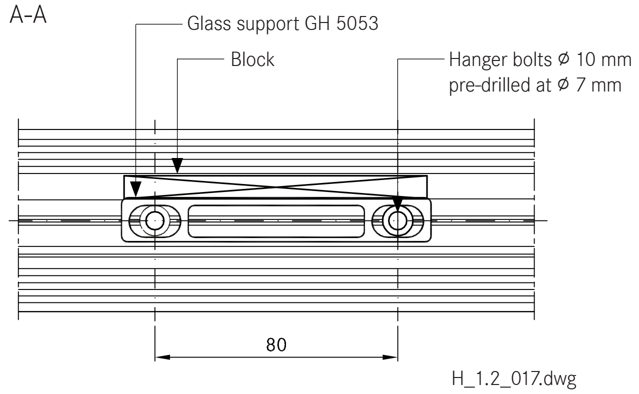

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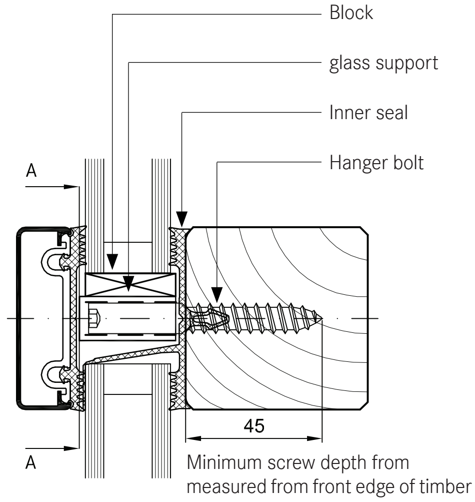
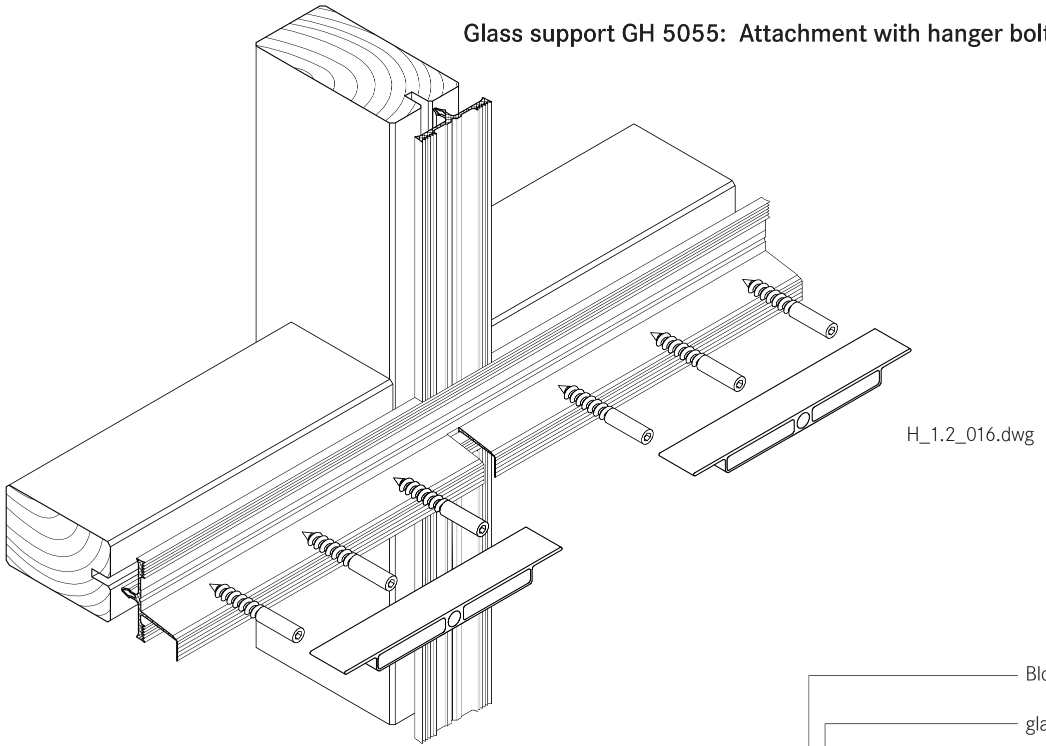


Glass inset and glass support

Glass support GH 5055 with hanger bolts

- Based on the test results for the system component GH 5053, a load bearing model was designed and the suitability of the GH 5055 glass support calculated.
- Installation is done the same way as GH 5053, but using three screws spaced 80 mm apart.
- Details of the approved pane weights, geometries and classification of system components are provided in section 9.

Glass support GH 5055: Attachment with hanger bolts



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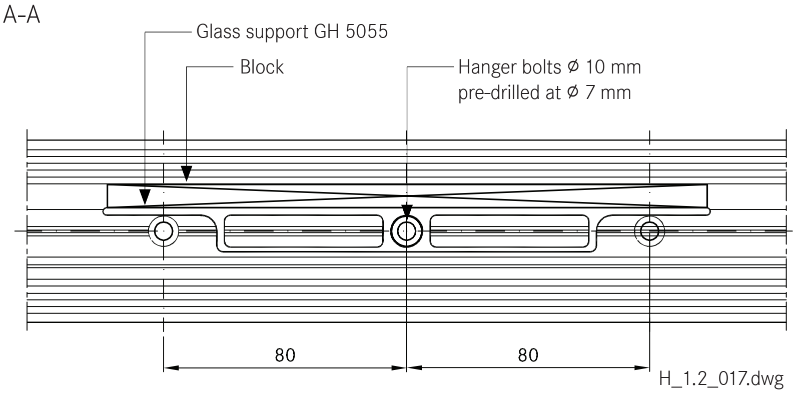
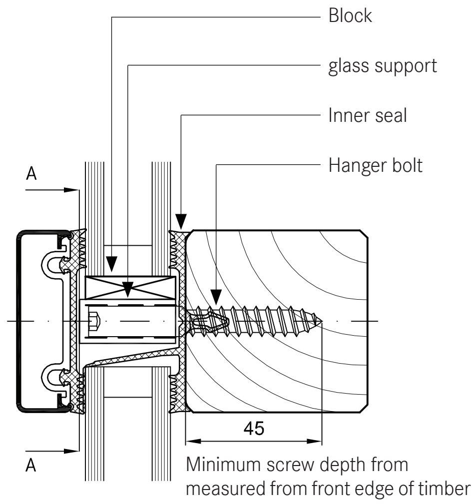




Glass inset and glass support

Classification of system components

Table 1:

Vertical glazing | System 50, 60, 80 | Hanger bolts

Row	Total glass thickness t_{Glass} (mm) for vertical glazing	Hanger bolts [2]			Glass supports [1]		
		Inner seal height			GH 5053	GH 5055	Depth (mm)
		5 mm	10 mm	12 mm			
1	4, 5, 6, 7	Z 0371 [3]	Z 0371 [4]	Z 0371 [5]	GH 0081	Section	9
2	8, 9	Z 0371 [3]	Z 0371 [4]	Z 0371 [5]	Section	Section	12
3	10, 11	Z 0371 [3]	Z 0371 [4]	Z 0371 [5]	Section	Section	14
4	12, 13	Z 0371 [3]	Z 0371 [4]	Z 0371 [5]	Section	Section	16
5	14, 15	Z 0371 [3]	Z 0371 [4]	Z 0371	Section	Section	18
6	16, 17	Z 0371 [3]	Z 0371	Z 0371	Section	Section	20
7	18, 19, 20	Z 0371	Z 0371	Z 0371	GH 0082	Section	22
8	22, 23	Z 0371	Z 0371	Z 0372	GH 0083	GH 0851	26
9	24, 25	Z 0371	Z 0372	Z 0372	GH 0084	GH 0852	28
10	26, 27	Z 0371	Z 0372	Z 0372	GH 0085	GH 0853	30
11	28, 29, 30	Z 0372	Z 0372	Z 0372	GH 0886	GH 0854	32
12	31, 32, 33	Z 0372	Z 0372	Z 0372	GH 0887	GH 0855	35
13	34, 35, 36	Z 0372	Z 0372	Z 0373	GH 0888	GH 0856	38
14	37, 38, 39	Z 0372	Z 0373	Z 0373	GH 0889	GH 0857	41
15	40, 41, 42	Z 0372	Z 0373	Z 0373	GH 0890	GH 0858	44
16	43, 44, 45	Z 0373	Z 0373	Z 0373	GH 0891	GH 0859	47
17	46, 47, 48	Z 0373	Z 0373	Z 0373	GH 0892	GH 0860	50
18	49, 50, 51	Z 0373	Z 0373	Z 0373	GH 0893	GH 0861	53
19	52, 53, 54	Z 0373	Z 0373	-	GH 0894	GH 0862	56
20	55, 56, 57	Z 0373	-	-	Section	Section	59
21	58, 59, 60	Z 0373	-	-	Section	Section	62
22	61, 62, 63	Z 0373	-	-	Section	Section	65
23	64	Z 0373	-	-	Section	Section	68

1) Cut from GH 5053 or GH 5055.

2) Generally: The screw-in depth (ET) for hanger bolts = 45 mm thread length (GL) measured from the front edge of the timber.

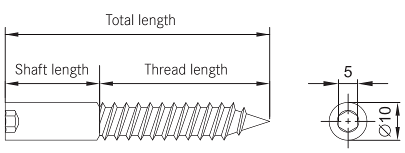
For glasses t_{Glas} < 20 mm, observe the permissible visible shaft length from the front edge of the wood!
If necessary, adjust the visible shaft length over the screw-in depth:

3) Permissible visible shaft length from the front edge of the wood = glass thickness t_{Glas} (mm) + 3 mm

4) Permissible visible shaft length from the front edge of the wood = glass thickness t_{Glas} (mm) + 7 mm

5) Permissible visible shaft length from the front edge of the wood = glass thickness t_{Glas} (mm) + 9 mm

Hanger bolts



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Item	Total length (mm)	Shaft length (mm)	Thread length (mm)
Z 0371	70	25	45
Z 0372	77	32	45
Z 0373	90	45	45

Glass inset and glass support

Classification of system components

Table 2:

Inclined glazing | System 50, 60, 80 | Hanger bolts

Row	Total glass thickness t_{Glass} (mm) for inclined glazing [1]	Hanger bolts [2]	Glass supports [3]		
			GH 5053	GH 5055	Depth (mm)
1	16, 17, 18	Z 0371	GH 0081	Section	9
2	19, 20	Z 0371	Section	Section	12
3	21, 22	Z 0372	Section	Section	14
4	23, 24	Z 0372	Section	Section	16
5	25, 26	Z 0372	Section	Section	18
6	27, 28	Z 0372	Section	Section	20
7	29, 30	Z 0372	Section	Section	22
8	31, 32	Z 0372	GH 0082	Section	24
9	33, 34	Z 0372	GH 0083	GH 0851	26
10	35, 36	Z 0373	GH 0084	GH 0852	28
11	37, 38	Z 0373	GH 0085	GH 0853	30
12	39, 40, 41	Z 0373	GH 0886	GH 0854	32
13	42, 43, 44	Z 0373	GH 0887	GH 0855	35
14	45, 46, 47	Z 0373	GH 0888	GH 0856	38
15	48, 49, 50	Z 0373	GH 0889	GH 0857	41
16	51, 52, 53	Z 0373	GH 0890	GH 0858	44
17	54	Z 0373	GH 0891	GH 0859	47

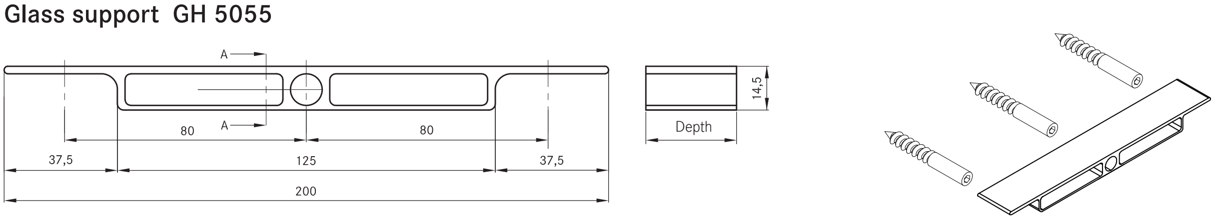
1) Accounting for a 10 mm inner seal.

2) The depth for hanger bolts = 45 mm thread length measured from the front edge of the timber.

3) Cut from GH 5053 or GH 5055.

Glass support GH 5053

Glass support GH 5055



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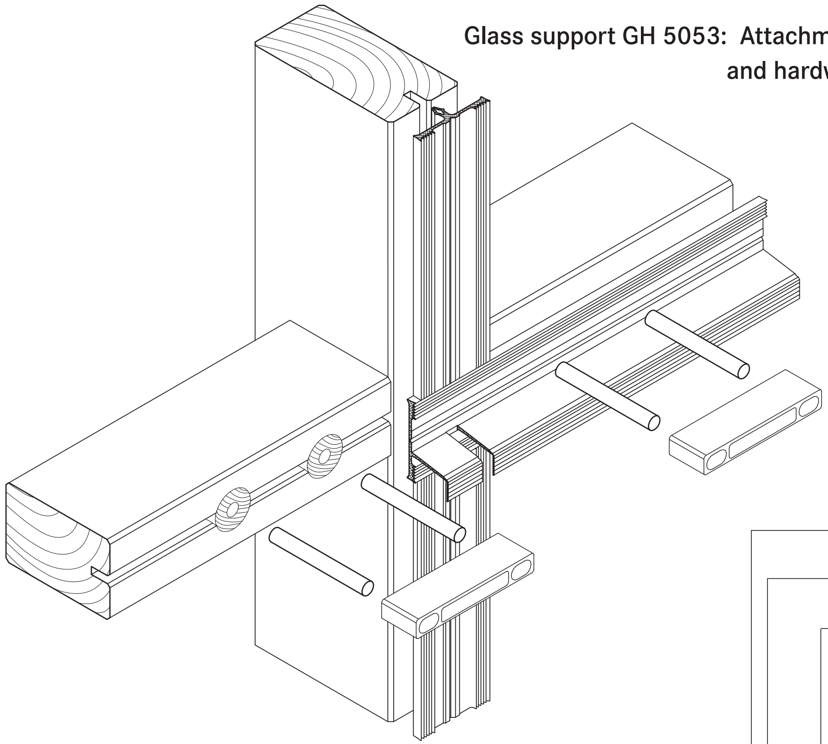
Glass inset and glass support

Glass support GH 5053 and GH 5055 with pins and hardwood cylinders

- Certified system components consist of glass support GH 5053 and GH 5055 with pins and hardwood cylinders.
- Depending on the width of supports, 2 or 3 bolts with a diameter of 10 mm are needed.
- The bolt length should be adapted to the thickness of the glass.
- To anchor the bolts in place, 50 mm wooden cylinders with a outer diameter of 30 mm and an axial core of Ø 10 mm are solidly glued into the timber.
- Additionally, holes with a depth of 50 mm and Ø of 30 mm are to be drilled into the transom profile vertical to the transom axis with 80 mm spacing.
- The glue or adhesive used must be suitable and must not swell.
- The bolts should be hammered in along the entire cylinder depth of 50 mm.
- For glass supports GH 5053 and GH 5055, the required depths are delivered corresponding to the thickness of the glass and placed onto the hanger bolts.

Glass support GH 5053: Attachment with bolts and hardwood cylinders



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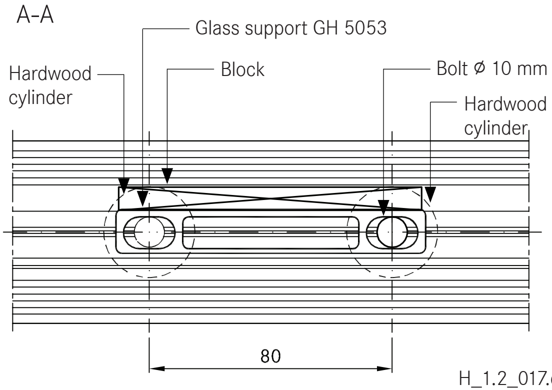

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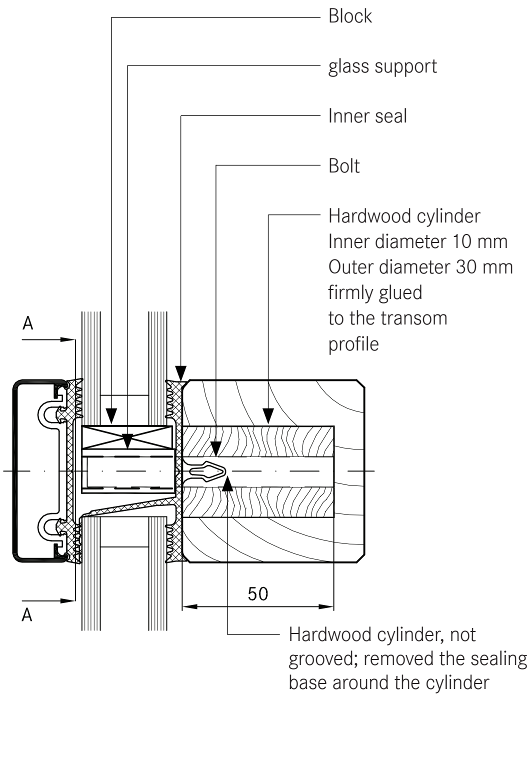

Glass inset and glass support

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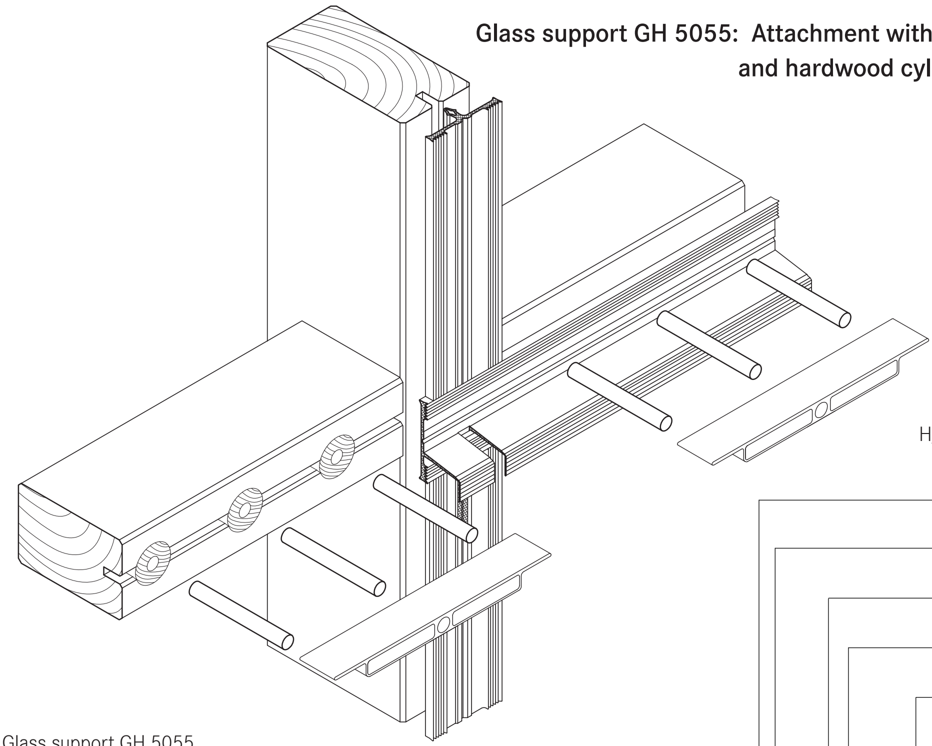
Glass support GH 5053 and GH 5055 with pins and hardwood cylinders

- The central groove in the Stabalux H System must not be milled into the wooden cylinder.
- When fitting the seals, the sealing base must therefore be removed around the cylinder.
- Blocks must be placed under the glass panes along the entire length of the glass supports.
- Details of the approved pane weights, geometries and classification of system components are provided in section 9.

Glass support GH 5055: Attachment with bolts and hardwood cylinders



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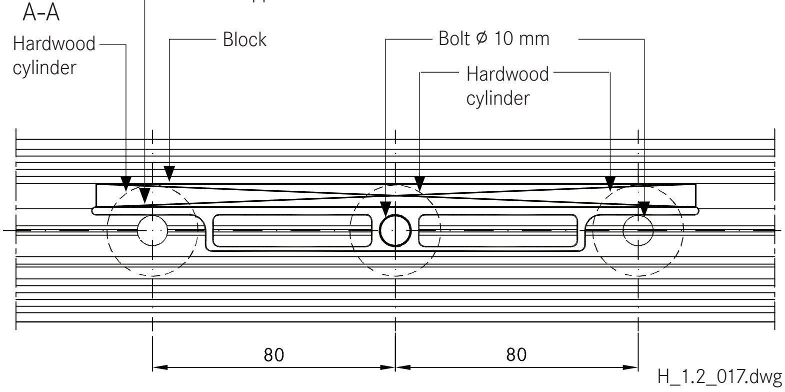

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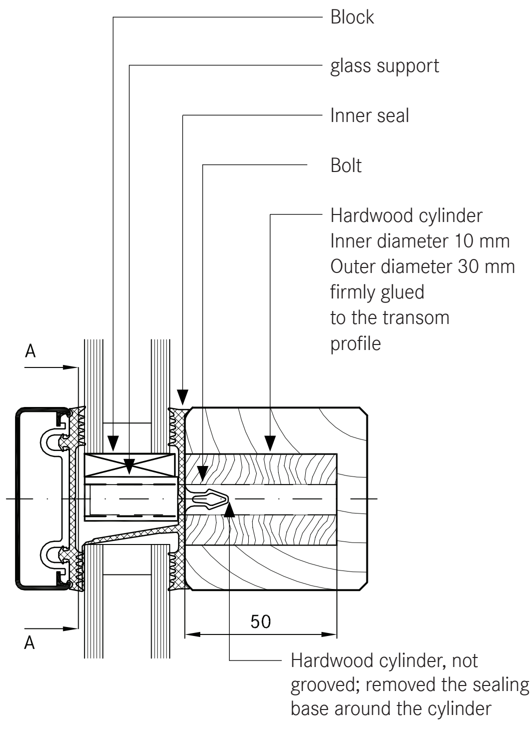


Glass inset and glass support

Classification of system components

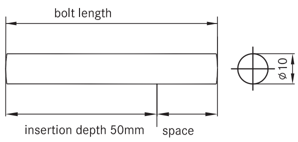
Table 3:

Vertical glazing | System 50, 60, 80 | Hardwood cylinders & bolts

Row	Total glass thickness t_{Glass} (mm) for vertical glazing	Hardwood cylinder	Bolt			Glass supports [1)]		
			Inner seal height			GH 5053	GH 5055	Depth (mm)
			5 mm	10 mm	12 mm			
1	8, 9	Z 0073	-	-	Z 0047	Section	Section	12
2	10, 11	Z 0073	-	Z 0047	Z 0047	Section	Section	14
3	12, 13	Z 0073	-	Z 0047	Z 0047	Section	Section	16
4	14, 15	Z 0073	Z 0047	Z 0047	Z 0047	Section	Section	18
5	16, 17	Z 0073	Z 0047	Z 0047	Z 0048	Section	Section	20
6	18, 19	Z 0073	Z 0047	Z 0048	Z 0048	Section	Section	22
7	20, 21	Z 0073	Z 0047	Z 0048	Z 0048	GH 0082	Section	24
8	22, 23	Z 0073	Z 0047	Z 0048	Z 0048	GH 0083	GH 0851	26
9	24, 25	Z 0073	Z 0048	Z 0048	Z 0048	GH 0084	GH 0852	28
10	26, 27	Z 0073	Z 0048	Z 0048	Z 0048	GH 0085	GH 0853	30
11	28, 29, 30	Z 0073	Z 0048	Z 0048	Z 0049	GH 0886	GH 0854	32
12	31, 32, 33	Z 0073	Z 0048	Z 0049	Z 0049	GH 0887	GH 0855	35
13	34, 35, 36	Z 0073	Z 0048	Z 0049	Z 0049	GH 0888	GH 0856	38
14	37, 38, 39	Z 0073	Z 0049	Z 0049	Z 0049	GH 0889	GH 0857	41
15	40, 41, 42	Z 0073	Z 0049	Z 0049	Z 0051	GH 0890	GH 0858	44
16	43, 44, 45	Z 0073	Z 0049	Z 0051	Z 0051	GH 0891	GH 0859	47
17	46, 47, 48	Z 0073	Z 0049	Z 0051	Z 0051	GH 0892	GH 0860	50
18	49, 50, 51	Z 0073	Z 0051	Z 0051	Z 0051	GH 0893	GH 0861	53
19	52, 53, 54	Z 0073	Z 0051	Z 0051	-	GH 0894	GH 0862	56
20	55, 56, 57	Z 0073	Z 0051	-	-	Section	Section	59
21	58, 59, 60	Z 0073	Z 0051	-	-	Section	Section	62
22	61, 62, 63	Z 0073	Z 0051	-	-	Section	Section	65
23	64	Z 0073	Z 0051	-	-	Section	Section	68

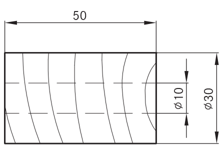
1) Cut from GH 5053 or GH 5055.

Bolt



Item	Bolt length (mm)
Z 0047	70
Z 0048	80
Z 0049	90
Z 0051	100

Hardwood cylinder Z 0073



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Glass inset and glass support

Classification of system components

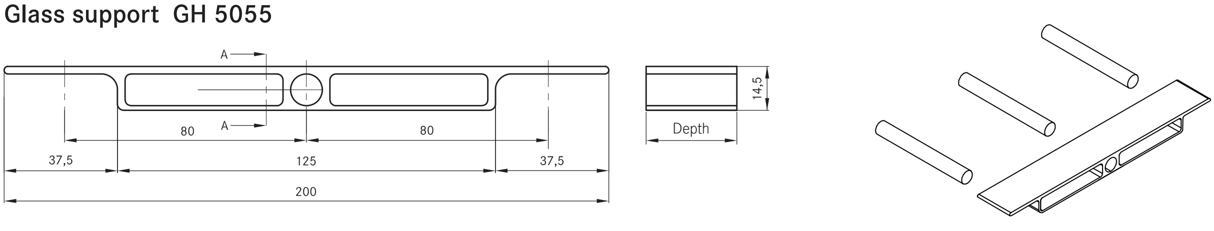
Table 4:
Inclined glazing | System 50, 60, 80 | Hardwood cylinders & bolts

Row	Total glass thickness t_{Glass} (mm) for inclined glazing [1)]	Hardwood cylinder	Bolt	Glass supports [2)]		
				GH 5053	GH 5055	Depth (mm)
1	20, 21, 22	Z 0073	Z 0048	Section	Section	14
2	23, 24	Z 0073	Z 0048	Section	Section	16
3	25, 26	Z 0073	Z 0048	Section	Section	18
4	27, 28	Z 0073	Z 0048	Section	Section	20
5	29, 30	Z 0073	Z 0049	Section	Section	22
6	31, 32	Z 0073	Z 0049	GH 0082	Section	24
7	33, 34	Z 0073	Z 0049	GH 0083	GH 0851	26
8	35, 36	Z 0073	Z 0049	GH 0084	GH 0852	28
9	37, 38	Z 0073	Z 0049	GH 0085	GH 0853	30
10	39, 40, 41	Z 0073	Z 0049	GH 0886	GH 0854	32
11	42, 43, 44	Z 0073	Z 0051	GH 0887	GH 0855	35
12	45, 46, 47	Z 0073	Z 0051	GH 0888	GH 0856	38
13	48, 49, 50	Z 0073	Z 0051	GH 0889	GH 0857	41
14	51, 52, 53	Z 0073	Z 0051	GH 0890	GH 0858	44
15	54	Z 0073	Z 0051	GH 0891	GH 0859	47

1) Accounting for a 10 mm inner seal.
2) Cut from GH 5053 or GH 5055.

Glass support GH 5053

Glass support GH 5055



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Screw fittings

Fastenings

- The fastenings for the Stabalux H system allow filling elements to be easily secured.
- The clamping strips are connected to the wooden profile using Stabalux system screws. Stainless steel 1.4301 DIN EN 10088 is the material used to produce screws for the Stabalux system.
- Depending on the type of screw fittings selected, special 4 mm vulcanised EPDM washers are available.
- Screws in suitable lengths are available for all common glass thicknesses. The screw length is determined from a table.
- The distance for screw fittings is variable. The maximum distance is a = 250 mm.
- The distance from the edge for the first screw fitting should generally be in the region of 30 mm ≤ a ≤ 80 mm. The placement of the glass supports and the choice of mullion-transom connection should also be taken into account.
- The clamp connection is exclusively exposed to tensile forces. The clamping strips are connected to the wooden profile using Stabalux system screws. To determine the stress limit (maximum tensile force) and permitted tensile forces for the connection, the conditions in the relevant general building approval and the Eurocode 5 (DIN EN 1995-1) series of standards shall apply.
- Screw fittings are applied using a conventional electric screwdriver with depth stop. This guarantees uniform application of pressure. The depth setting should be chosen so that a sealing washer compression of 1.5 - 1.8 mm is achieved.
- An electric screwdriver with adjustable torque can be used as an alternative. The required torque is approx. 5 Nm. The required torque is influenced by the relatively large scatter when dealing with wood and the variable influence of friction due to different drilling depths. It is therefore advisable to determine the setting on a test piece and to check compression of the sealing washer.

Concealed screw fittings

- Assembly is facilitated by selecting pre-drilled pressure strips (UL 5009-L, UL 6009-L and UL 8009-L, slot 7 x 10 mm, a = 125 mm) with clippable upper strips. The remaining pressure strips should be provided with a round hold of d = 8 mm. The functionality of the clip procedure can be checked after the first upper strip has been pushed against the pressure profile.

Note:

When using aluminium cover strips on roofs, take account of the expansion factor as a result of the high degree of heat absorption when selecting the length to use. In this case it is recommended that holes for screwing on the clamping strip are created with a diameter of d = 9 mm. Equally, the use of single-piece cover strips should be carefully considered.

Visible screw fittings

- Cover strips should be drilling with a round hole of d = 8 mm.

Note:

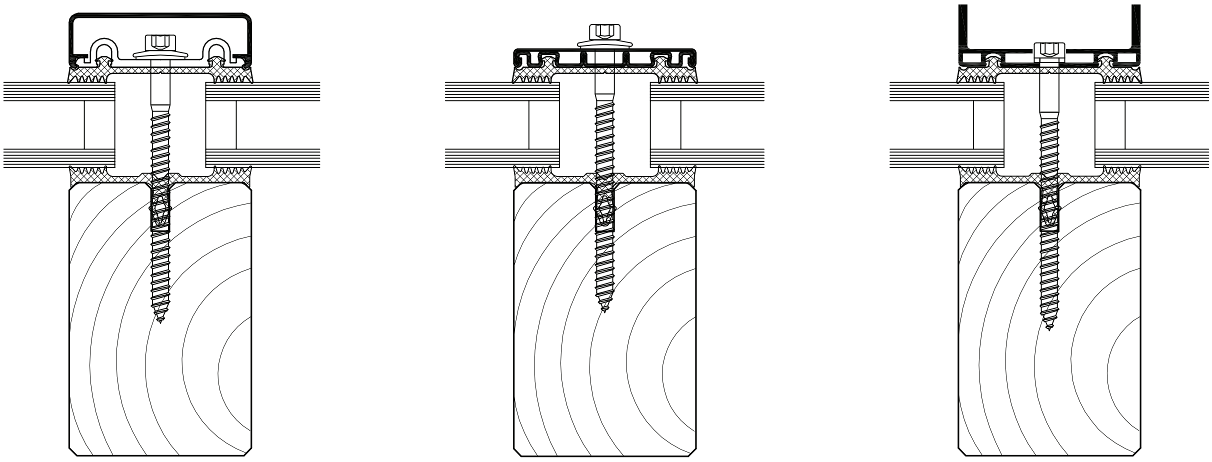
(see Note on covered screw fittings)

Visible recessed screw fittings

- When creating visible recessed screw fittings a stepped bore is required. The lower part of the cover strip should be drilled with a d = 7 mm diameter. The upper part of the cover strip needs a d = 11 mm diameter for the screw head. It is recommended to install a washer (PA washer, e.g. Z 0033) with all screw fittings.

Screw fittings

Fastenings



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Concealed screw fittings

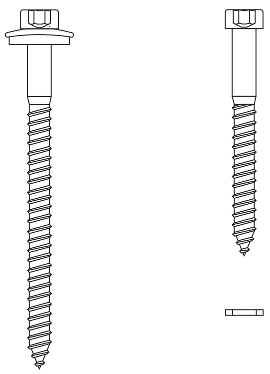
Stabalux system screws with cylinder head d = 10 mm und 4 mm sealing gasket e.g. Z 0331

Visible screw fittings

Stabalux system screws with cylinder head d = 10 mm und 4 mm sealing gasket e.g. Z 0331

Visible recessed screw fittings

Stabalux system screws with cylinder head d = 10 mm with additional PA washer, e.g. Z 731 with Z 33



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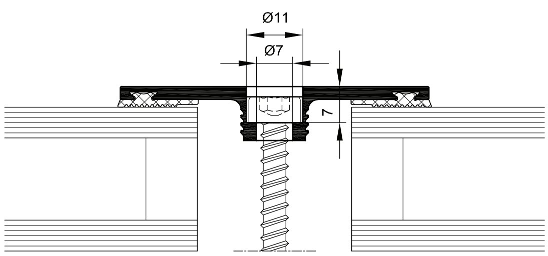
e.g. Z 0331

e.g. Z 0731
with Z 0033

Calculating the screw length for DL 5073 / DL 6073



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Attention!

The calculation to determine screw lengths for the
the calculation to determine screw lengths is:

Glass thickness - 3 mm + inner seal (5, 10, i.e. 12 mm) + 16 mm + e

e = statically required screw-in depth

Screw fittings

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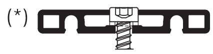
Calculating the screw length

	System width 50 / 60 mm		System width 80 mm [1)]		
Sealing washer	Z 0086	3,0 mm	Sealing washer	3,0 mm	mm
PA washer (*)		1,5 mm	PA washer	1,5 mm	
	Z 0020	8,0 mm			+
	DL 5059 / DL 6059 (*)	(2,5) 8,0 mm	DL 8059	(3,5) 8,0 mm	
	DL 5061 / DL 6061 (*)	(1,5) 6,0 mm	DL 8061 (*)	(2,0) 7,0 mm	
	DL 5067 / DL 6067 (*)	(1,5) 6,0 mm	DL 8067 (*)	(2,0) 7,0 mm	
	DL 5071 / DL 6071 (*)	(1,5) 6,0 mm	DL 8071 (*)	(2,0) 7,0 mm	
	DL 6044	6,0 mm			mm
	DL 6043	6,0 mm			
	UL 5110 / UL 6110	3,0 mm	UL 8110	3,0 mm	
	UL 6009	2,5 mm	UL 8009	3,5 mm	
	UL 5009	2,5 mm			
	UL 6005	2,5 mm	UL 8005	3,5 mm	+
	UL 6007 / UL 6008	2,5 mm	UL 8007 / UL 8008	3,5 mm	
	UL 6003	2,5 mm	UL 8003	3,5 mm	



(*) For visible recessed screw fittings PA-washers have to be used. The values in ( ) must be considered for the calculation of the screw length.

The thickness of the outer seal can be found in the list on catalog pages 16 and 17. GD 5009 e.g. 3 mm or GD 1940 e.g. 10 mm. → mm

\+

Glas thickness → mm

\+

	System width 50 / 60 mm			System width 80 mm		
e.g.	GD 5201 / GD 5203	GD 6202 / GD 6204	5,0 mm	e.g. GD 8202 / GD 8204	5,0 mm	
e.g.	GD 5205 / GD 5207	GD 6206 / GD 6208	10,0 mm	e.g. GD 8206 / GD 8208	10,0 mm	mm
e.g.	GD 5314 / GD 5317	GD 6314 / GD 6318	12,0 mm			

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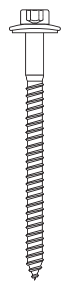

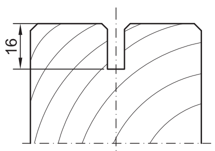

Screw channel + screw depth **e**
(e = 30 mm in most cases statically sufficient)
see chapter 9.ff

16 mm + e = mm = Screw length

Result has to be round up to next decimal place

1) Delivered upon request

Representation and item numbers are examples for System 60. System width 50 are analogous.

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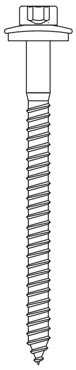
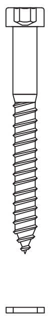
Screw fittings

Wood screws for Stabalux H



Cylinder head screw ∅ 10 mm with hex socket | with sealing gasket

Z0327	cylinder head screw	6.5 x 70 mm
Z0329	cylinder head screw	6.5 x 80 mm
Z0331	cylinder head screw	6.5 x 90 mm
Z0333	cylinder head screw	6.5 x 100 mm
Z0335	cylinder head screw	6.5 x 110 mm
Z0337	cylinder head screw	6.5 x 120 mm
Z0339	cylinder head screw	6.5 x 130 mm



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Cylinder head screw ∅ 10 mm with hex socket | without sealing gasket

Z0727	cylinder head screw	6.5 x 70 mm
Z0729	cylinder head screw	6.5 x 80 mm
Z0731	cylinder head screw	6.5 x 90 mm
Z0733	cylinder head screw	6.5 x 100 mm
Z0735	cylinder head screw	6.5 x 110 mm
Z0737	cylinder head screw	6.5 x 120 mm
Z0033	**PA washer ∅**	10 x 1.5 mm

Flat cover strip DL 5073 / DL 6073

Tips for laying the cover strip DL 5073 / DL 6073

We assume that this cover strip will be used with glass panes that are supported on two sides and the recessed screw head is concealed. In this case, a cylinder head screw with inner hex is to be used e.g. Z 731. When covering with a 2 mm cover plug Z 89, a bore depth of 7 mm is calculated.

Depending on the precision of the bore, it should be decided on case by case basis if any slight changes to this depth are necessary. The cover plug Z 0089 does not need to be glued in place, but may be levelled using levelling compound.

Coating the cover strip

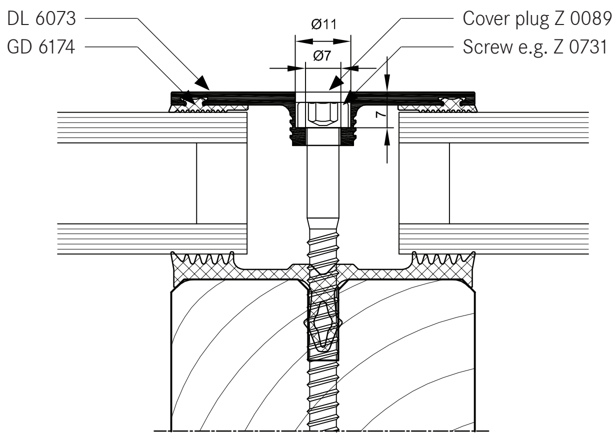
Profile production (aluminium extrusion moulding) with different mass distribution is extremely difficult. Lengthwise shadow formation may result. Resulting actions are to be taken with the agreement of the coater.

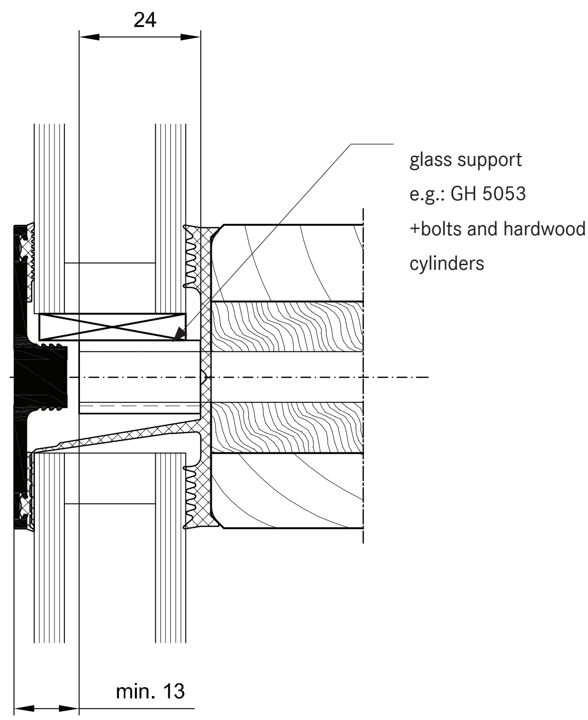
Intersections

Due to the special shape of the strip (the material extends into the rebate), there is no closed sealing section available at intersections. We therefore recommend placing particular attention to ensure tightness of the joints and fill will Stabalux connecting paste Z 0094.

Glass supports/blocking

Special attention should be given to dimensional proportions. To support the outer pane, a sufficiently large glazing block must be installed that can carry the load to safely ensure the glass load is distributed effectively.





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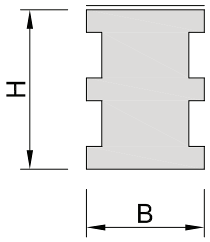
Slab insulation

Use of slab insulation

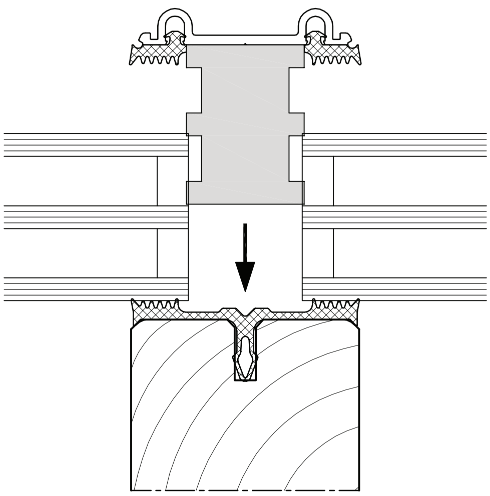
- Using insulation blacks significantly reduces heat dissipation.
- The highly effective slab insulation has a permanently adhesive HOT-MELT.
- Depending on the situation where they are used, insulation blocks can be directly applied to the cover strip/pressure profile or placed into the rebate over the screw fittings and pushed into position with the cover strip/pressure profile.

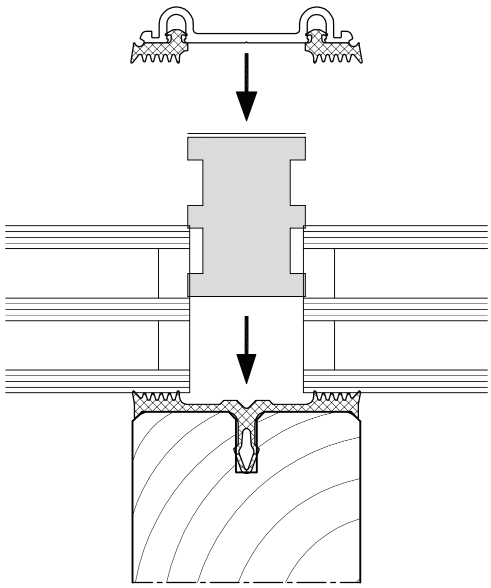
Note:

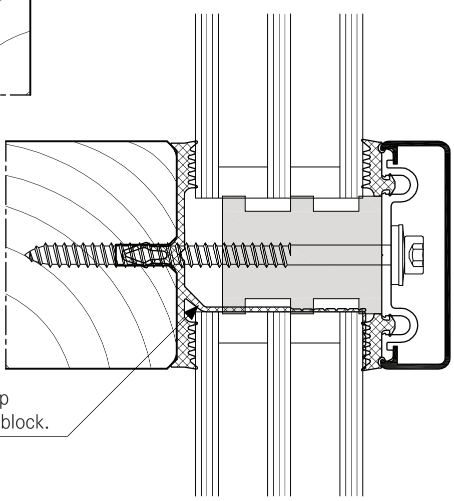
- The use of slab insulation with cover strips DL 5073 / DL 6073 should be tested for each individual situation.
- 2-piece outer seals are always used with slab insulation blocks:
- With system width 80 mm and a 40 mm rebate 2 x 20 mm wide slab insulation blocks can be combined (40 mm wide insulation blocks available upon request).
- for a glass inset of 15 mm, outer seal **GD 1932**
- for a glass inset of 20 mm, outer seal **GD 1932**



Insulation block	Width (Rebate)	Height
Z 0605 slab insulation 20/42	20 mm	42 mm, glass thickness from 44 mm
Z 0606 slab insulation 20/26	20 mm	26 mm, glass thickness from 28 mm
Z 0607 slab insulation 30/42	30 mm	42 mm, glass thickness from 44 mm
Z 0608 Insulation block 30/26	30 mm	26 mm, glass thickness from 28 mm







Correctly position the seal flap
when installing the insulation block.

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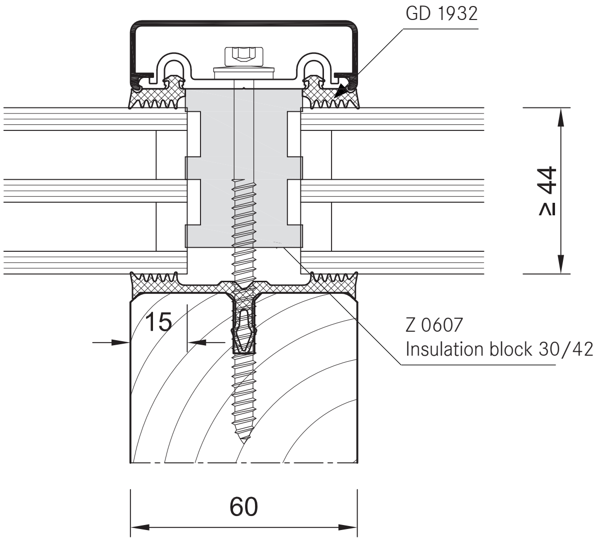
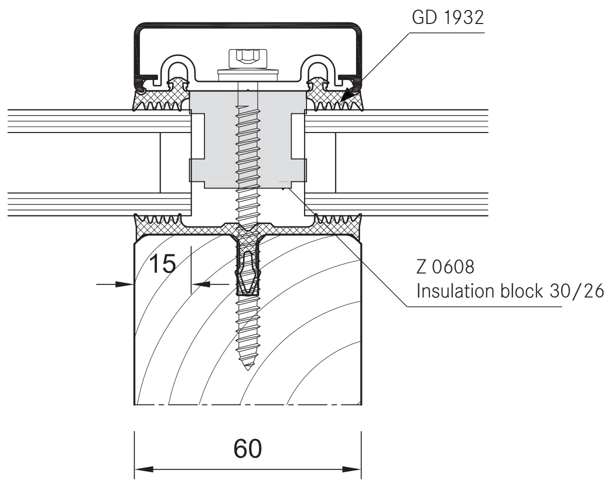
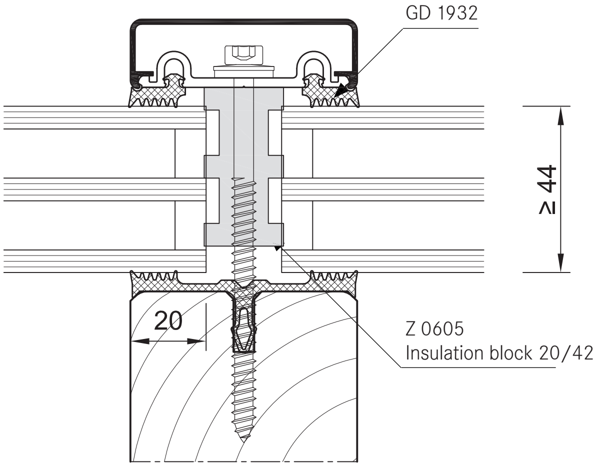
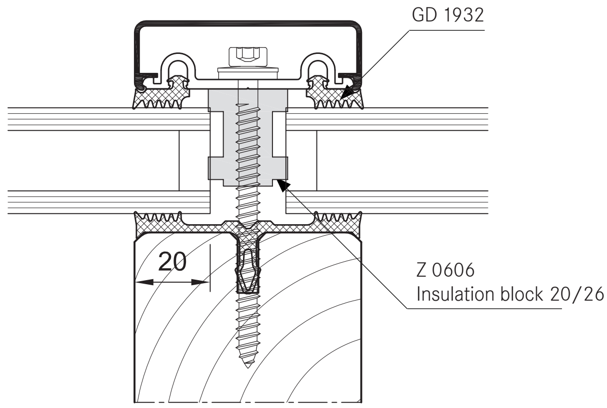
Slab insulation

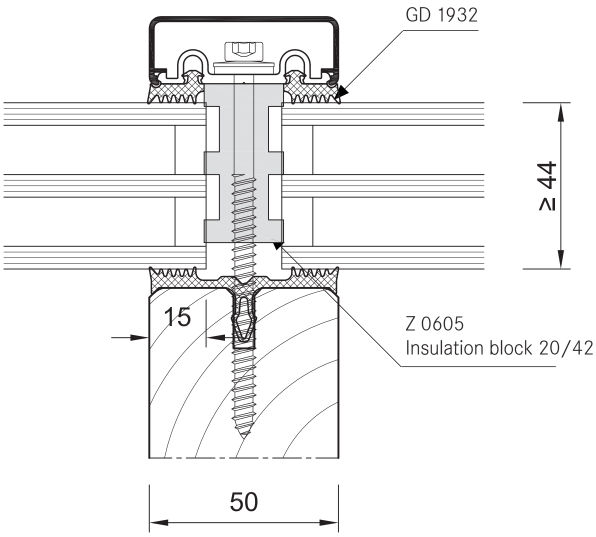
Examples:

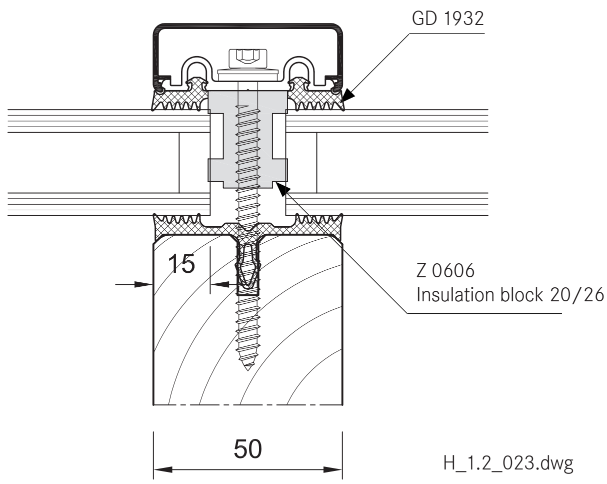












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Pane support variants

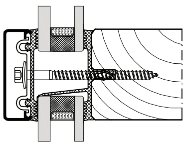
Special design

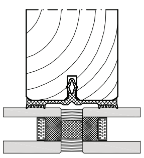
Glass structures that partially refrain from using visible cover strips are considered special designs.

These designs do not conform to the intended uses of the system. No guarantees are made for e.g. quality of seals, durability and structural stability. Responsibility here lies entirely with the company implementing the design.

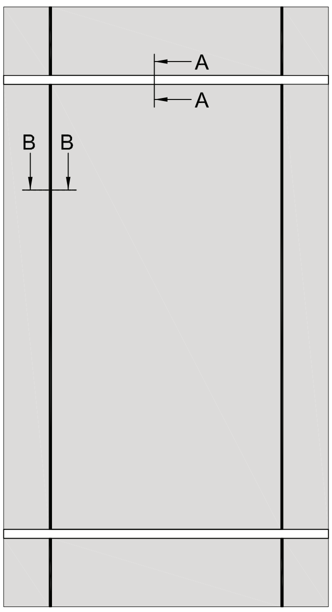
Based on our experience we recommend paying close attention to the points made on the following pages during planning and implementation.

Mullion-transom structure, 2-sided cover strip


Section A-A

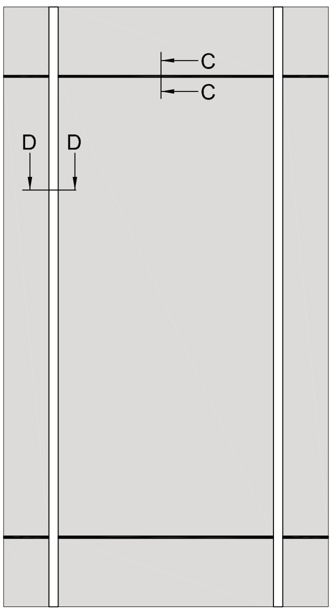

Section B-B

Mullion-transom structure with transom cover strips [1)]

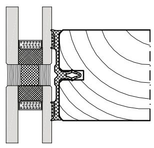


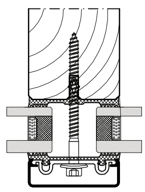
[1)] Seals with 1, 2 or 3 sections are possible

Mullion-transom structure with mullion cover strips [2)]



[2)] Use of mullion seals with 1 section in mullions and transoms


Section C-C


Section D-D

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Pane support variants

Vapour seal:

When using this type of structure, it is important to be aware that any loss of contact pressure can affect the room-side permeability. There is an increased risk of condensation build up in the rebate.

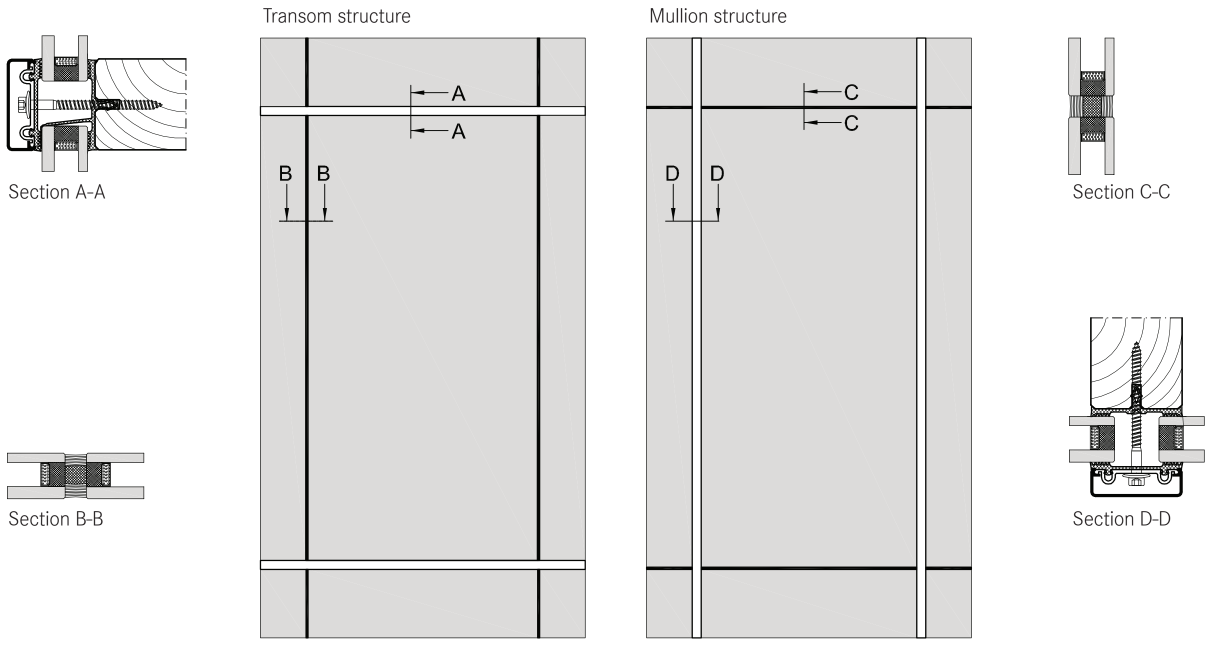
vertical clamping strips:

The glass supports should be placed to below the outer pane and sealed with it.

horizontal clamping strips:

Ventilation and condensation drainage is achieved via a recess in the lower sealing lip in the centre of the outer seal or at one third intervals.

Transom structure, mullion structure
2-sided cover strip



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Pane support variants

Requirements for special designs

1 Vapour seal

The room-side level of glazing must have the best possible vapour seal. In this regard, the vapour diffusion properties of the silicone sealant to be used should be tested. Ensure that there are no permeable areas around concave cross joints.

2 Rebate ventilation, pressure equalisation and condensation drainage

Systems with partially sealed rebate represent a limitation to rebate ventilation. Check on a case-by-case basis that no damage will be caused by standing condensation. It is especially critical that designs with sealed vertical joints are evaluated. To allow ventilation of the horizontal rebate we recommend installing a suitable vertical ventilation space. Alternatively, ventilation can be achieved using the outer joints.

3 Weatherproofing

The outward facing seals must be watertight. In cross joints, it is especially important to ensure a firm join between the Stabalux profile seal and the silicone joints. We recommend sealing up to the outer edge of the glass before mounting the cover strips.
We would like to once again emphasise that our profile seals will not make a permanent bond with commonly used silicone sealants. A seal can only be created at contact points through permanent application of pressure.

4 Mechanical strength screw fittings

Ensure screw fittings are sufficiently planned for. Special attention should be given to the effects of wind suction and the reduced support.

5 Glass weight distribution

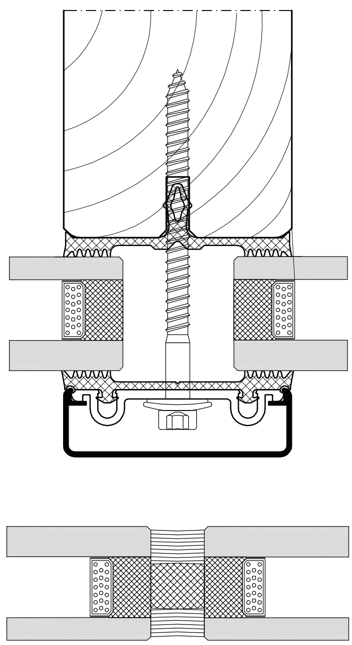
Mechanical distribution of the weight of the glass panes through the structure must be ensured. System glass supports can be used for existing horizontal transoms. Designs using “only” mullions require special glass supports which carry the weight of the glass directly into the mullions.

6 Glass sizing

Attention should be given to the reduced support of panes when dimensioning the glass. For example, only the vertical or horizontal cover strips are effective in the event of wind suction stresses or stress on the fall protection.

7 Material compatibility

Compatibility of the silicone sealants with our profile sealants and the edge bonding of the glass must be ensured. We recommend the exclusive use of tested silicone sealants from the whole-glass facades sector. Approval is usually given by the silicone manufacturer.



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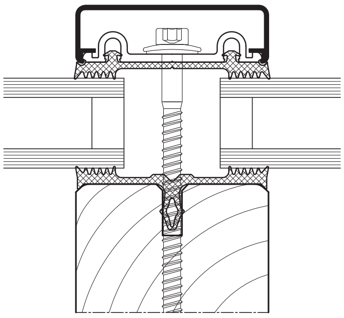
System cross sections

Examples:

1



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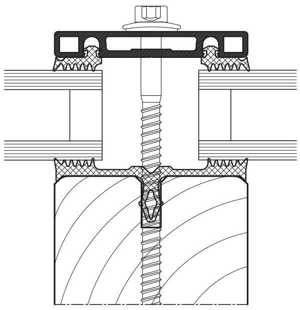

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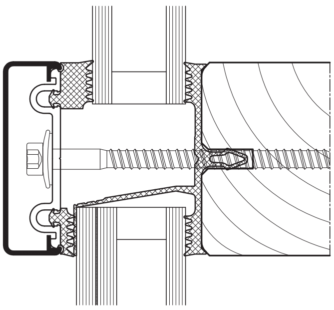

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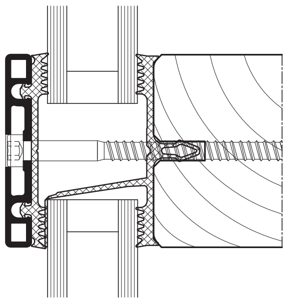

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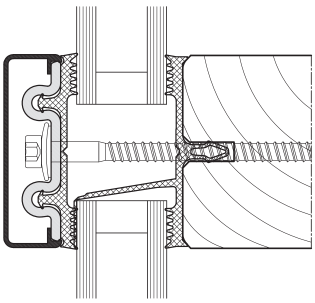

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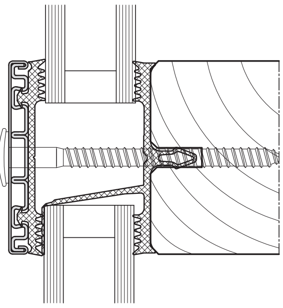

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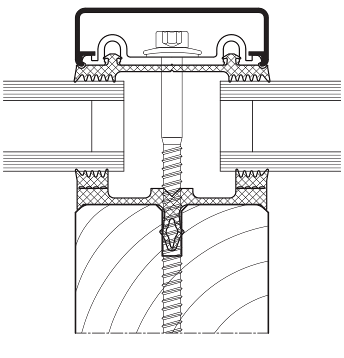

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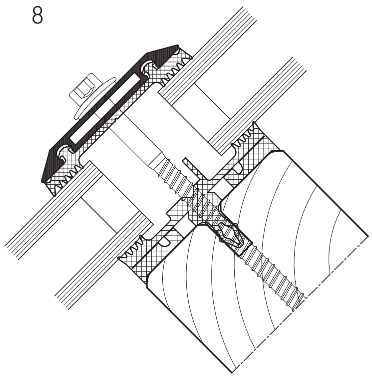

1 Vertical glazing, mullions
concealed screw fittings

2 Vertical glazing, mullions
visible screw fittings

3 Vertical glazing, transoms
divided outer seal for height compensation

4 Vertical glazing, transoms
visible recessed screw fittings

5 Vertical glazing, transoms
concealed screw fittings
Stainless steel bottom strip,
fire seals

6 Vertical glazing, transoms,
visible screw fittings
Stainless steel cover strip,
fire seals

7 Inclined glazing, mullions
concealed screw fittings

8 Inclined glazing, transoms,
visible screw fittings

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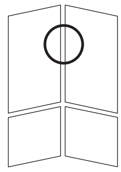
System details

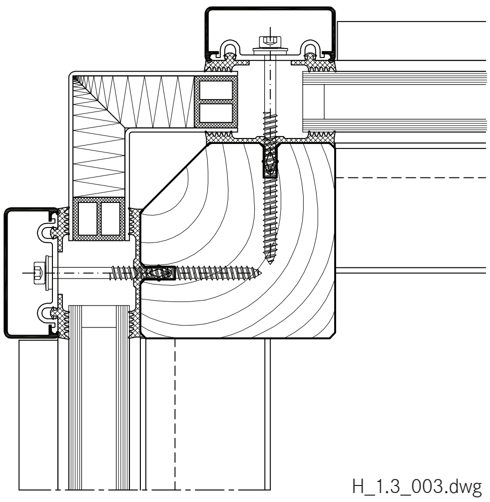
1.3
3

Creating facade corners

At exposed areas such as glass facade corners, it is particularly important to ensure sufficient heat insulation in order to avoid the creation of thermal bridges and prevent a build-up of condensation. Thermal current calculations provide information about the actual heat loss.



Outer corner



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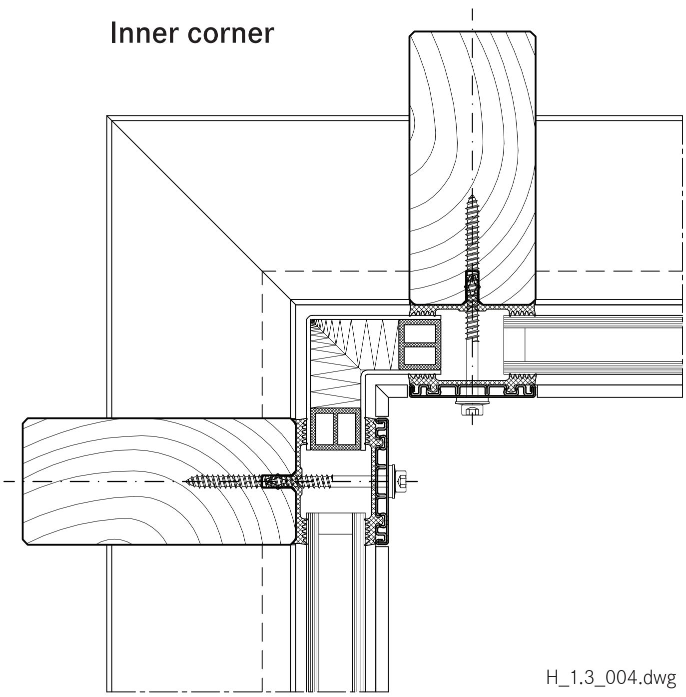
Inner corner



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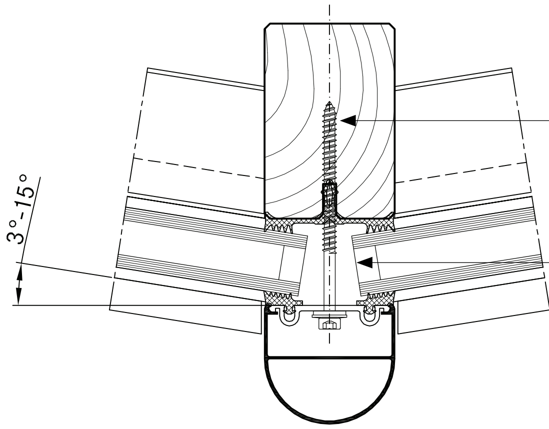
Facade polygon

Special seal allow a polygon shaped arrangement of the facade mullions. For convex glass surfaces an angle between 3° and 15° can be freely chosen. For concave glass surfaces the angle can vary between 3° and 10°.



Calculation of screw length with consideration of the angle

ATTENTION!
Adhere to the minimum glass inset!

Geometrically check the feasibility.
Recommendation: Use for system 60 and above

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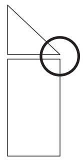
System details



Eaves with glass roof connection

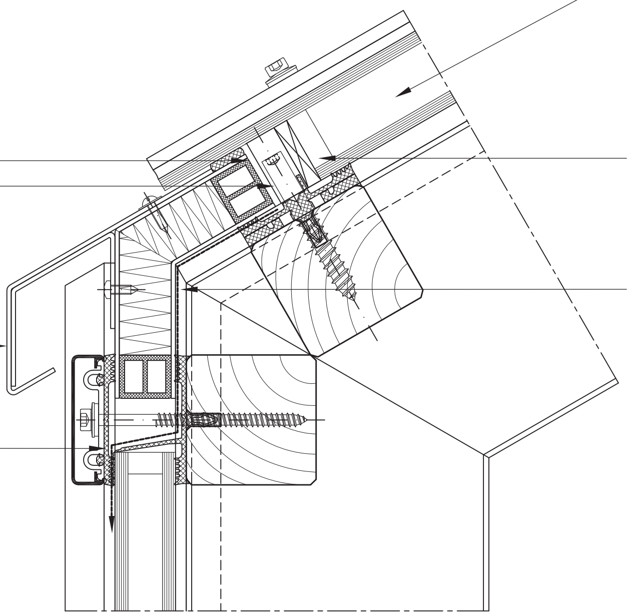
- Depending on the construction of the transoms, a design with or without rain gutters and the choice of stepped glazing or closable cover strips gives us different variants for implementation.
- All options require condensation and moisture to be drained away at the eaves.

Design with stepped glazing

- With a stepped glazing design it is important to select a UV-resistant edge bonding for the glass. This edge bonding systems, usually silicone-based, are quite permeable to gases and are therefore unable to achieve the required high values for sound and heat insulation of conventional systems and require additional sealing around the edges.
- Our thermal calculations show that stepped glass panes, compared to covered glass edges, have a much less favourable isothermal movement.
- Stepped glass panes must also be statically measured according to their reduced hold against wind suction.
- The additional thermal loads that occur in stepped glass panes should countered by the use of pre-tensioned glass (TVG, ESG) for the outer panes.
- Stepped glass panes should be preferred for flatter inclined roofs as water can drain away at the eaves unhindered.

Example 1:

Design with stepped glazing



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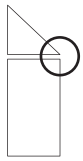
System details



Eaves with glass roof connection
Design using cover strips

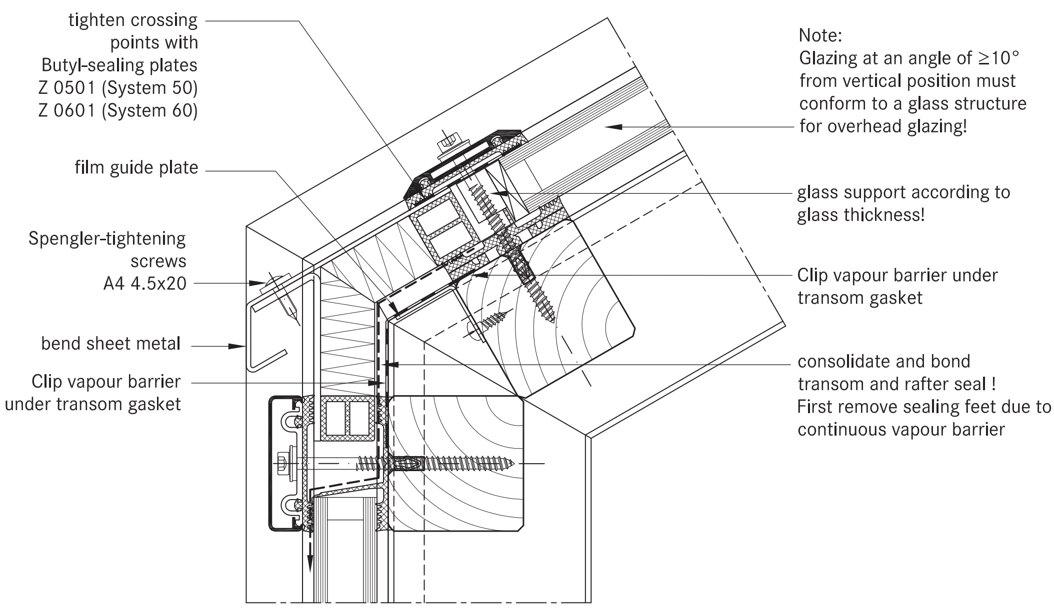
- Horizontal pressure strips prevent the free run off of rain water and dirt.
- Cover strips with angled edges reduce the build up of water in front of the cover strip.
- The outer sealing level on glass roofs must also be thoroughly sealed.
- In combination with our butyl clad stainless steel panels, glazing with pressure strips on 4 sides achieves a higher level of safety.
- Make sure that the inner sealing section provides guaranteed drainage for condensation.
- To improve drainage and heat-induced expansion, cover strips should be shortened by 5 mm at transom joints. Gasket joints, however, are to be laid flat with a slight excess in dimensions. Open ends of the transom cover strips must be sealed.

Note:

Due to the increased thermal stresses in the roof, we recommend using concealed screw fitting when choosing clamping strips for larger system lengths and in rafters. Unused holes in the pressure profile must be sealed.

Example 2:

Design using cover strips



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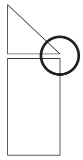
System details

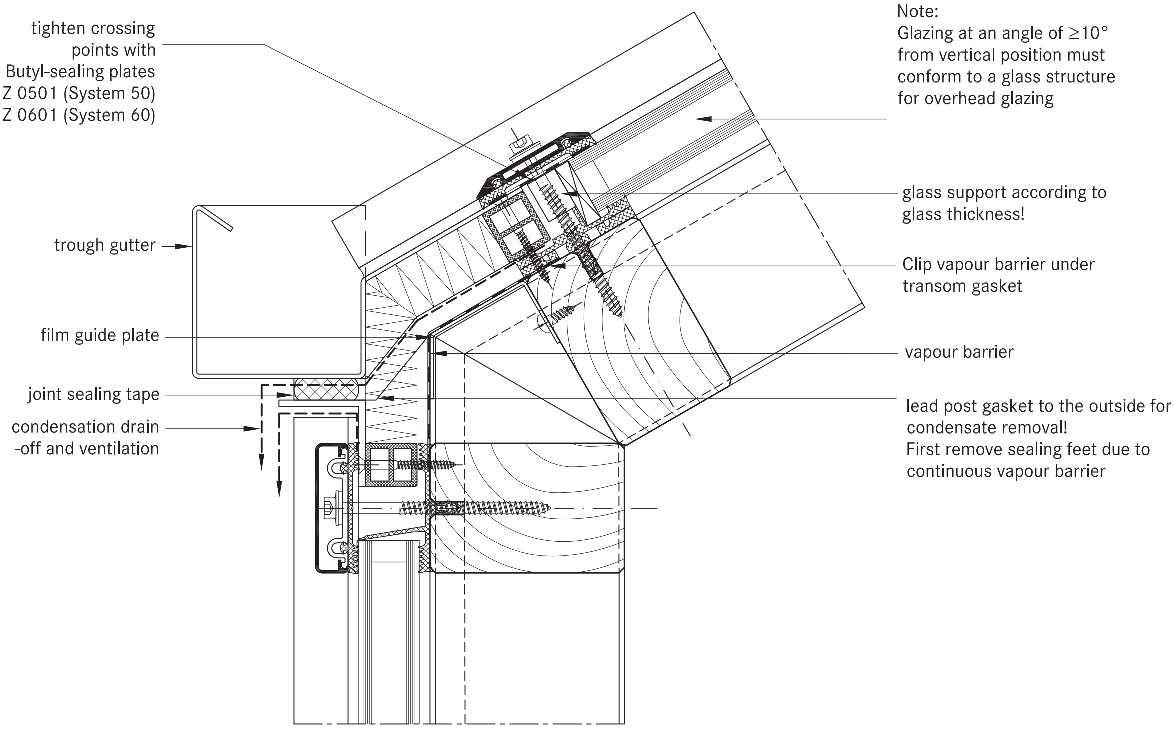


Eaves with glass roof connection
Design with gutter

- The gutter must be able to take its own weight and mounted in such a way that stresses from its own weight, water and ice will not lead to deformations and directly apply a load to the glazing.
- Overflowing water must not be able to get inside the structure. Alongside the gutter-shaped outer rafter seal, the moisture barrier installed over the guide plate also acts to drain away condensation.

Example 3:

Design with gutter



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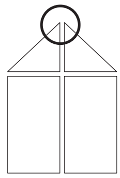
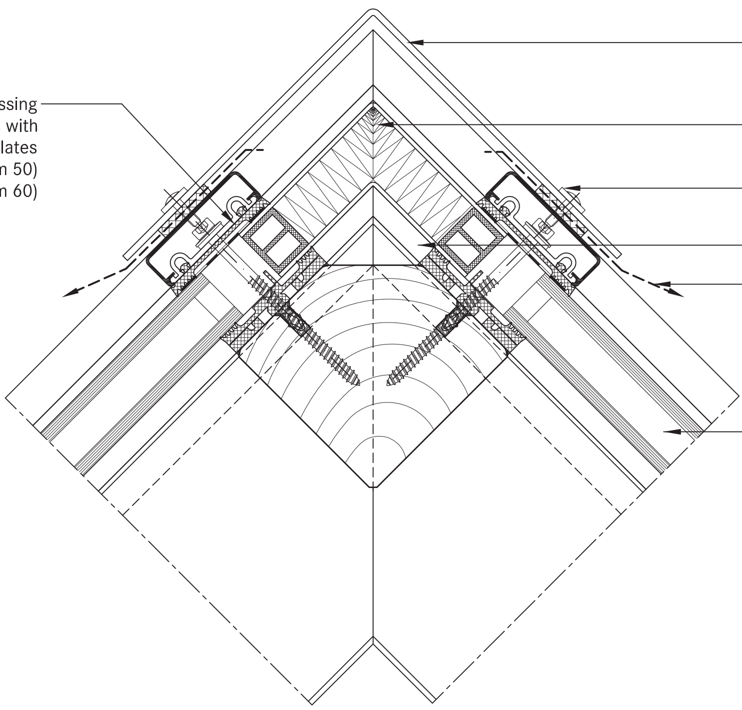
System details

Roof ridge design



- When designing the ridge cap, ensure that the rafter cover strips are pulled under the ridge cap.



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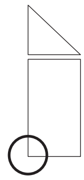
Structural attachments

Structural attachment film baffles

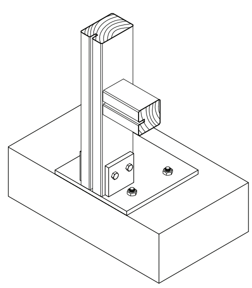
- Attachment of glazing to the building structure requires a well thought out approach.
- Moisture damage can occur if moisture condenses at any thermal bridges.
- Thermal bridges must be avoided and warm air from the inside spaces must not penetrate too deeply into the structure.
- The required moisture barriers must be installed as deeply as possible into the inner space using impermeable structural film baffles. This prevents moisture penetration into the structure via condensation from the air inside.
- An additional foil to seal against rainwater must be permeable to moisture. Only if this foil has a water vapour diffusion resistance value μ of max. μ = 3000 can a dry structure be guaranteed in the transition zones.

Structural attachments



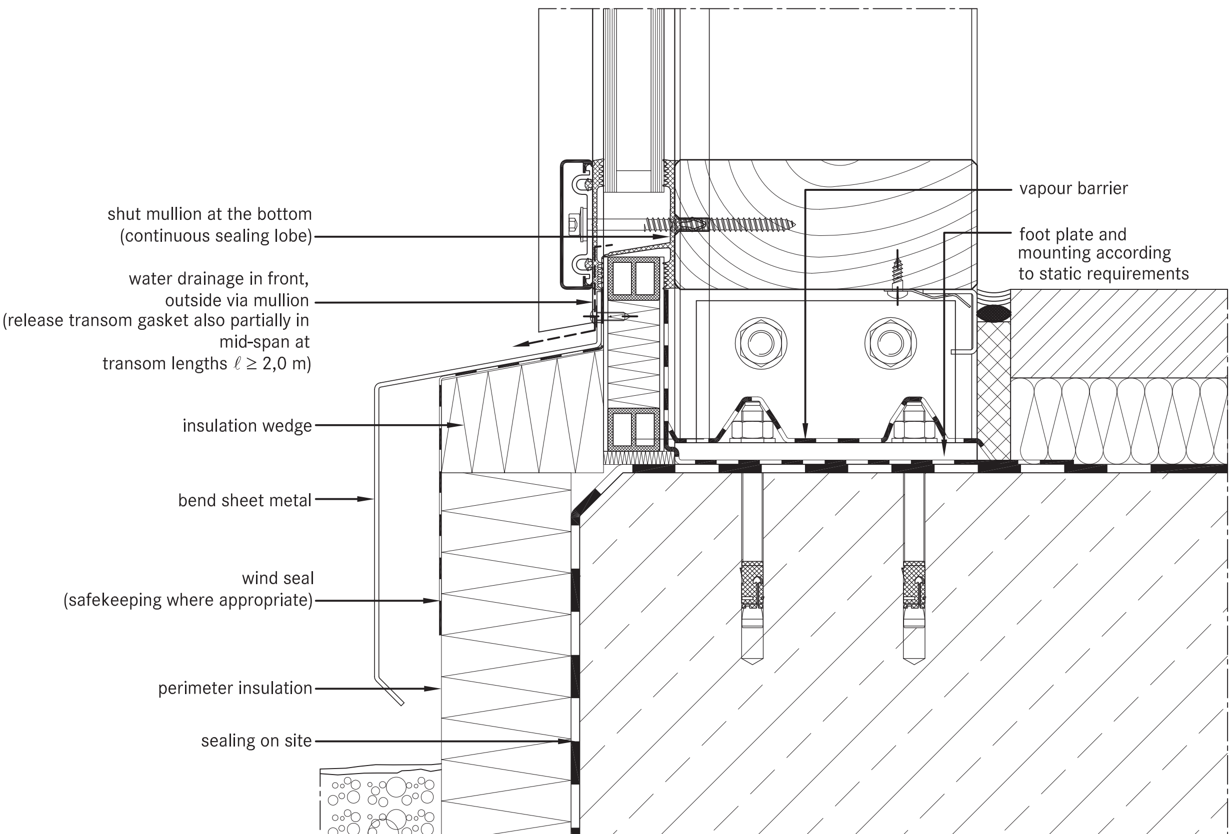
Facade base

- Controlled drainage of the rebate space can only be ensured if the sealing sections overlap in such a way that no moisture can get under the seals and foils.
- Run foils under the transom seal to act as a moisture barrier and glue to the wooden structure. In accordance with DIN 18195 the seal should be run at least 150 mm above the water-guiding layer.
- Attach foil with moisture barrier in accordance with the requirements of DIN 18195.



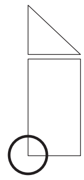
Example 1:

Mounting intermediate mullion to base plate



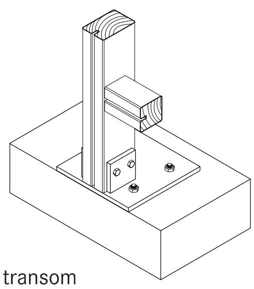
Drainage of the base area is achieved via the seal flap towards the outside. In this case the seal flap around the mullion at the base should not be released. For edge mullions, ensure there is a corresponding seal placed (continuous transom seal up the to the end point) and a constructive design of the drainage section.

Structural attachments



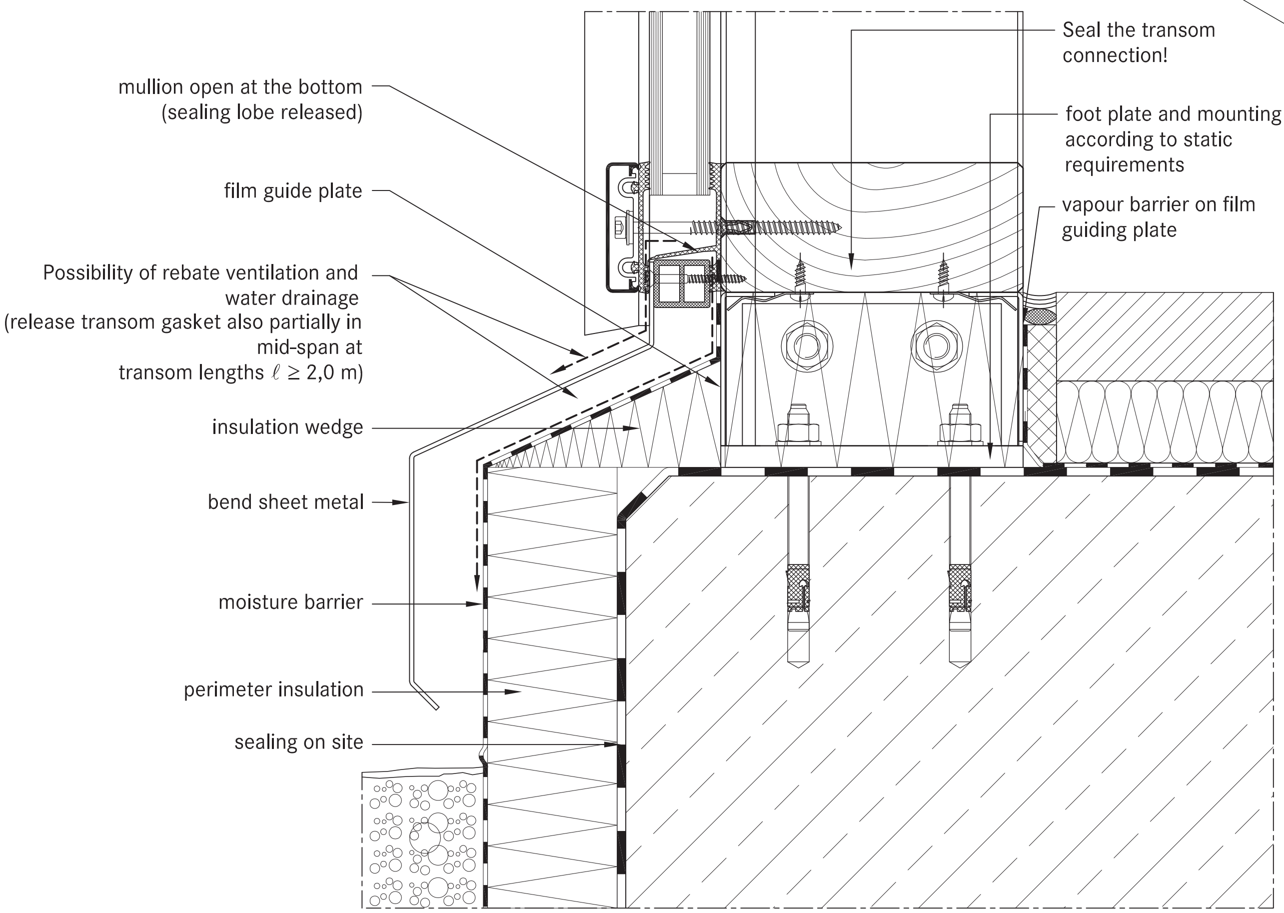
Facade base

- Rebate space ventilation is achieved via the open end of the vertical cover strips.
- Ensure the connection is impermeable to vapour.
- Mullion mountings must be sufficiently statically dimensioned. Required axis and edge distances for anchoring the base plates and in the building structure must be observed.



Example 2:

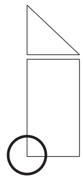
Mounting intermediate mullion to base plate



Where seal flaps are interrupted by joints, filler rods in the joint must also be cut.

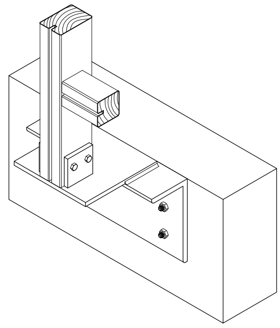
H_1.3_011.dwg

Structural attachments



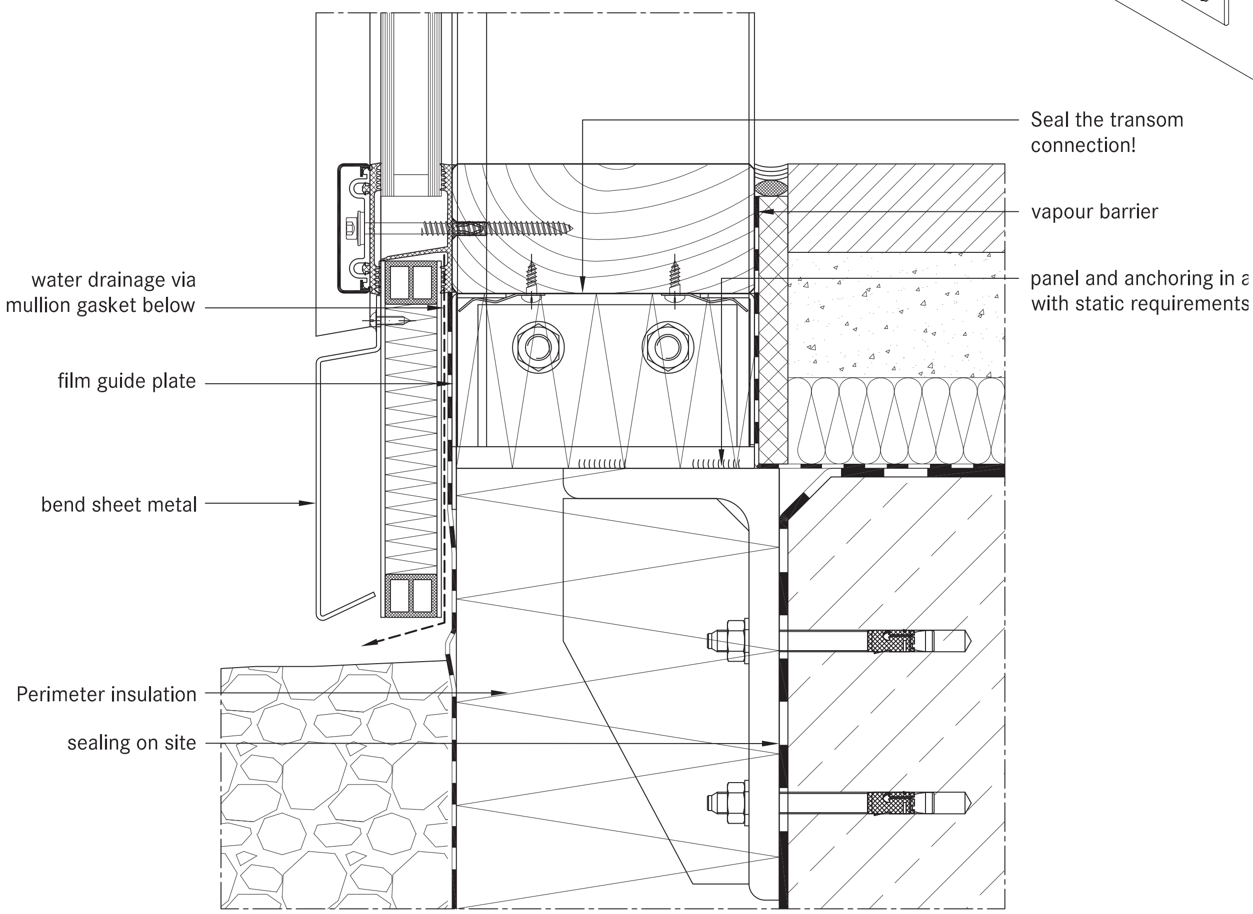
Facade base

- Heat insulation around the structural connection should be designed in such as way as to prevent cold bridges forming.
- Steel parts should also be provided with sufficient protection against corrosion even in concealed areas.
- Weather-protection sheets should be used depending on the requirements of the construction. Sufficient rear ventilation must be ensured.



Example 3:

Attaching intermediate mullions at base plates



H_1.3_012.dwg

Structural attachments

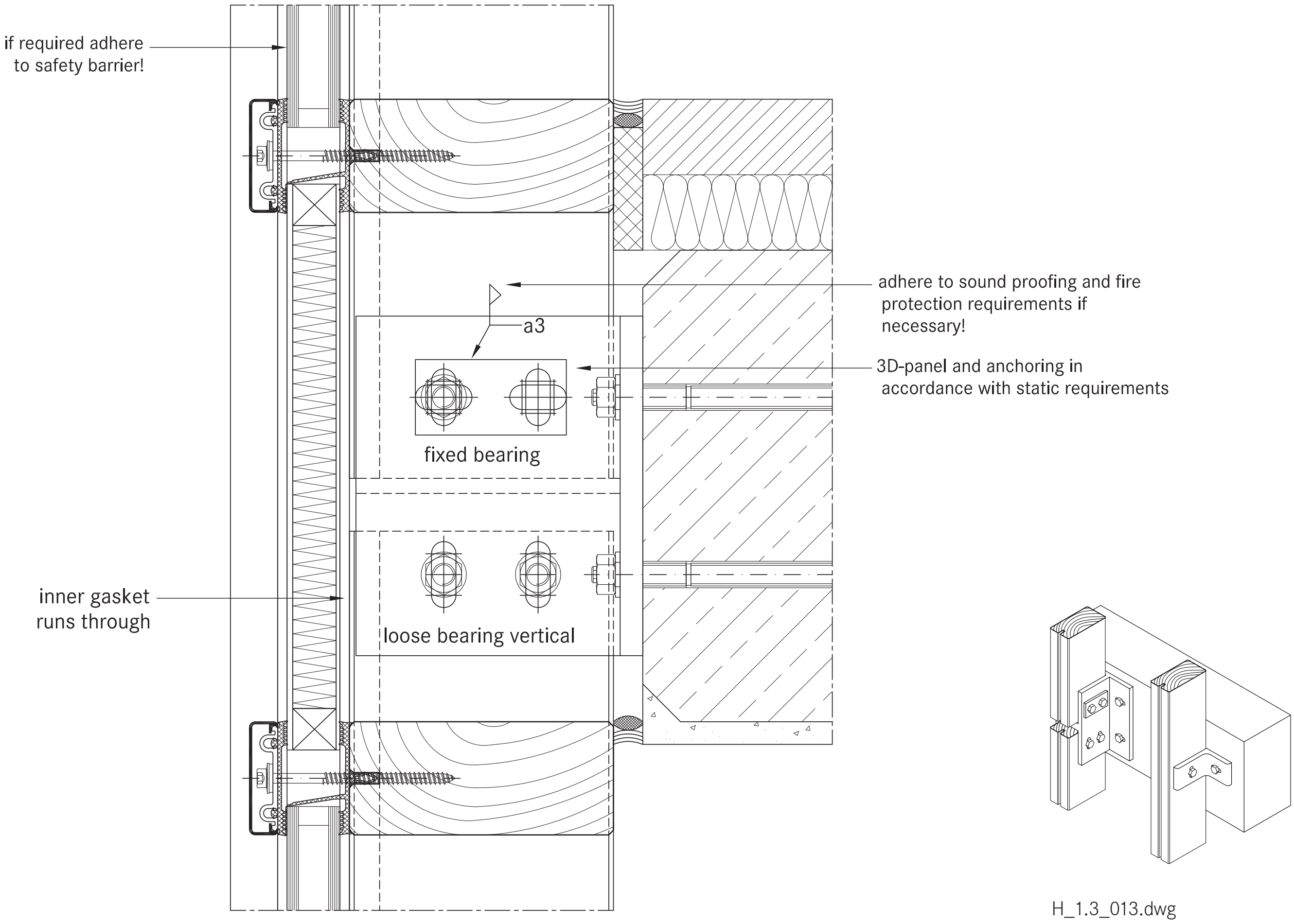
Connection before intermediate floors

- Depending on requirements, mullions are designed as continuous multi-span transoms or separated at each floor.
- Reasons for separating mullions can include e.g. building settlement, fire protection, sound insulation, etc.
- If the separation joint is intended to absorb expansion, then as well as the required degree of freedom for mullions the ability for movement of integrated elements must also be ensured.
- The constructive design of the mullion joint and mounting should be chosen according to the statically calculated base system and determines the choice and arrangement of fixed and movable bearings, type of screw fittings, structural connection parts and attachment to the concrete floor.
- With continuous mullions and a corresponding mount the multi-span support principle is in effect. Sagging due to horizontal effects is lower. The required moment of inertia reduces for 2-span supports with the same span length compared to the 1-span support by a factor of 0.415. However, a tension and stability analysis should be carried out.

Example:

Mullions separated at each floor

In this example, distribution of horizontal and vertical loads is achieved at each floor through the existing floor structure.

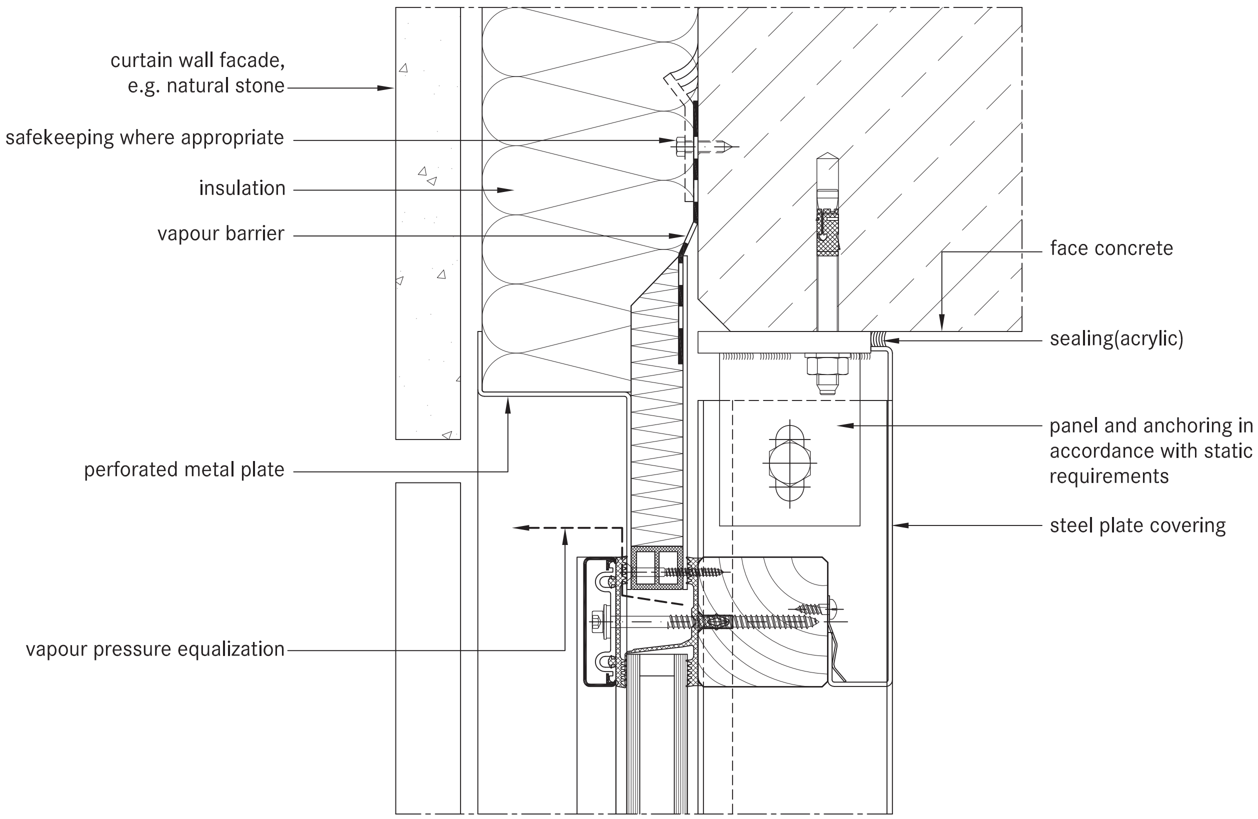


H_1.3_013.dwg

Structural attachments

Ceiling connection

- Structural connections should take account of any movement that may occur.
- As well as temperature induced expansion in the facade, all longitudinal expansions and movements of the affected components must be considered.
- Additional stresses from restraints must be avoided.

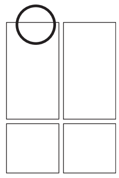


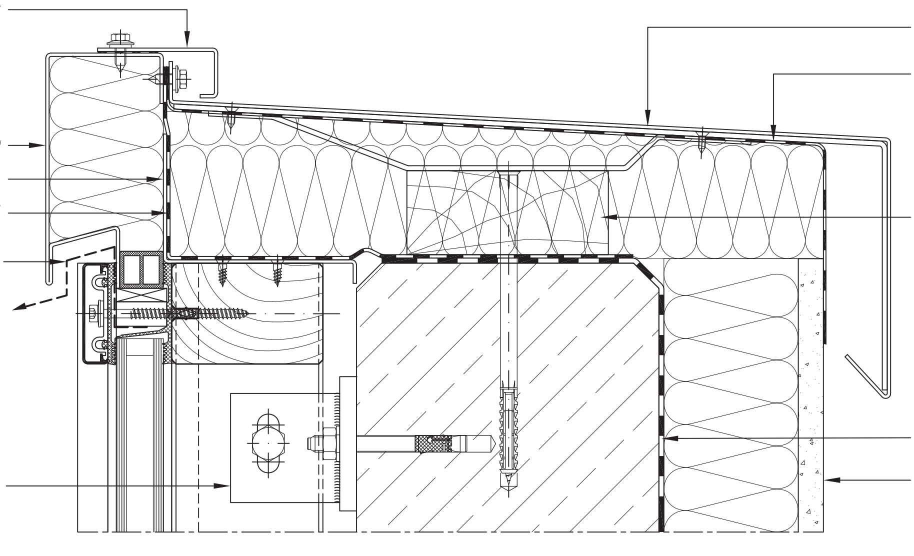
H_1.3_014.dwg

Structural attachments

1.3
4

Facade connection to parapets



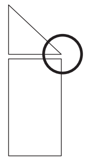


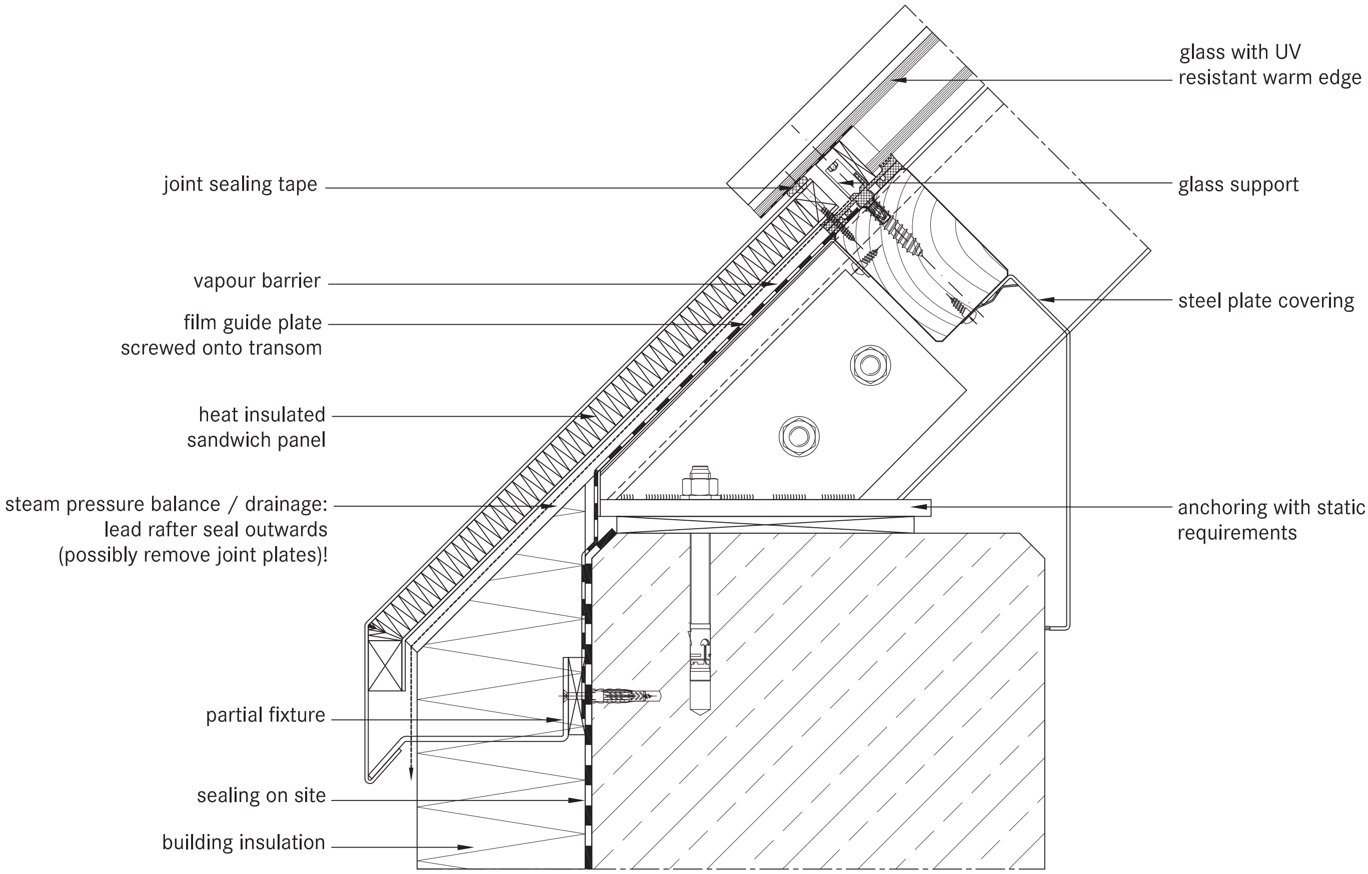
H_1.3_015.dwg

Structural attachments

Connection to structural eaves

- This connection is suitable for glass roofs that are being installed as skylights in the structure. These may be gabled roofs, single pitch roofs, pyramids or arched roofs.



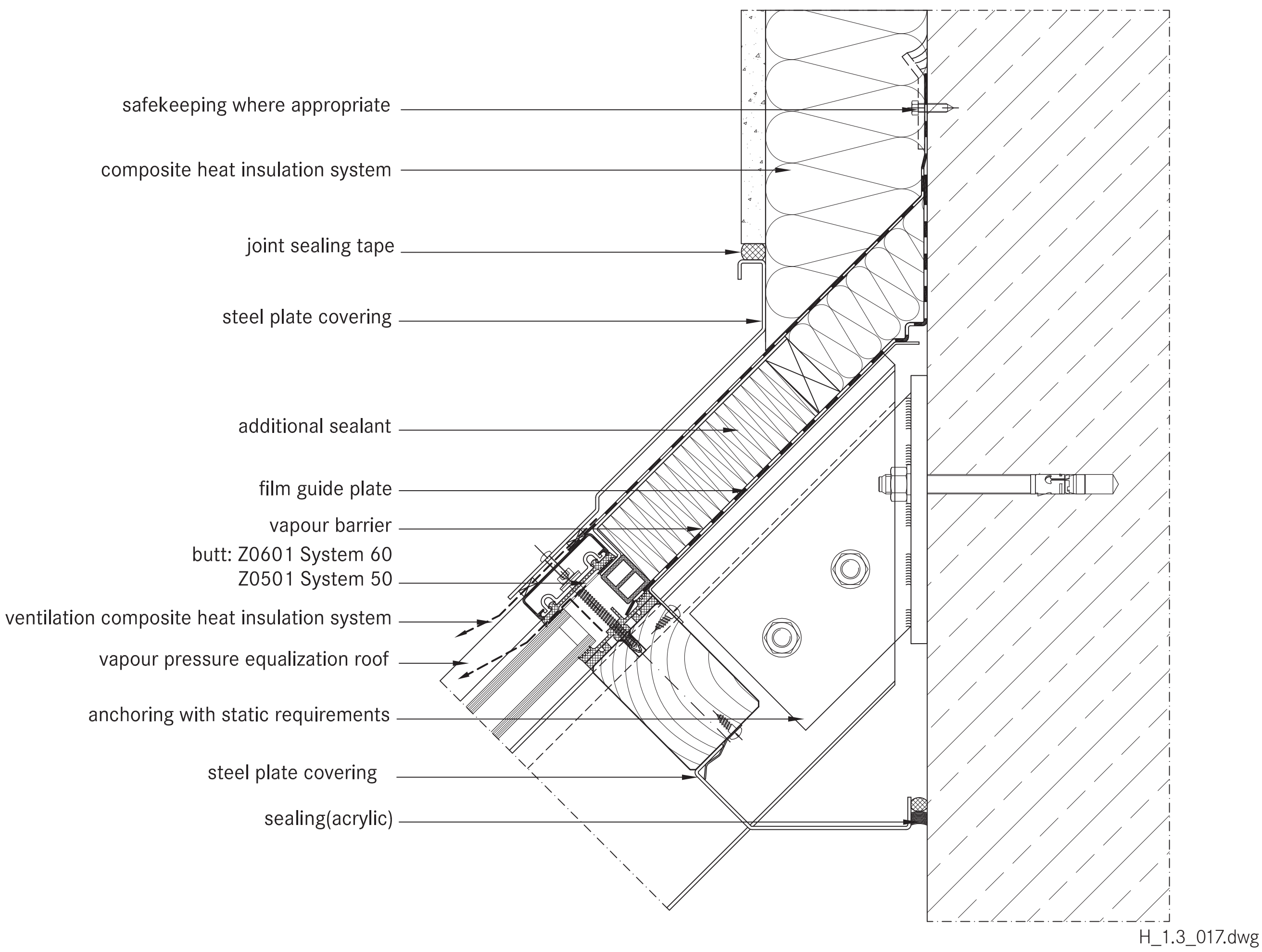


H_1.3_016.dwg

Structural attachments

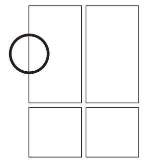
Ridge connection to walls

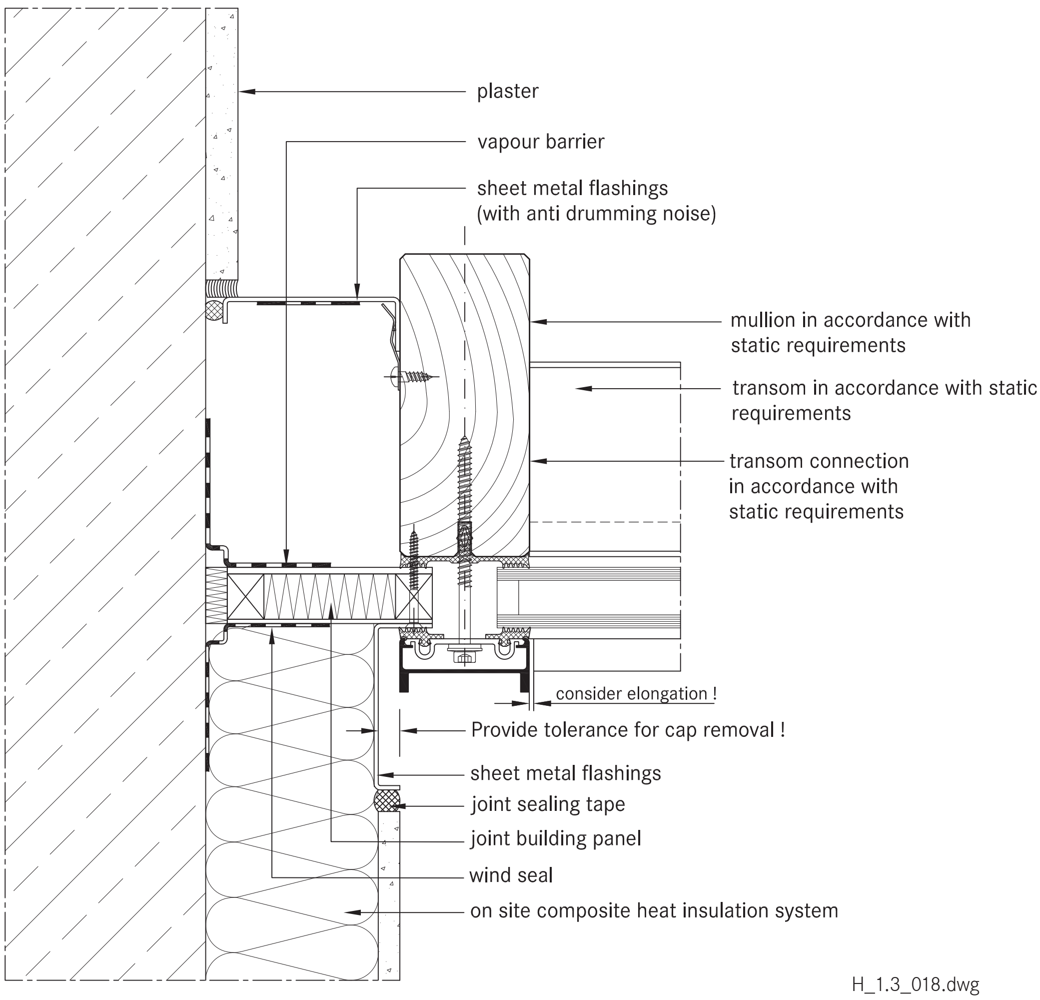
- When making ridge connections to walls, permeability to moisture is particularly important. Warm air with a high level of moisture gets into cooler zones of the inner sealing section where the design is not sufficiently sealed and can cause structural damage from penetrating into the connecting structure.
- Joint seals made from butyl-clad stainless steel plates (Z 0501, Z 0601) must be installed on the outside of joint areas.



Structural attachments

Horizontal wall connection to heat insulation bonding system

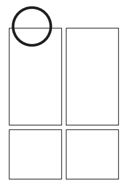


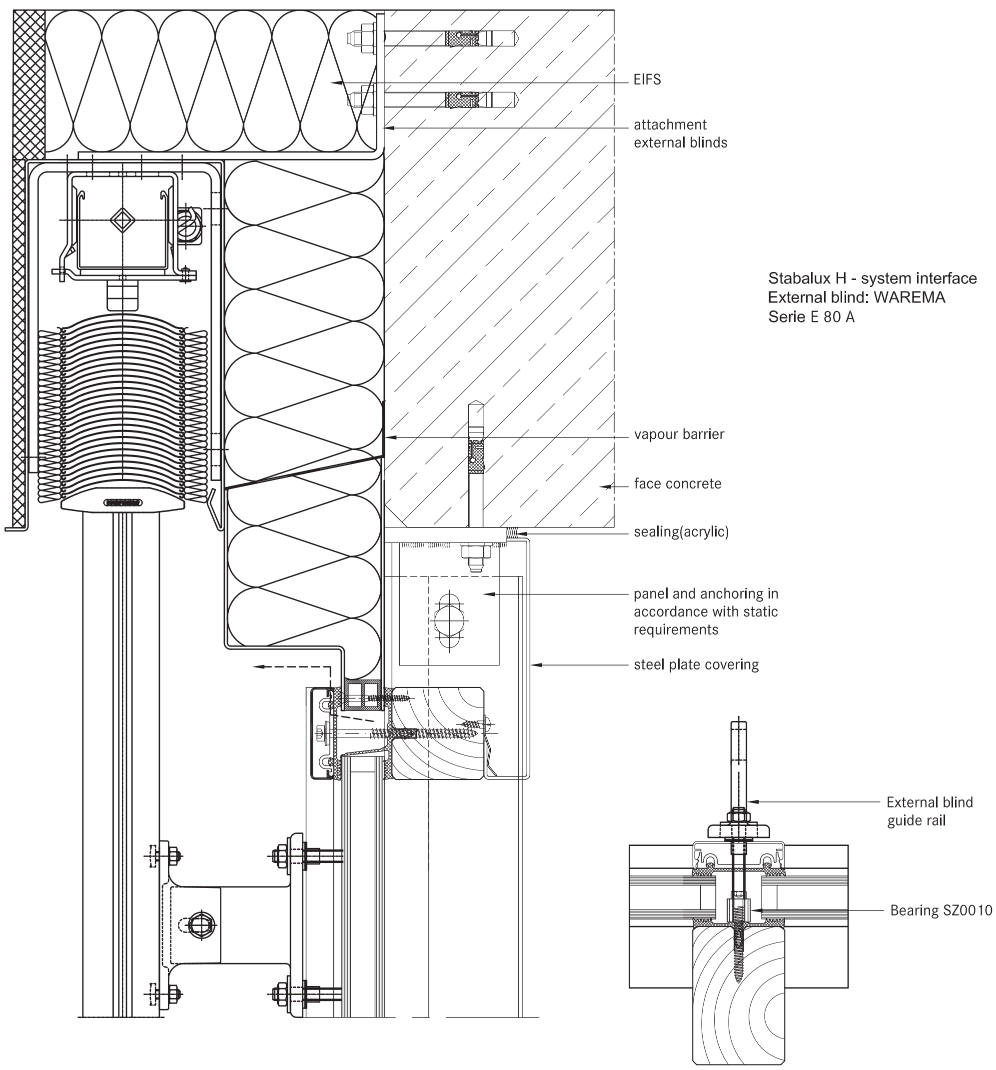


H_1.3_018.dwg

Structural attachments

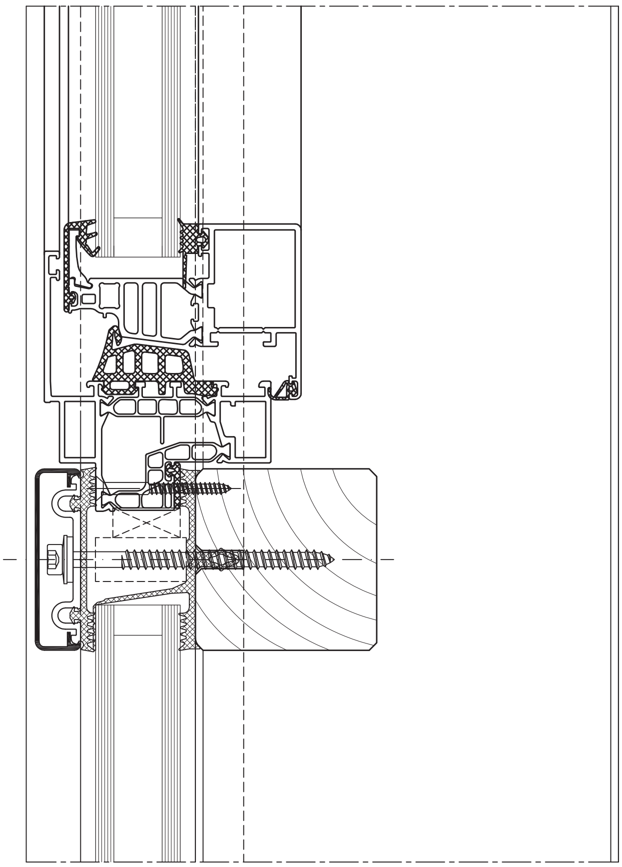
Ceiling connection including WAREMA external blinds



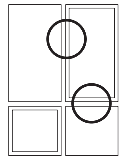


H_1.3_029.dwg

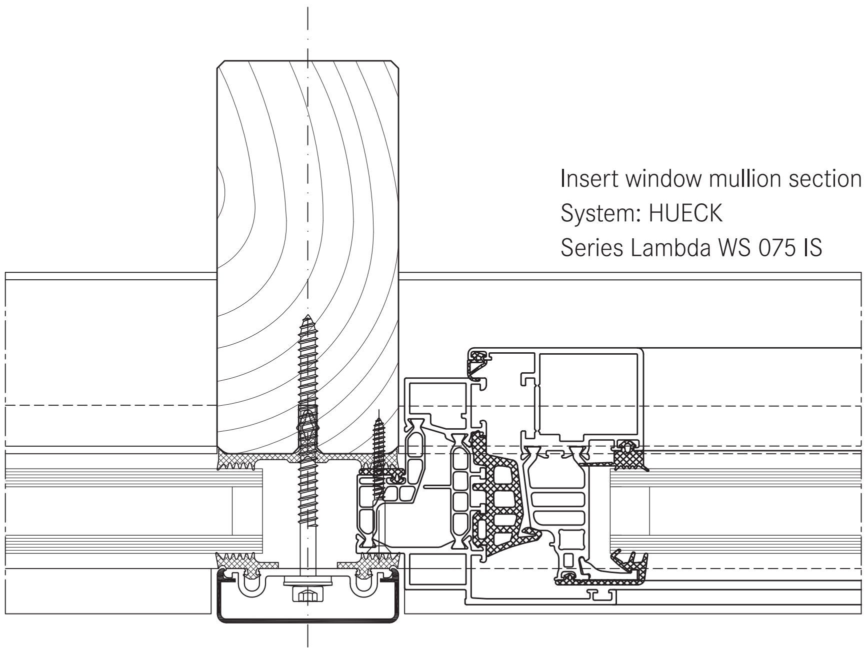
Installing windows and doors



Insert window transom section
System: HUECK
Series Lambda WS 075 IS



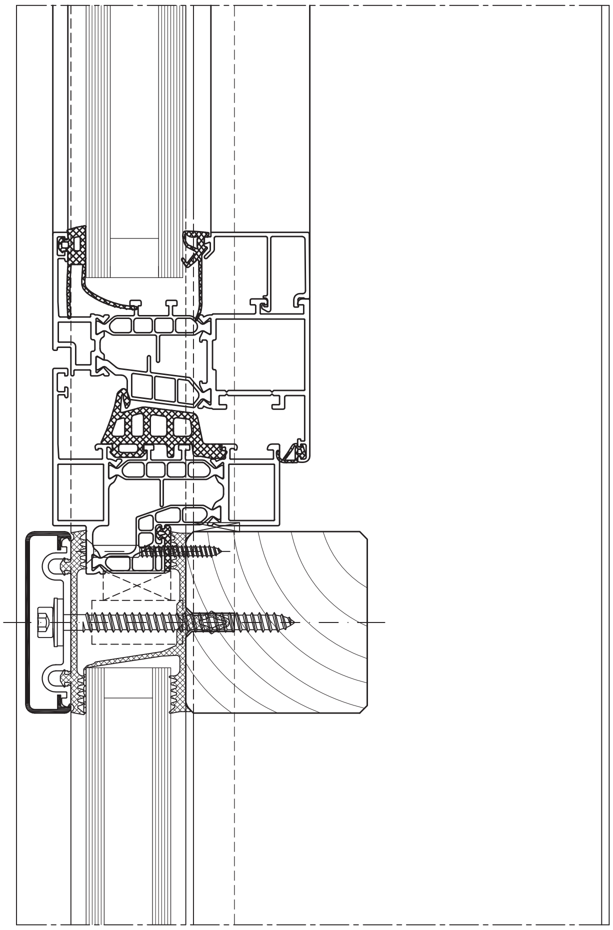
Mullion and transom facades and glass roofs from Stabalux are neutral with regards to the selection of insert elements. All commonly available window and door systems made from steel, aluminium, wood or plastic can be used. Frame profiles from the window and door manufacturer's should be selected to match the chosen glass thickness. If no profiles with a suitable insert rebate are available, mountings may be used as shown in the following examples. Like with glass elements, windows are set into the facade on glass supports, padded and then secured against slippage.



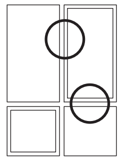
Insert window mullion section
System: HUECK
Series Lambda WS 075 IS

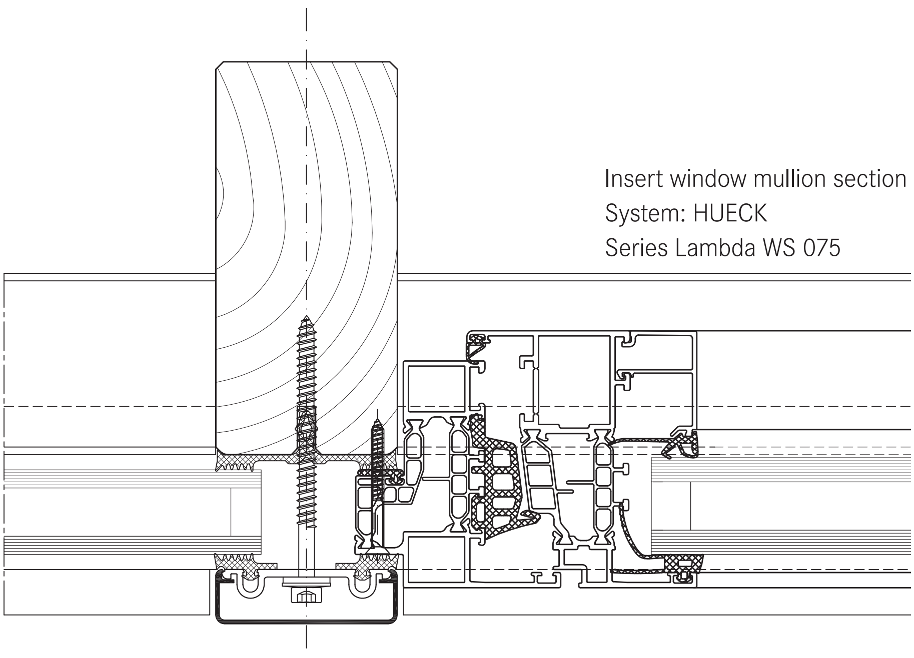
H_1.3_019.dwg

Installing windows and doors



Insert window transom section
System: HUECK
Series Lambda WS 075

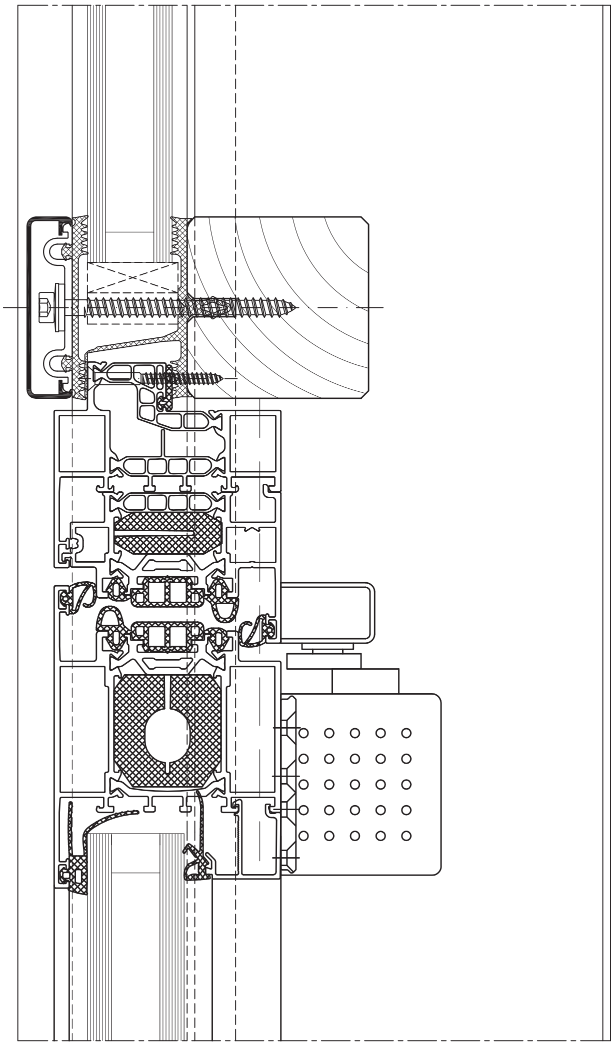




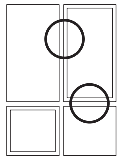
Insert window mullion section
System: HUECK
Series Lambda WS 075

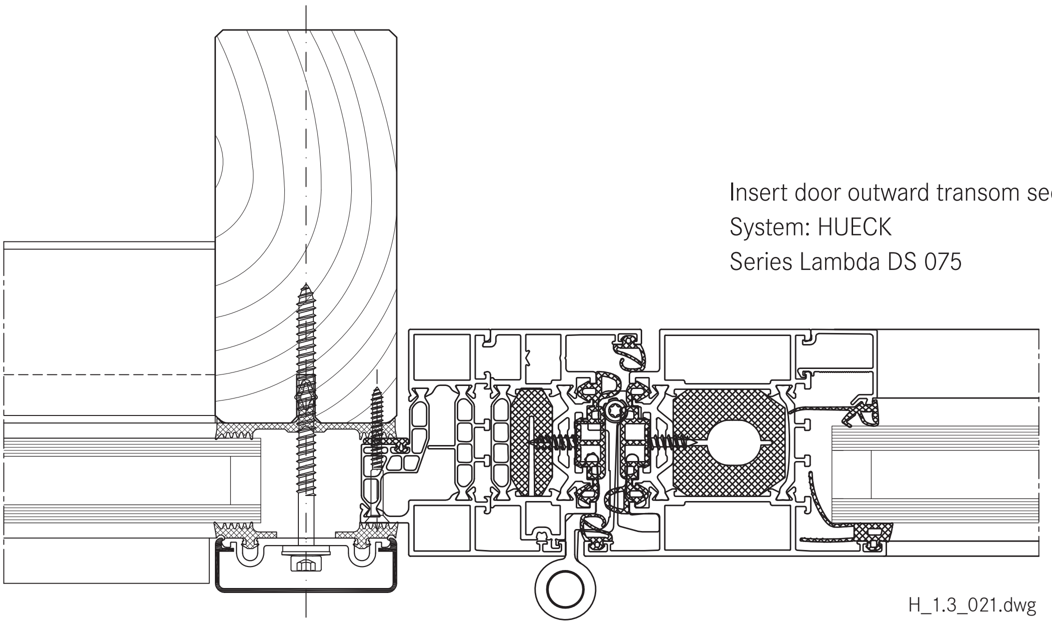
H_1.3_020.dwg

Installing windows and doors



Insert door outward transom section
System: HUECK
Series Lambda DS 075

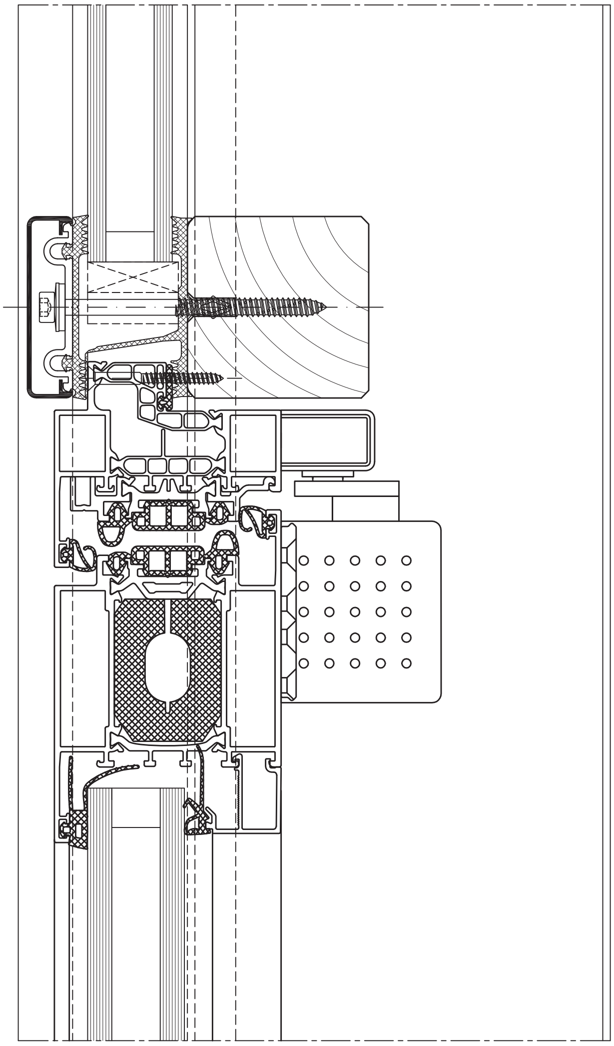




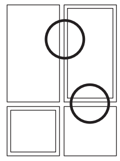
Insert door outward transom section
System: HUECK
Series Lambda DS 075

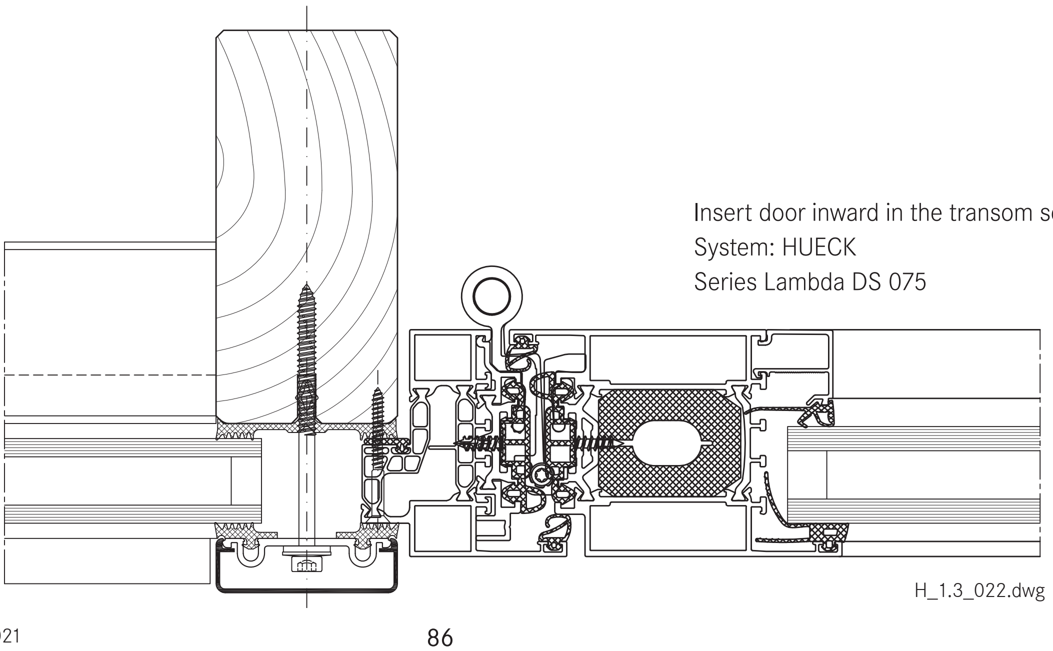
H_1.3_021.dwg

Installing windows and doors



Insert door inward in the transom section
System: HUECK
Series Lambda DS 075

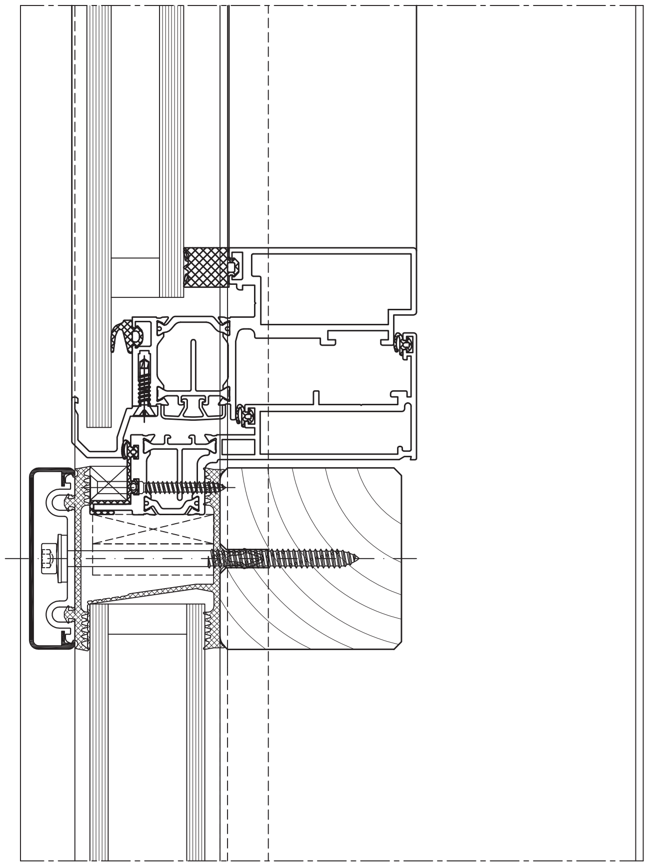




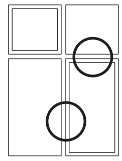
Insert door inward in the transom section
System: HUECK
Series Lambda DS 075

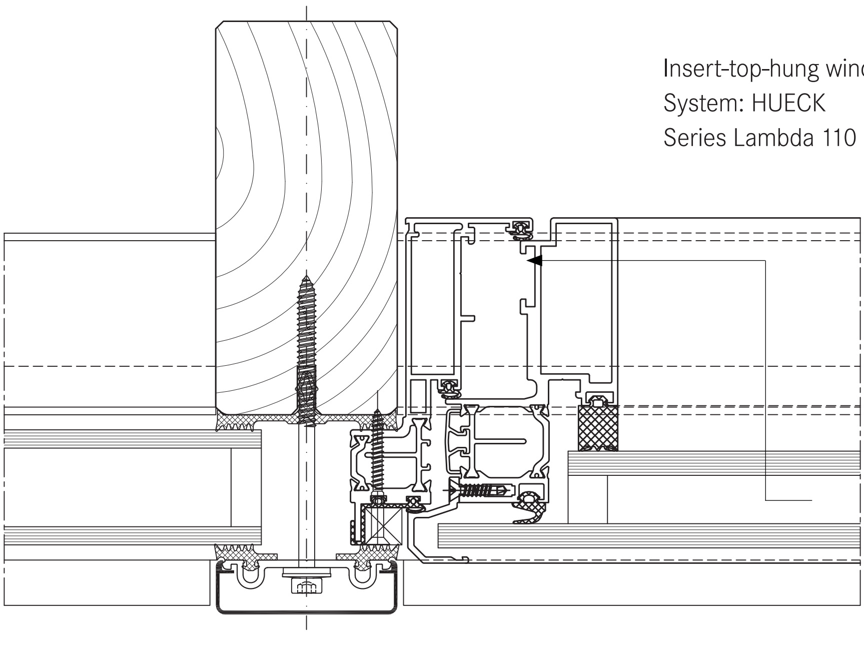
H_1.3_022.dwg

Installing windows and doors



Insert-top-hung window transom section
System: HUECK
Series Lambda 110

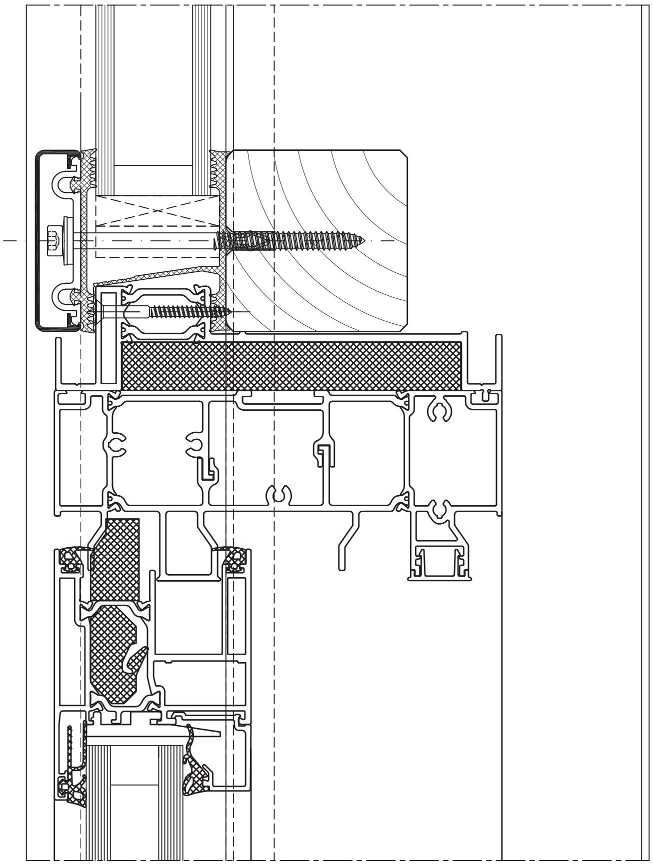




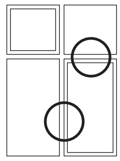
Insert-top-hung window mullion section
System: HUECK
Series Lambda 110

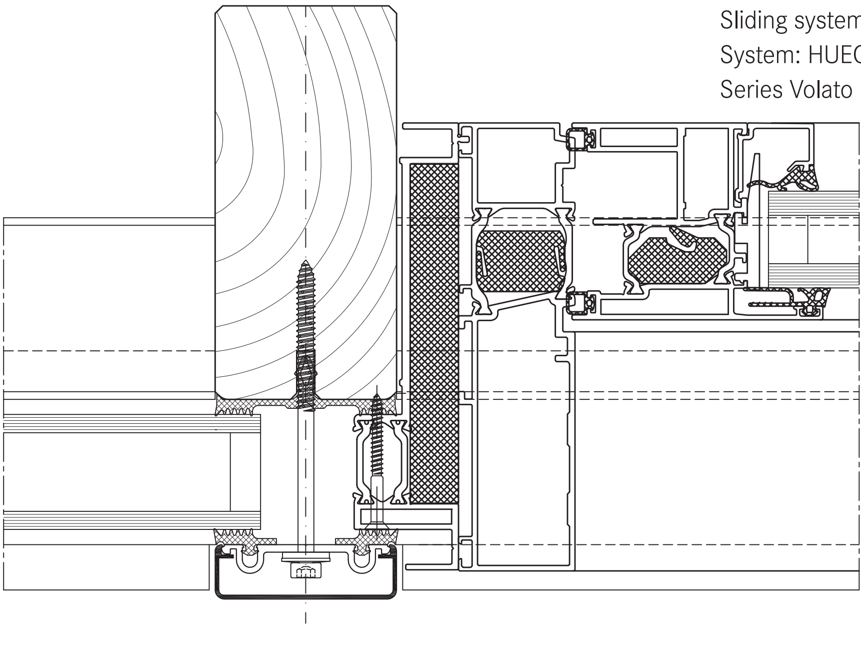
H_1.3_023.dwg

Installing windows and doors



Sliding system transom section
System: HUECK
Serie sVolato M



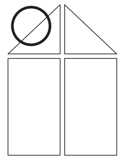


Sliding system mullion section
System: HUECK
Series Volato M

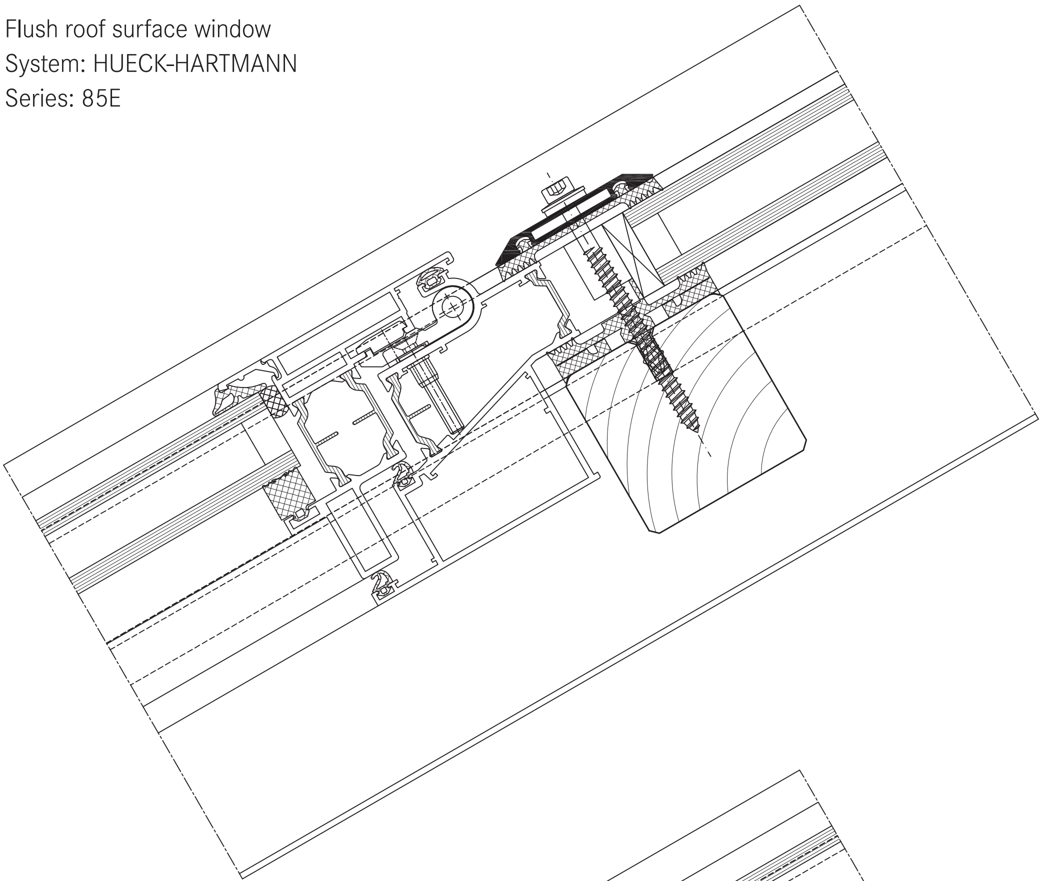
H_1.3_024.dwg

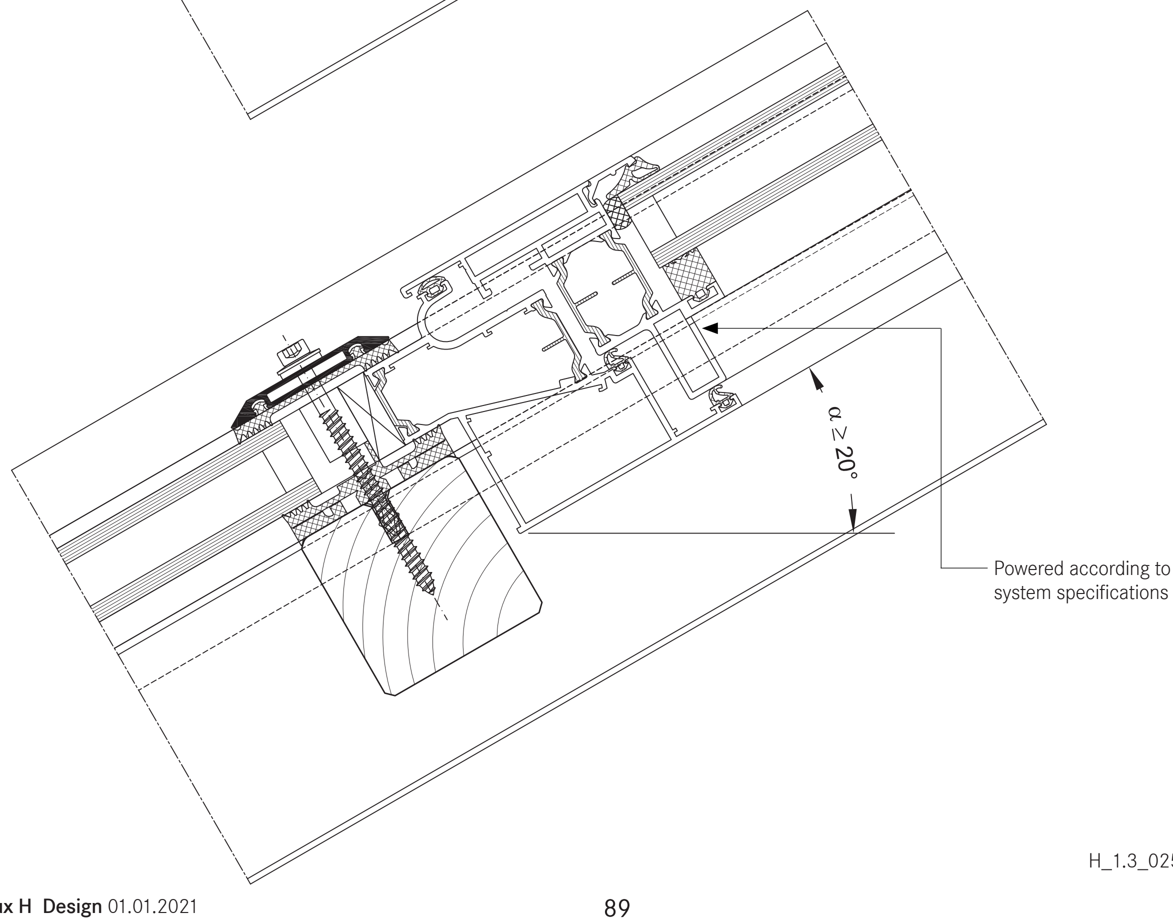
STABALUX

Installing windows and doors



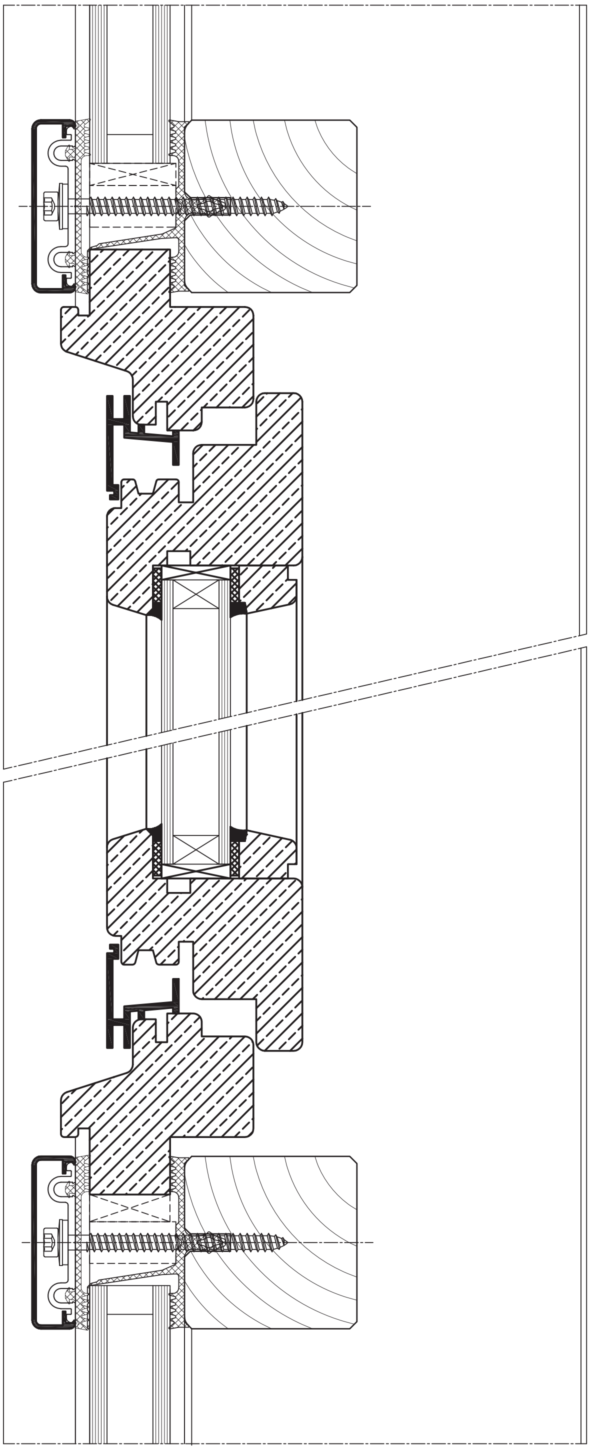
Flush roof surface window
System: HUECK-HARTMANN
Series: 85E



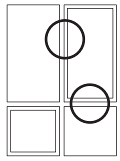


H_1.3_025.dwg

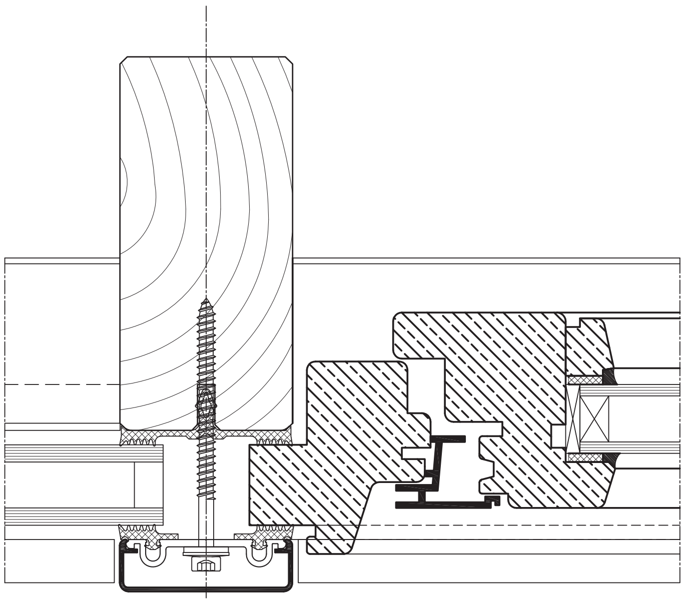
Installing windows and doors



Insert window - transom sections
wood windows



Insert window - mullion section
wood windows

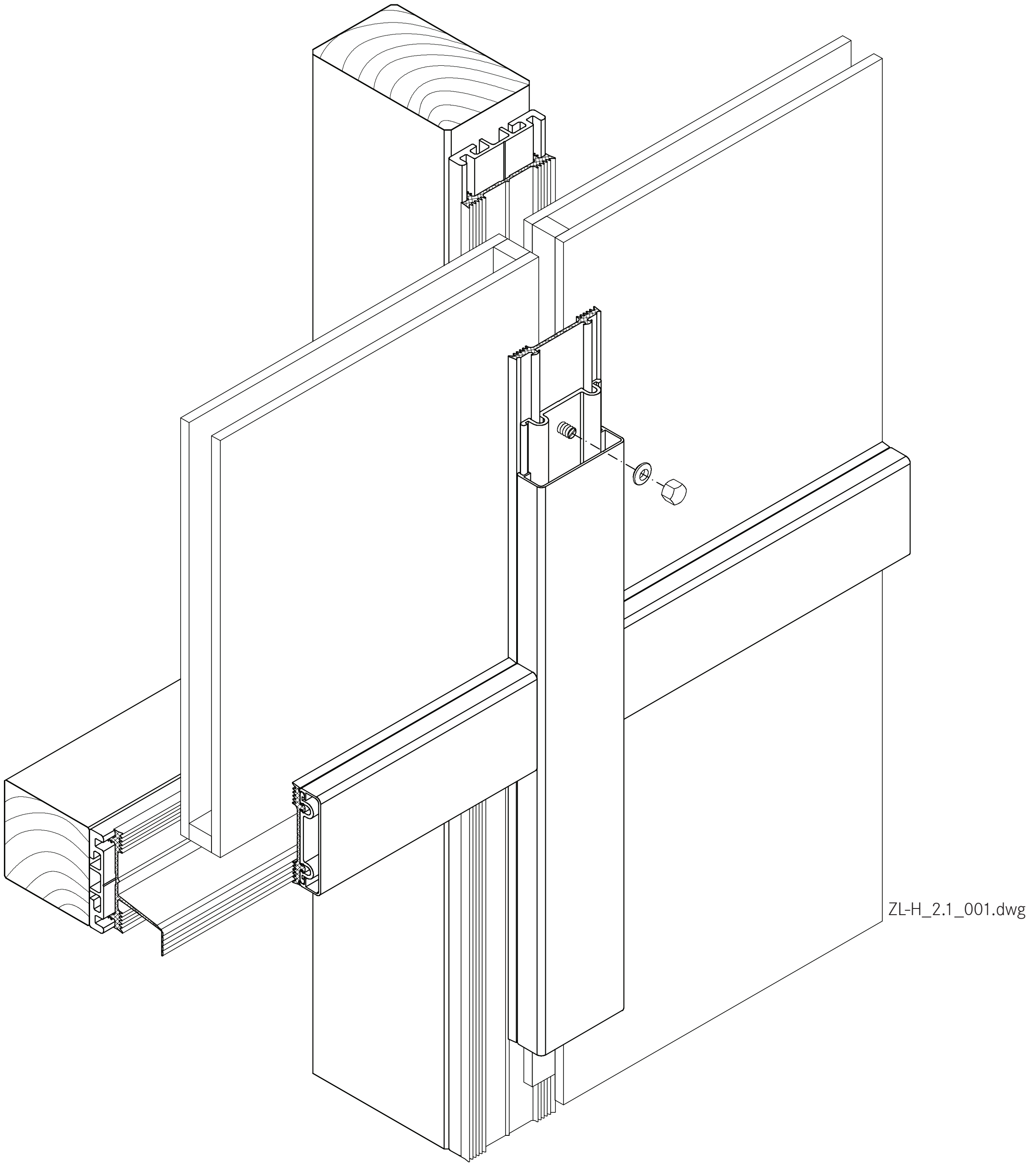


H_1.3_027.dwg

Stabalux ZL-H

System properties

Wood facade system with spacer strip ZL



System properties

Stabalux ZL-H

- Stabalux ZL-H is a simple and affordable add-on system for single and double glazing with a complete and customisable range for creating facades and roofs with a wooden supporting structure.
- The Stabalux ZL-H system is available in 50, 60 and 80 mm widths.
- The spacer strip is attached centrally to the sub-structure to ensure precise seals are made. Together with the seal, this provides a uniform appearance.
- The system can be installed on the construction site without any prior processing of the sub-structure and is therefore an ideal choice for facade refurbishment work.

Specifications:		**Facade**	**Facades with inclinations up to 20°; overlapping inner sealing**	**Roof up to 2° inclination**
System widths		50, 60, 80 mm	50, 60, 80 mm	50, 60, 80 mm
Air permeability EN 12152		AE	AE	AE
Driving rain resistance EN 12154/ENV 13050	Static Dynamic	RE 1650 Pa 250 Pa/750 Pa	RE 1650 Pa 250 Pa/750 Pa	RE 1350 Pa [2)]
Resistance to wind EN 13116	Permitted load Increased load	2 kN/m² 3 kN/m²	2 kN/m² 3 kN/m²	2 kN/m² 3 kN/m²
Shock strength EN 14019		E5 / I5	E5 / I5	**Increased requirements in accordance with Cahier 3228 du CSTB Méthode d‘essai de choc sur verrière Weight 50 kg Head 2.4 m**
				[2)] the test was carried out using a water volume of 3.4ℓ/(m²min) - above the amount required by the standard

Suitable for
Passive building construction

System design e.g. ZL-H-60120-44-15		U_f = 0.61 W/(m²K) [1)] Glass thickness 44 mm		

[1)] Without effect of screws

* works only in combination with direct screw joints

System properties

Certifications, authorisations, CE mark

(Section 9)

The tests we have carried out provide contractors and planners with certainty as well as the ability to use the test results and product passports. For example, they might use this information to issue the CE mark.

Permeability/Safety

- The Stabalux sealing geometry prevents moisture ingress.
- Condensation is guided away in a controlled manner.
- Stabalux offers slotted and overlapping sealing systems for vertical glazing. Overlapping systems have been tested for inclined facades up to 20°.
- Seal flaps increase the safety and impermeability of the installation on vertical glazing.
- For roof glazing, a special Stabalux sealing system with offset sealing sections is used. This keeps the supporting structure level during planning and production processes.
- Sealing the transom rebate allows flat roofs to be created with an incline of up to 2°.
- Creation of the required drainage takes place at the construction site by pushing together the seals in the facade or slotting together the offset sealing sections in the facade or roof.

Insulation/Thermal Separation (Section 9)

The Stabalux System ZL-H has excellent thermal properties. A heat transfer coefficient of U_f for frames of up to 0.6 W/(m²) are achieved.

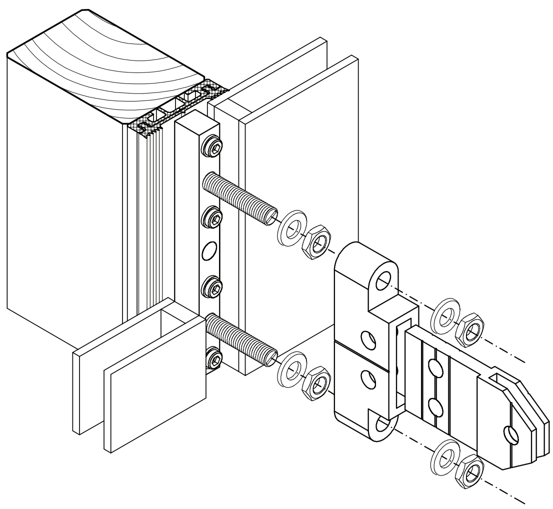
Noise insulation of the glass facade

(Section 9)

The noise insulating properties of a facade depend on a variety of factors, each of which affects the properties in a different way. The task of the planner is to expertly select the optimum design on a case-by-case basis. Different combinations of frame profiles, glazing systems and noise reducing glass have vastly different effects on noise insulation. Investigations and measurements performed by us (e.g. using the Stabalux H System) are just examples of a huge range of possibilities and serve only as a guideline.

Stabalux SOL sun protection (Section 9)

Alongside the usual measures to prevent glare and excessive solar energy passing through, we offer a specially developed system of outside lamellae.
Particular attention has been paid here to ensure attachment and assembly of these can be done easily with Stabalux systems whilst meeting architectural and climatic requirements. Glass panes and clamping strips are not subject to any load from application of the sun protection. Assembly and sealing are simple and efficient.

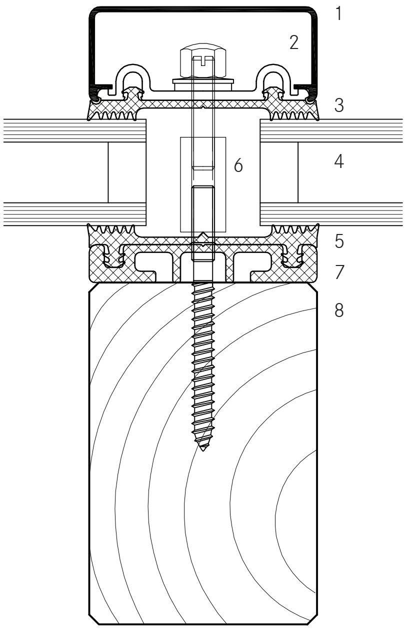


ZL-H_2.1_002.dwg

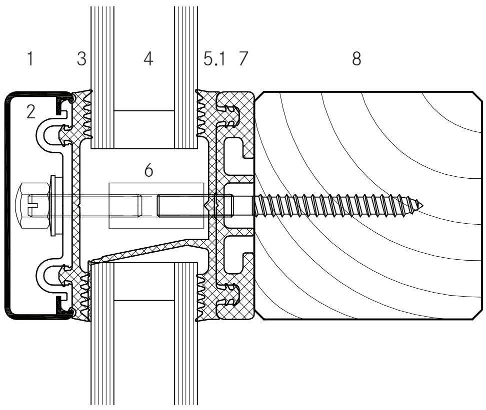
System cross sections and inner seals - facade

Inner seal 5 mm tall / 1 drainage level

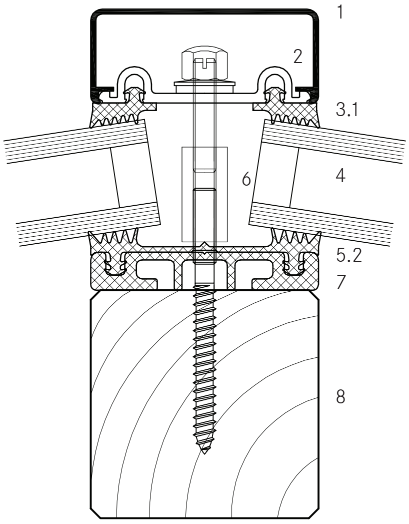
Vertical glazing mullion



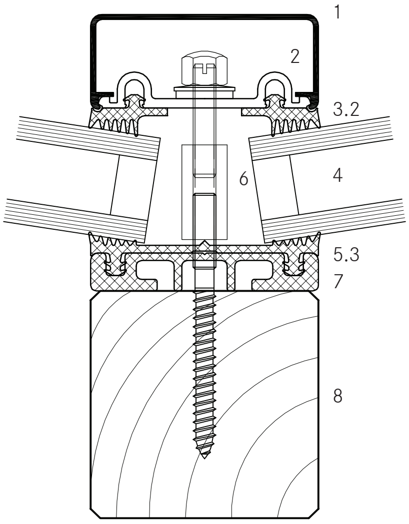
Vertical glazing transom



Polygonal glazing mullions - convex 3° - 15°



Polygonal glazing mullions - concave 3° - 10°



ZL-H_2.1_003.dwg

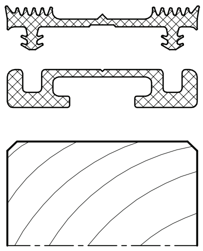
1	Upper strip
2	Pressure profile
3	Outer seal
3.1	Outer seal convex polygonal glazing
3.2	Outer seal concave polygonal glazing
4	Glass / panel
5	Inner seal
5.1	Inner sealing using a seal flap
5.2	Inner seal convex polygonal glazing
5.3	Inner seal concave polygonal glazing
6	System screw fittings
7	Spacer strip
8	Timber profile

System cross sections and inner seals - facade

2.1
2

Inner seal 5 mm tall / 1 drainage level

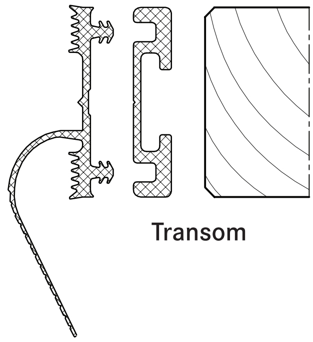
System 50 mm



GD 5025

ZL 5053

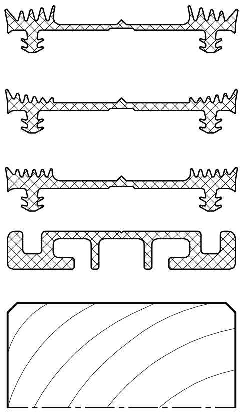
Mullion



GD 5030

Transom

System 60 mm



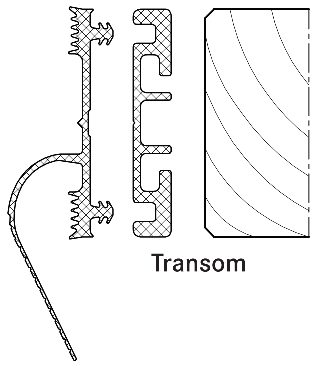
GD 6038
Polygonal/convex

GD 6036
Polygonal/concave

GD 6025

ZL 6053

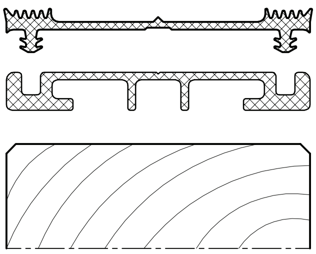
Mullion



e.g. GD 6030

Transom

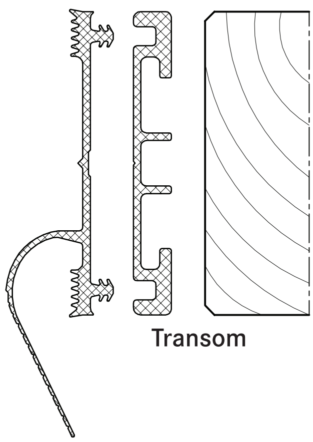
System 80 mm



GD 8025

ZL 8053

Mullion



GD 8030

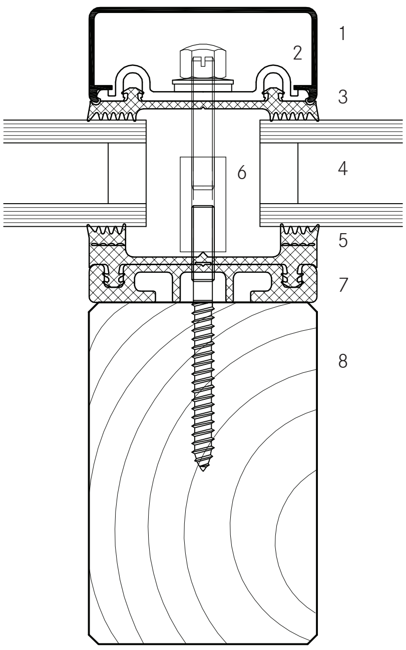
Transom

ZL-H_2.1_004.dwg

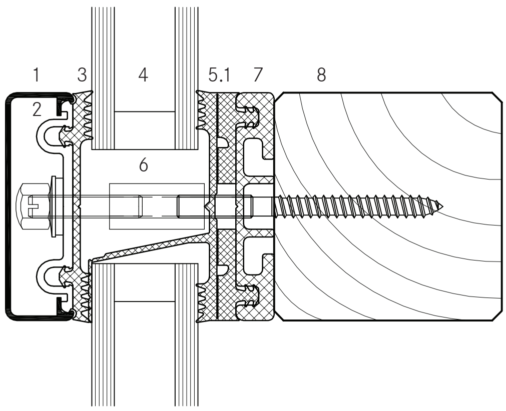
System cross sections and inner seals - facade

Inner seal 10 mm tall / 2 overlapping drainage levels

Vertical glazing mullion - 2nd level



Vertical glazing transom -1st level



ZL-H_2.1_003.dwg

1 Upper strip
2 Pressure profile
3 Outer seal
4 Glass / panel

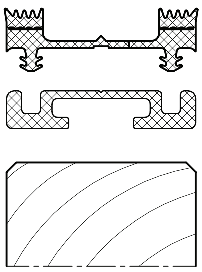
5 Inner seal 10 mm
5.1 Inner sealing using a seal flap 10 mm
6 System screw fittings
7 Spacer strip
8 Timber profile

* tested system for vertical facades and facades with an incline up to 20°

System cross sections and inner seals - facade

Inner seal 10 mm tall / 2 overlapping drainage levels

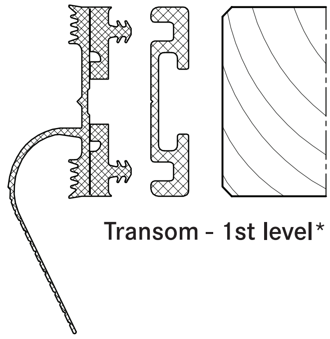
System 50 mm



GD 5033

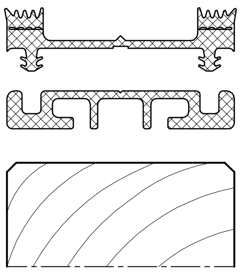
ZL 5053

Mullions - 2nd level



Transom - 1st level*

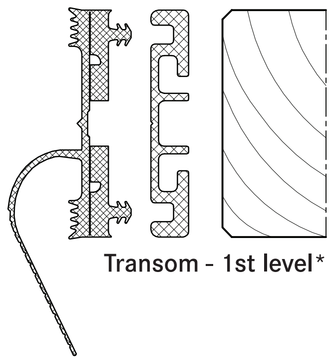
System 60 mm



GD 6033

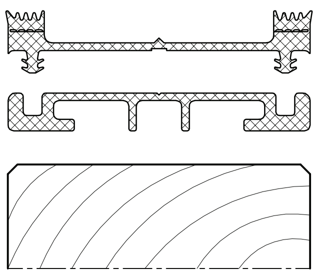
ZL 6053

Mullions - 2nd level



Transom - 1st level*

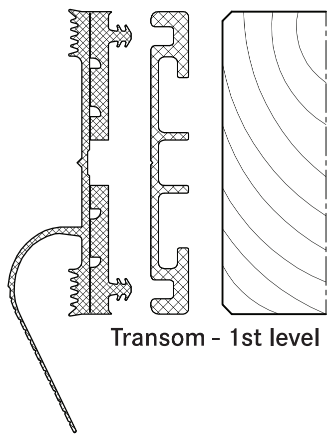
System 80 mm



GD 8033

ZL 8053

Mullions - 2nd level



GD 8031

Transom - 1st level

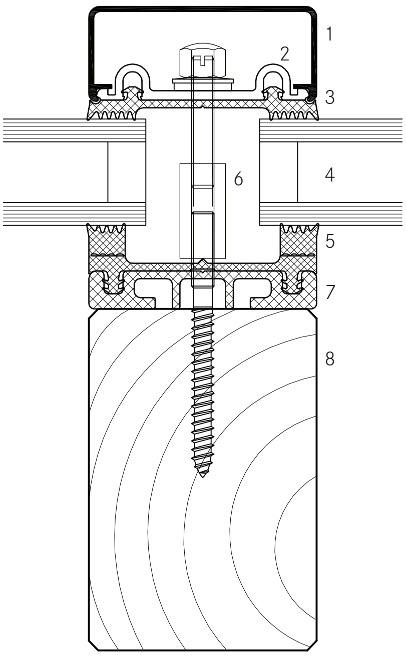
ZL-H_2.1_004.dwg

*System 50 mm and System 60 mm upon request

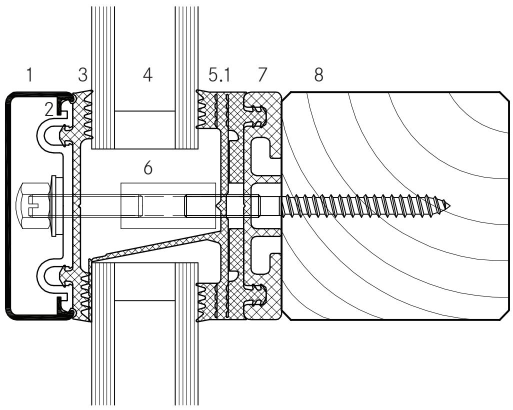
System cross sections and inner seals - facade

Inner seal 12 mm tall / 3 overlapping drainage levels

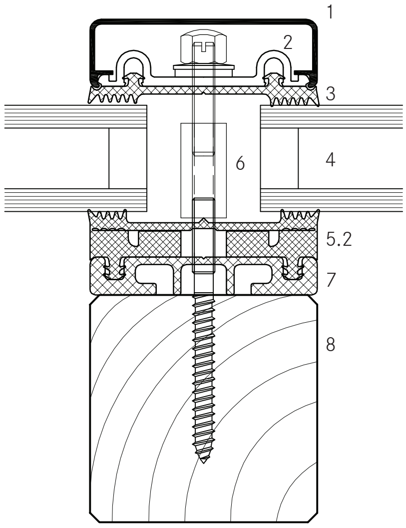
Vertical glazing main mullion - 3rd level*



Vertical glazing transom - 2nd level*



Vertical glazing secondary mullion - 1st level



ZL-H_2.1_003.dwg

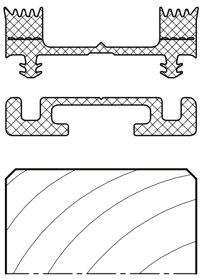
1	Upper strip
2	Pressure profile
3	Outer seal
4	Glass / panel
5	Inner seal 12 mm main mullion
5.1	Inner seal using a seal flap
5.2	Inner seal 12 mm secondary mullion
6	System screw fittings
7	Spacer strip
8	Timber profile

* tested system for vertical facades and facades with an incline up to 20°

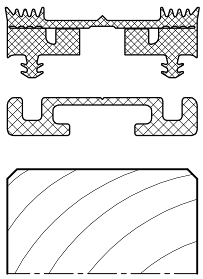
System cross sections and inner seals - facade

Inner seal 12 mm tall / 3 overlapping drainage levels

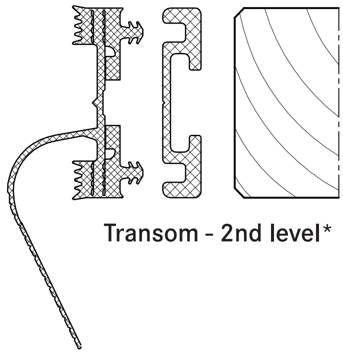
System 50 mm



Main mullion - 3rd level*

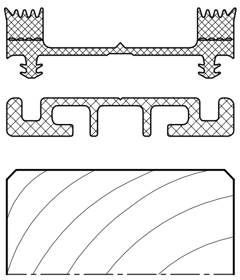


Secondary mullion - 1st level*

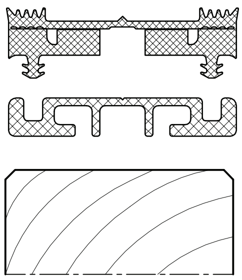


Transom - 2nd level*

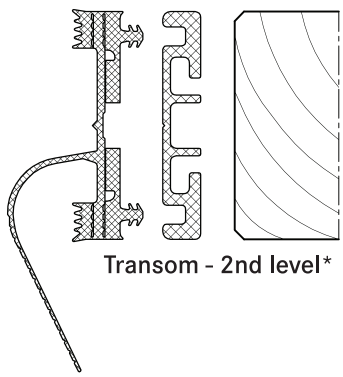
System 60 mm



Main mullion - 3rd level*

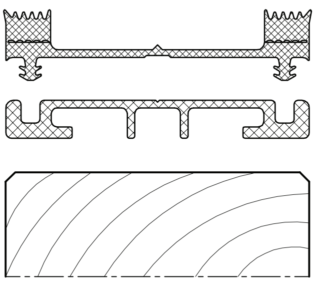


Secondary mullion - 1st level*

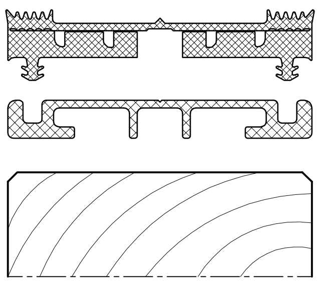


Transom - 2nd level*

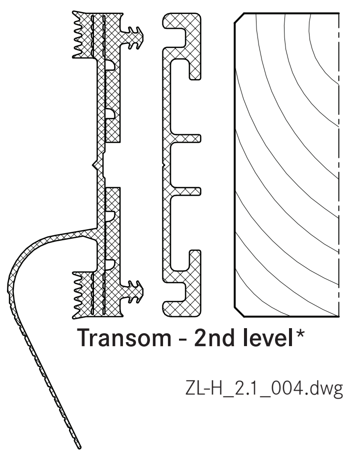
System 80 mm



Main mullion - 3rd level*



Secondary mullion - 1st level*



Transom - 2nd level*

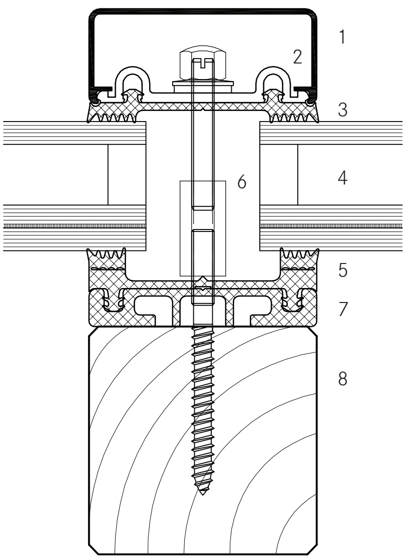
ZL-H_2.1_004.dwg

*System 50 mm, 60 mm and 80 mm upon request

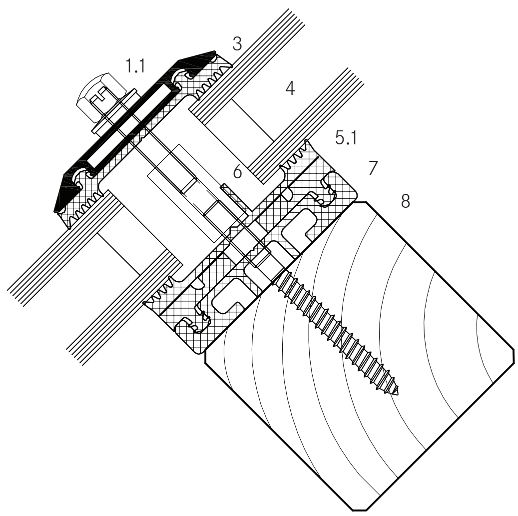
System cross sections and inner seals - roof

Inner seal 10 mm tall / 2 overlapping levels

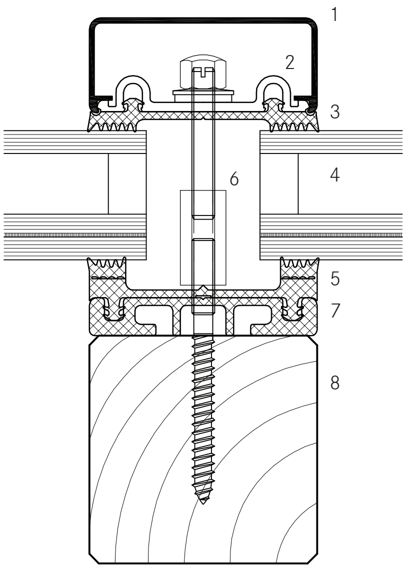
Angled glazing rafter



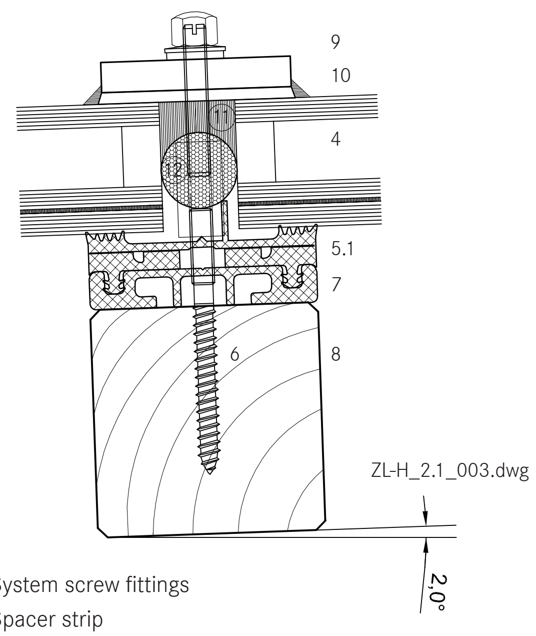
Angled glazing transom



Angled glazing rafter up to 2° inclination



Angled glazing transom up to 2° inclination

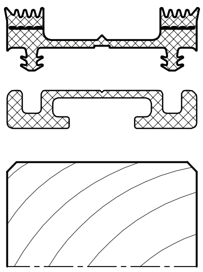


1	Upper strip
1.1	Cover strip
2	Pressure profile
3	Outer seal
4	Glass / panel
5	Inner seal 10 mm rafter
5.1	Inner seal 10 mm transom
6	System screw fittings
7	Spacer strip
8	Timber profile
9	Hold-down clamp
10	Washer
11	All weather silicone seal
12	Rope seal

System cross sections and inner seals - roof

Inner seal 10 mm tall / 2 overlapping levels

System 50 mm

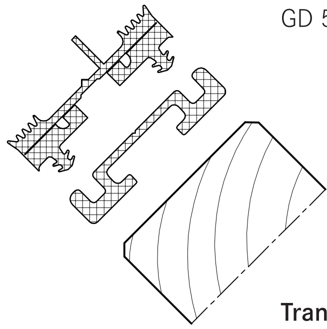


GD 5033

ZL 5053

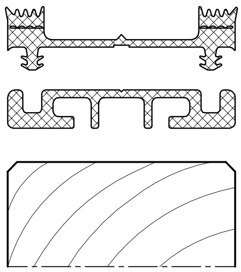
Rafter

GD 5034



Transom

System 60 mm

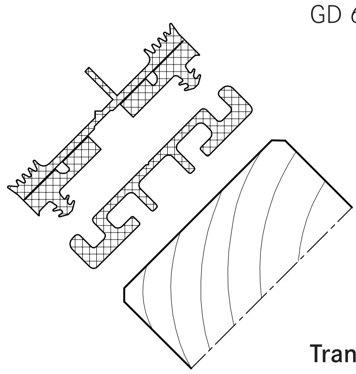


GD 6033

ZL 6053

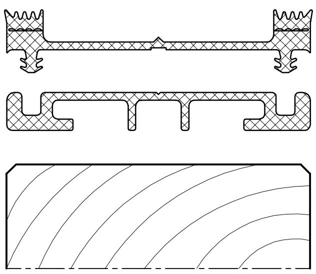
Rafter

GD 6034



Transom

System 80 mm

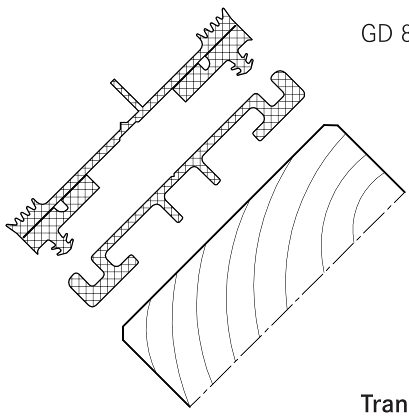


GD 8033

ZL 8053

Rafter

GD 8034*



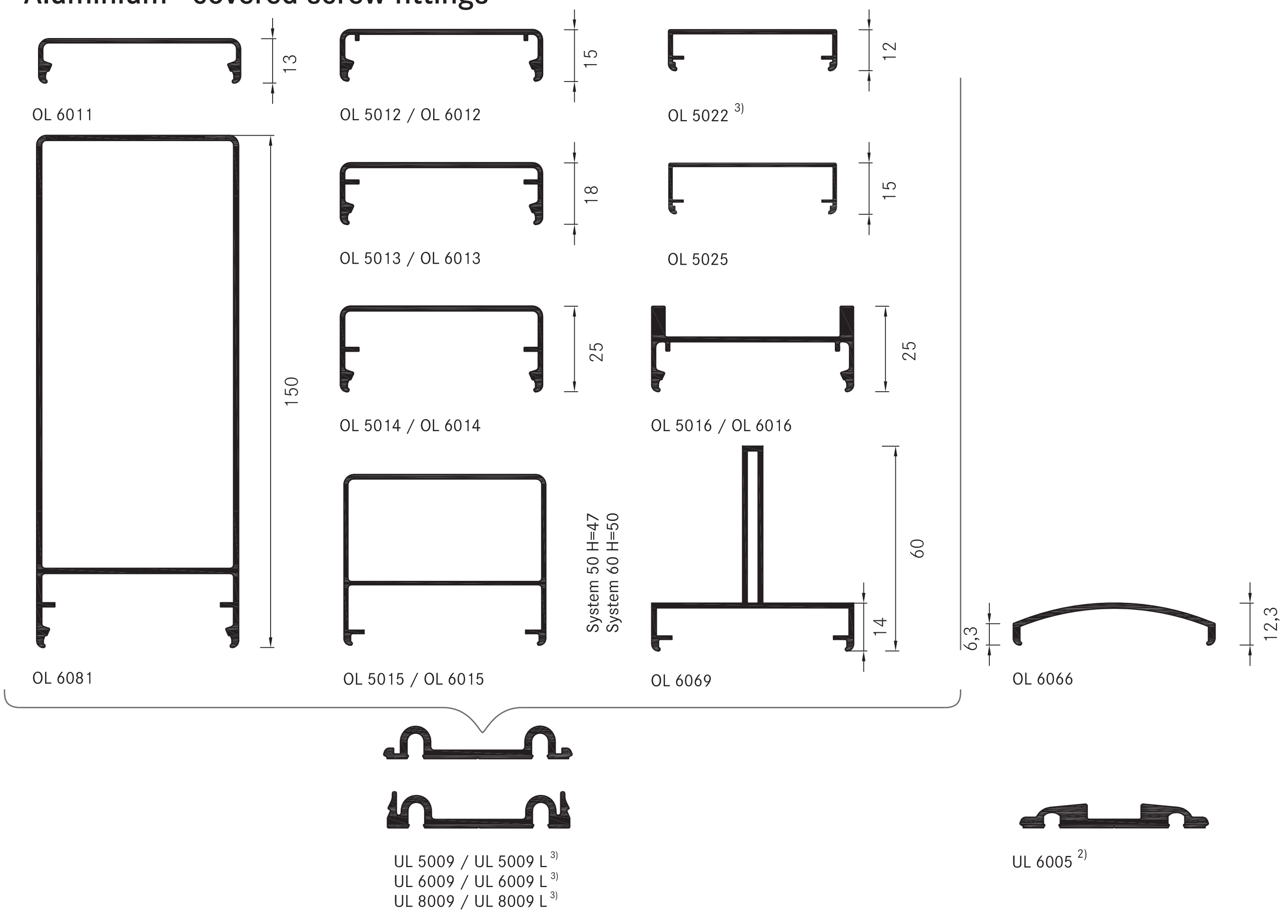
Transom

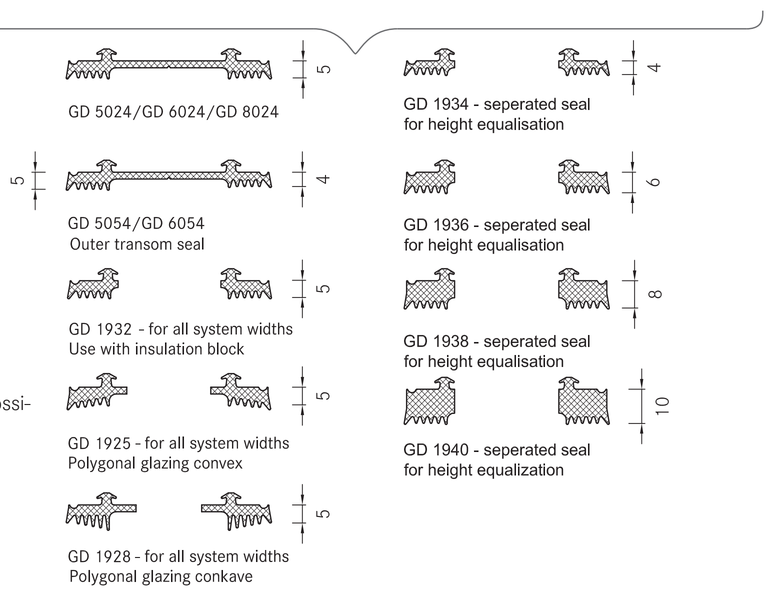
ZL-H_2.1_004.dwg

*System 80 mm upon request

Cover strips and outer seals

Aluminium - covered screw fittings





1) Check mountability (height of U plate + cap nut, possible use of sealing washer or special screws)

2) only possible with special screws

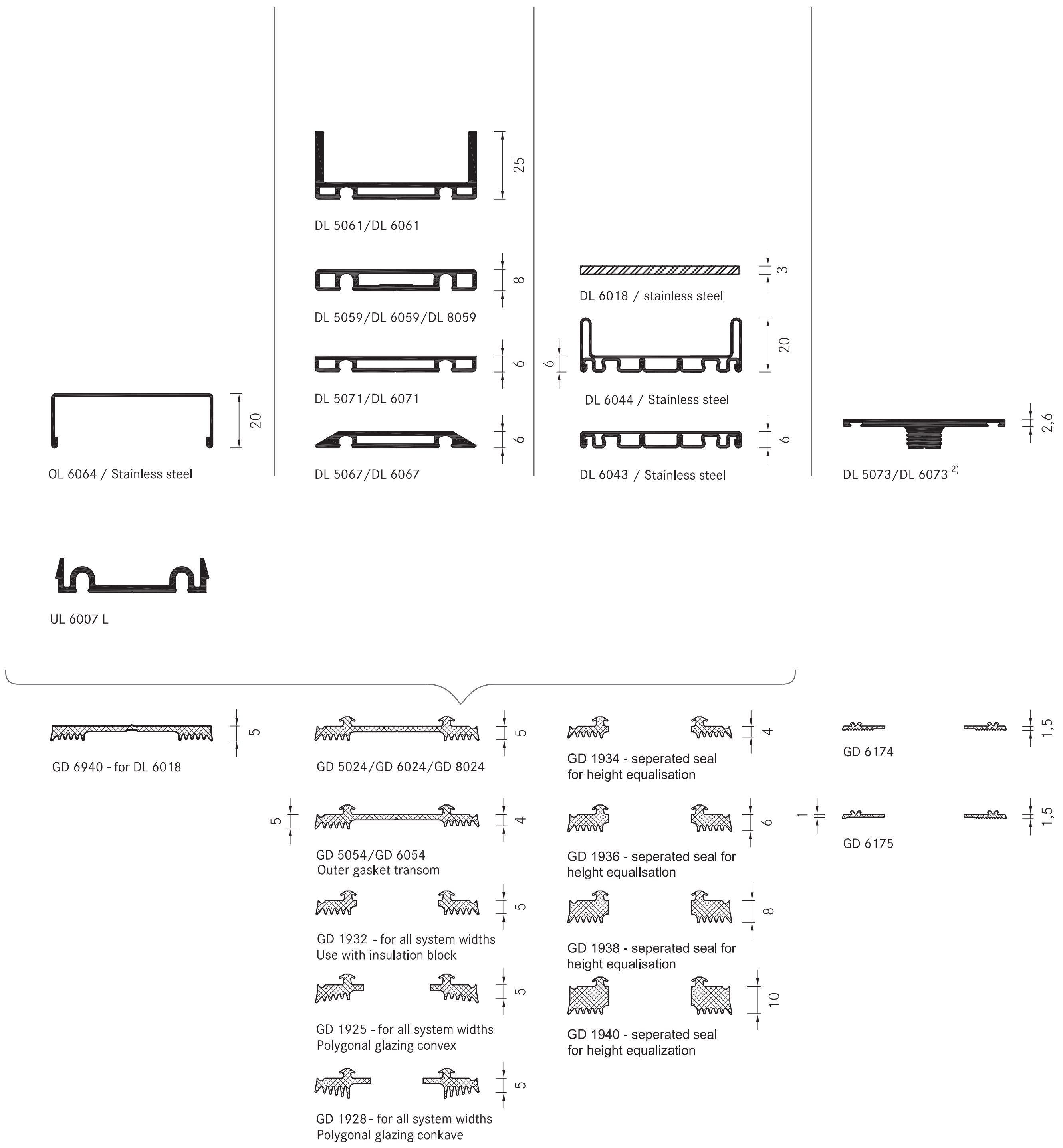
3) The geometry of the clipping process is different for the 50, 60 and 80 mm widths

ZL-H_2.1_005.dwg

Cover strips and outer seals

2.1
4

Stainless steel - covered screw fittings | **Aluminium- visible screw fittings** | **Stainless steel - visible screw fittings** | **Flat cover profile DL 5073/DL 6073**



ZL-H_2.1_005.dwg

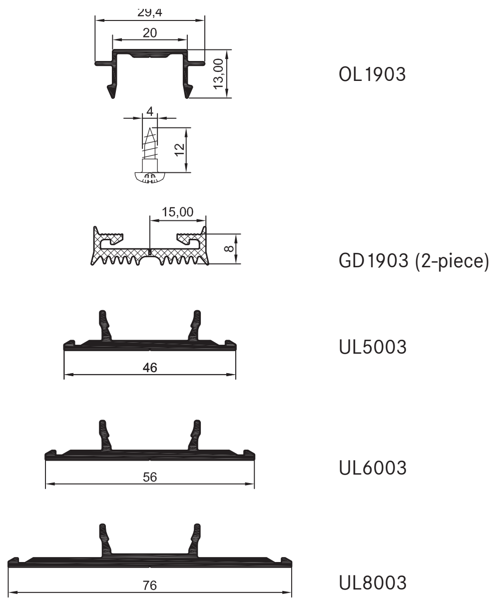
Cover strips and outer seals

Wooden covering strips

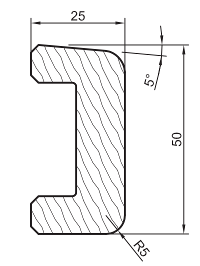
Wooden cover strips can be easily mounted to mullions and transoms using aluminium top or lower bars. The pressure profile UL5003/UL6003/UL8003 acts as a clamping strip.
Assembly: apply the two-piece GD 1903 outer seal to the upper strip attach to the system using screws. Divide the OL 1903 into 80 mm long pieces and attached centrally using 3 screws to the wooden cover strip at 300 mm intervals and then clip to the upper strip.

The wooden cover strip to be provided by the customerisasupplementtotheStabaluxSystemwareand,if necessary,mechanically due to the natural properties of wood weathering to secure. Guidelines for the use of exterior wood should be followed.

(Please see section 2.2.7 on assembling the outer seal)



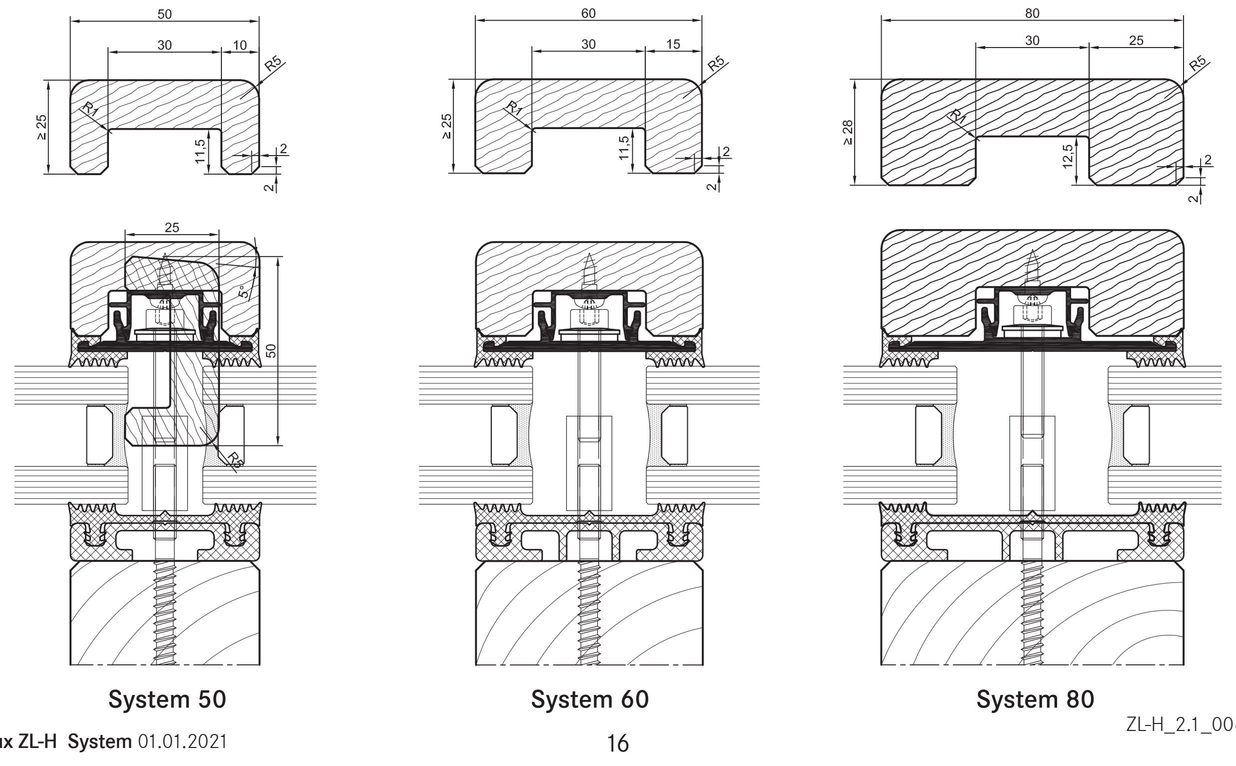
Transom



Set the wooden upper strip in the transom with an incline of 5°.

Example: System 50 mm

Mullion



System 50 System 60 System 80

ZL-H_2.1_006.dwg

Material information

Wood type and quality

The wooden load-bearing substructure is used for mounting the glazing and must meet all load and suitability requirements. The profile dimensions and choice of materials are key. The type of wood chosen depends on the client, architect and/or processor.

All wood materials are produced using wood types permitted by the current Eurocode 5 (DIN EN 1995-1) standard. Alongside the mature solid wood sections and laminated solid timbers, facade construction is increasingly using a multi-layer construction method. Due to its stability against deformations, we recommend using plywood sections. The following minimum requirements must be met for all wooden materials:

- Softwood, strength class C24
- Laminated timber, strength class GL24h
- For fireproof glazing, pay attention to the specifications given in the relevant authorisations.

The use of comparable hardwoods is also permitted.

Wood type	Strength class	Elastic modulus $E_{0,mean}$ [kN/cm^2]
Spruce, fir	C16	800
Pine, larch, spruce, fir	C24	1100
Douglas Fir, Southern Pine	C30	1200
Western Hemlock	C35	1300
Yellow Cedar	C40	1400
Oak, Teak, Keruing	D30	1100
Beech	D35	1200
Beech, Azalea, Intsia	D40	1300
Angelique (Basralocus)	D40	1300
Azobé (Bongossi)	D60	1700
Laminated timber made using wood from class:		
C24	GL24h	1160
C30	GL28h	1260
C35	GL32h	1370
C40	GL36h	1470
Laminated veneer:		
Kerto Q		1000-1050
Kerto S		1380
Kerto T		1000
Multiplex sheets:		
(plywood)		900-1600

The woods and values mentioned here are examples for guidance only. Exact values for your choice should be determined with the supplier and applicable standards.

Spacer strip quality

Stabalux spacer strips are made of hard PVC, unpunched, in black - suitable for a uniform visual appearance for inner Stabalux seals.

Seal profiles

Stabalux seals are organic natural rubber materials based on EPDM and conform to the DIN 7863 standard, non-cellular elastomer sealing profiles for window and facade construction. Compatibility with contact media should tested by the processor, particularly when using plastic glazing and making structural joints with non-Stabalux products.
Sealing the rebate with all weather silicone seal is possible.

All weather silicone seal

Only certified materials may be used for sealing the rebate with all-weather silicone. Pay attention to all information provided by the manufacturer and the sealing work must be carried out by trained persons. It is recommended that a licensed and certified specialist contractor is hired for this purpose. We further refer you to the DIN 52460 standard and IVD data sheets (Trade Association for Sealants).
The compatibility of the materials is particularly important when using all-weather silicone. In this case, the compatibility of the sealant with the edge bonding of the glass and the backfill of the joints. If self-cleaning glass is used, the compatibility must be established in advance. Glass sealants and edge bonding must be UV-resistant. The incline of roofs should also be taken into account. Information about UV-resistance can be requested from the manufacturer. Silicone edge bonding generally provides better UV-resistance than polysulfide-based materials. The advantage of silicone lies in its high vapour sealing properties which is particularly useful when using more volatile argon fillings.
Highly elastic, weatherproof and UV-resistant seals meet the widest range of demands for reliable joints.

Material information

Aluminium profiles

The aluminium profiles we supply are generally made from EN AW 6060 according to DIN EN 573-3, T66 according to DIN EN 755-2.

Coating the aluminium

Alongside anodic oxidation, with the corresponding pre-treatment, conventional coating methods such as air-drying multi-layer coating systems (wet coating) or thermosetting coatings (stove enamelling / powder-coating) can be used. By using different mass distribution, longitudinal shadow formation is possible with cover profiles DL 5073 and DL 6073. Resulting actions are to be taken with the agreement of the coater.

Longitudinal expansions in aluminium profiles exposed to temperature

When cutting the lower, upper and cover profiles from aluminium, allowance should be made for temperature-induced longitudinal expansion.
The theoretical rod lengths ℓ should be shortened by:

$\Delta\ell = \alpha^T \cdot \Delta T \cdot \ell$

Example:

$\Delta\ell = 24 \cdot 10^{-6} \cdot 40 \cdot 1000 = 0.96 \approx$ **1 mm**

$\alpha^T \approx 24 \cdot 10^{-6}$ 1/K	Coefficient of thermal expansion for aluminium
ΔT = 40 K	Assumed temperature difference of aluminium dependent on the colour and amount of solar radiation
ℓ = 1000 mm	Rod length
$\Delta\ell \approx$ 1 mm	Longitudinal expansion

further examples:

$\Delta\ell = 24 \cdot 10^{-6} \cdot 60 \cdot 1000 = 1.44 \approx 1.5$ mm
$\Delta\ell = 24 \cdot 10^{-6} \cdot 100 \cdot 1000 = 2.4 \approx 2.5$ mm

A rod with a system length of ℓ = 1000 mm should be shortened by 1 mm for a temperature difference of ΔT = 40 °C. A rod of length ℓ = 3000 mm should be shortened by 3 mm.

Rod length ℓ (mm)	Temperature difference ΔT	Longitudinal expansion $\Delta\ell$ (mm)
1000	40°C	1
3000	40°C	3
1000	60°C	1.5
3000	60°C	4.5
1000	100°C	2.5
3000	100°C	7.5

Note:

We recommend shortening the pressure profile by ≈ 2.5 mm per ℓ = 1000 mm of length. When doing so, ensure to use the correct length of the outer seal.

When using cover profiles in roof area, it is recommended that holes for screwing on the cover profile are created with a diameter of d = 9 mm.

Stainless steel profile

Pressure profiles and bottom sections of cover profiles are made from 1.4301 stainless steel for visible screw fittings. The surface conforms to classification 2B according to DIN EN 10088-2.
Upper strips using 1.4401 stainless steel. The surface has a ground finish (grain 220, DIN EN 10088-2). The upper parts of the cover profile are made from 1.4571 stainless steel with ground finish (grain 240, DIN EN 10088-2). To protect the surface, a film has been applied to one side whose edge can be seen on narrow side.

Other items

All system items are produced according to applicable standards.

Maintenance and care

The information sheets WP.01 – WP.05 from the Association of Window and Facade Producers (VFF) must be observed. The address can be found in the address section. Further information can be found in section 9.0 - Cleaning / Maintenance.

STABALUX

Profile design

2.2
2

System spacer strip ZL

The type of wood chosen depends on the client, architect and/or processor and the following considerations:

- Softwood, strength class C24
- Laminated timber, strength class GL24h

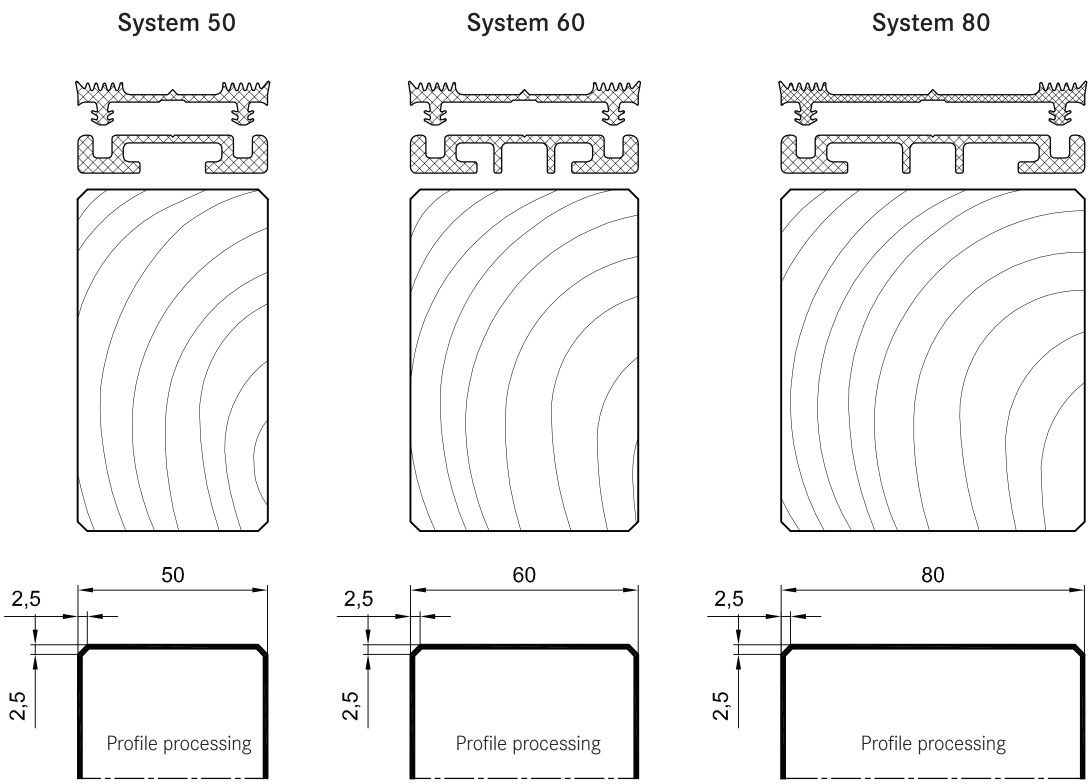
The use of comparable hardwoods is also permitted.

The profile design is just an example. Spacer strips can also be mounted onto existing profiles.

Worked edges must be free of shavings and imperfections.

When using hardwood cylinders for glass supports GH 5053 and GH 5055, you must ensure to install the cylinders before mounting the spacer strip.

Note:



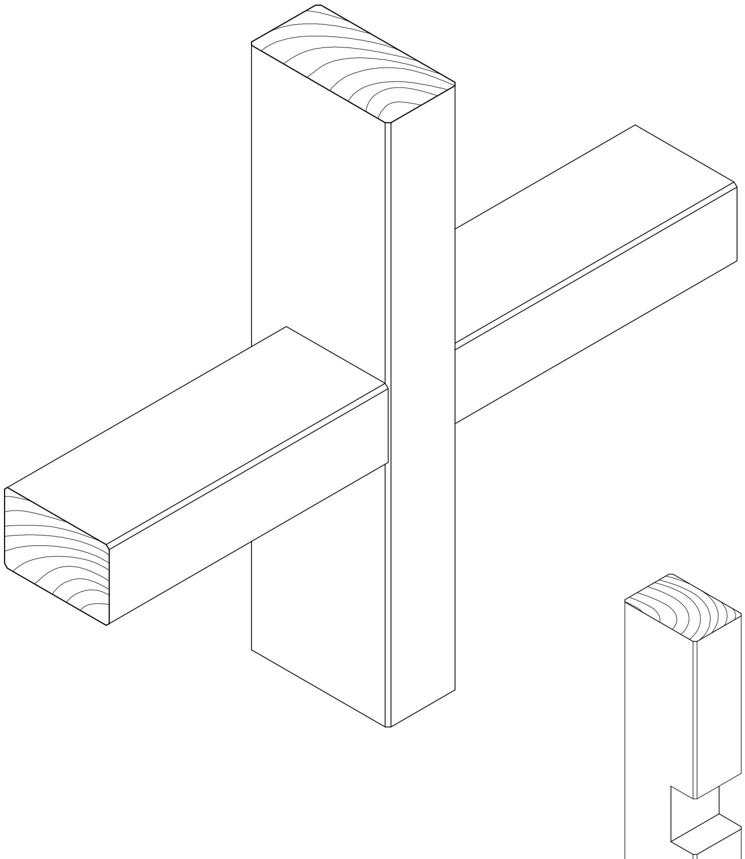
ZL-H_2.2_001.dwg

Mullion-transom joint

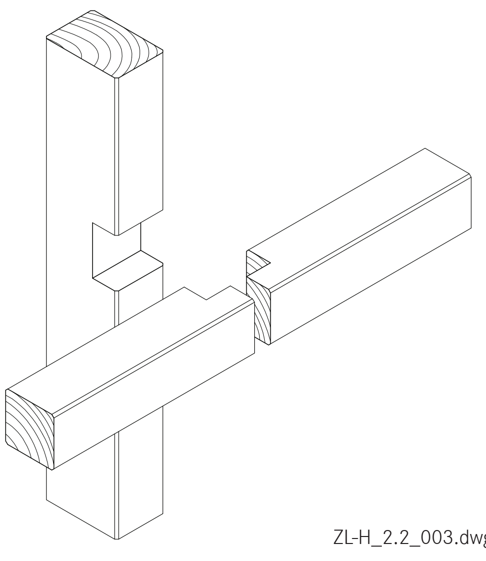
2.2
3

Principle

- Attachment of the transoms to the mullions must match the static base system of the mullion-transom design selected.
- Load bearing capacity and suitability are to be statically demonstrated on site. In doing so, the design and technical processing experiences of the processor can be considered.
- Designs are to be chosen that can be considered regular joints for the intended purpose and meet the standards of the Eurocode 5 (DIN EN 1995) or are covered by general building approvals.
- The solutions presented by us are purely examples. A range of designs are possible depending on the shape of the wood and different jointing options.



ZL-H_2.2_002.dwg



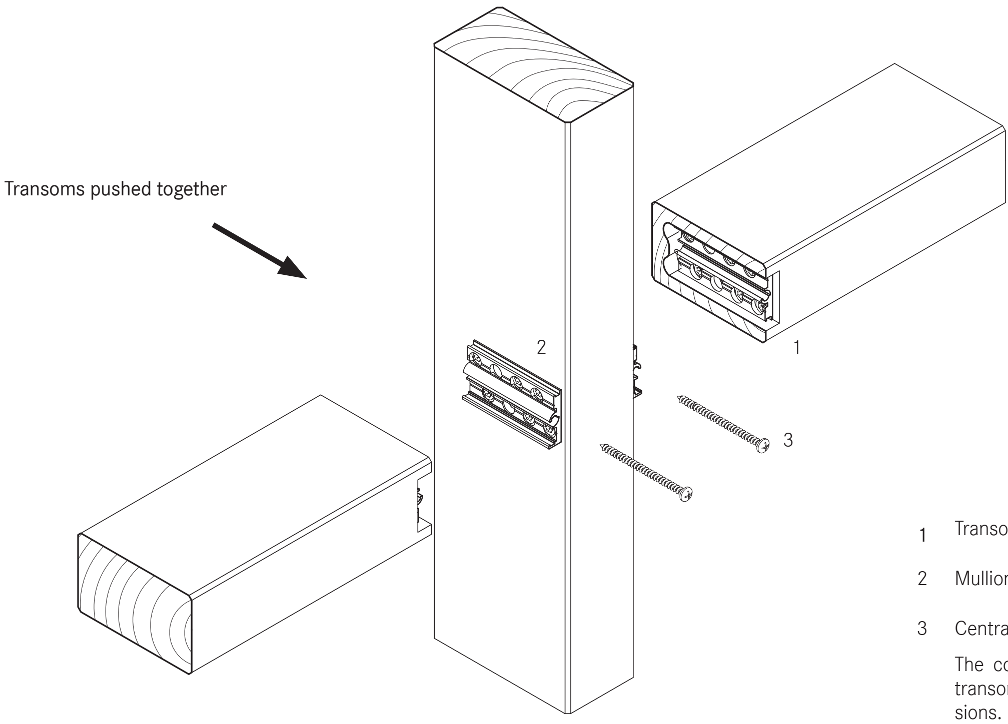
ZL-H_2.2_003.dwg

Mullion-transom joint

2.2
3

RHT transom connector for wood systems

- The RHT links wooden mullion and transom constructions with a visible width of 50–80 mm.
- The two identical connector parts are mounted to mullions and transoms and linked with one another by pushing together the transoms.
- A connecting screw locks the connection in all three dimensions.
- The clamping foot on the transom inner seal must be disengaged in the area of the mullion-transom joint.
- When attaching the clamping strips to the system, take care to place the screws outside of the mullion-transom connection in order to avoid a collision with the RHT connector screw fittings.
- The central wooden groove in the transom should begin approx. 80 mm before the end of the transom.
- The glass support should be mounted approx. 100 mm from the end of the transom to prevent any collision between the RHT screws in the transom.



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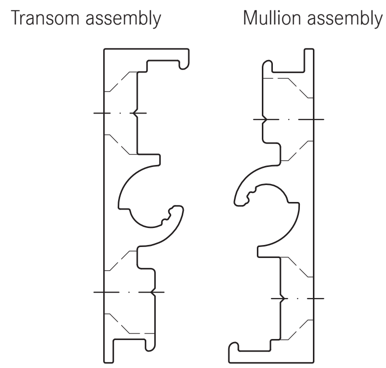
1 Transom assembly

2 Mullion assembly

3 Central connecting bolt

The connecting bolt tensions the transom holder in all three dimensions.



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STABALUX

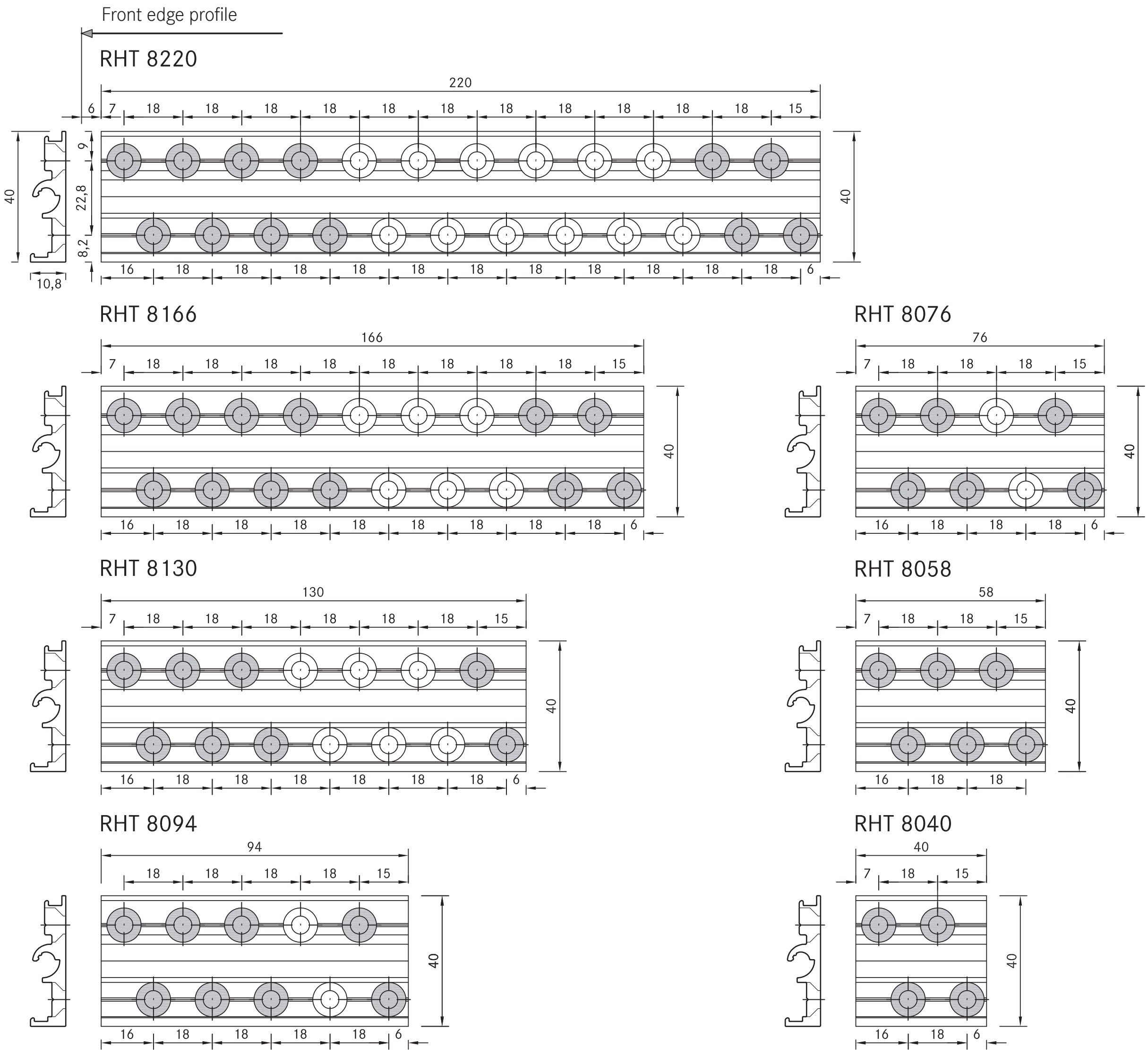
Mullion-transom joint

2.2
3

RHT for wood systems - types

- The range comprises 7 RHT types with different lengths and therefore different load-bearing capacities.
- The screw group comprising a larger number of screws (shown in the diagram) is positioned toward the front edge of the mullion and transom (glass side).

Connector types



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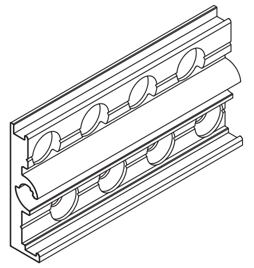
Mullion-transom joint

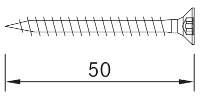
Assembly on the mullion

- The front edge of the connector lies 6 mm behind the front edge of the mullion.
- Z 0126 screws in length 5/50 are always used for attaching to horizontal timbers (mullions).
- When using hard woods or when working near the edge of the wood, a hole of 3 mm diameter should be pre-drilled.
- The number of screws varies, depending on the connector type. (Refer to the previous page)

Mullion assembly

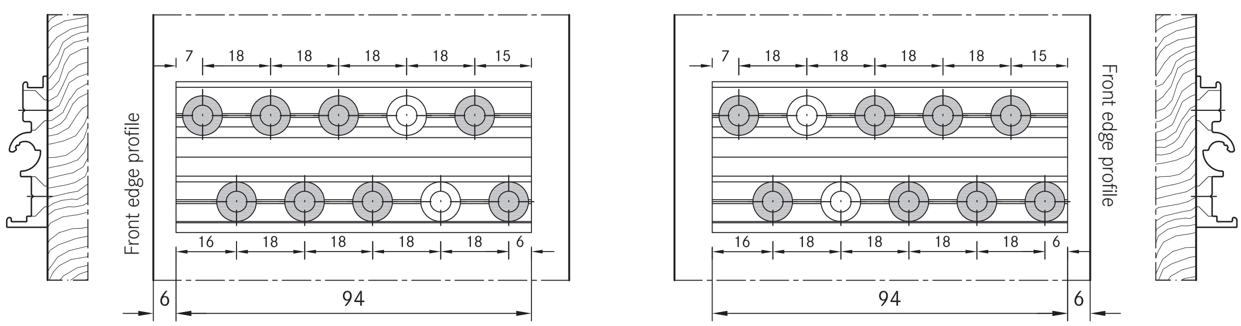


Screw fittings mullion Z 0126



Left mullion with connector e.g. RHT 8094

Right mullion with connector e.g. RHT 8094



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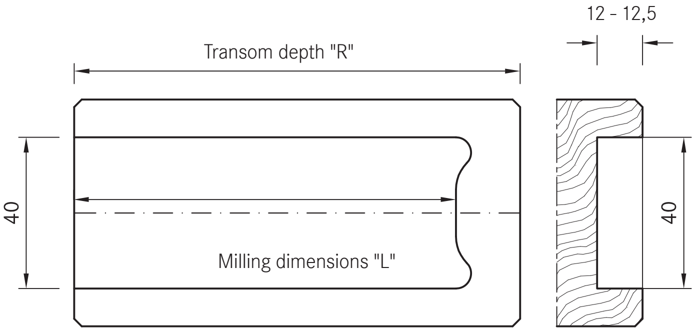
Mullion-transom joint

Assembly on the transom

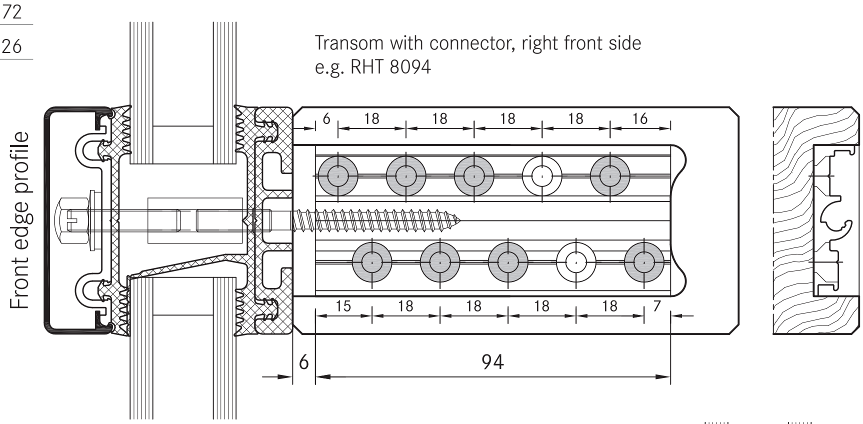
- A recess with 12-12.5 mm depth is milled into the (front of the) transom.
- The milling dimensions are:
  With x length x depth
  40 x (RHT length + 6) x 12-12.5 (mm)
- The milling can be carried out using a standard hand router.
- The front edge of the connector lies 6 mm behind the front edge of the transom.
- Z 0127 screws in length 5/80 are always used for attaching to longitudinal timbers (transoms).
- When using hard woods or when working near the edge of the wood, a hole of 3 mm diameter should be pre-drilled.
- The number of screws varies, depending on the connector type. (Refer to the previous page)

Connector type	Transom depth R (mm)	Milling dimensions L (mm)
RHT 8040	55-73	46
RHT 8058	74-91	64
RHT 8076	92-109	82
RHT 8094	110-145	100
RHT 8130	146-181	136
RHT 8166	182-235	172
RHT 8220	236-300	226

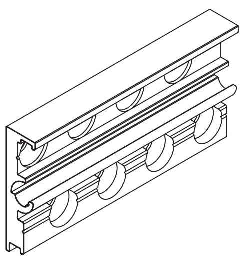


Front-side transom groove, depth 12-12.5 mm

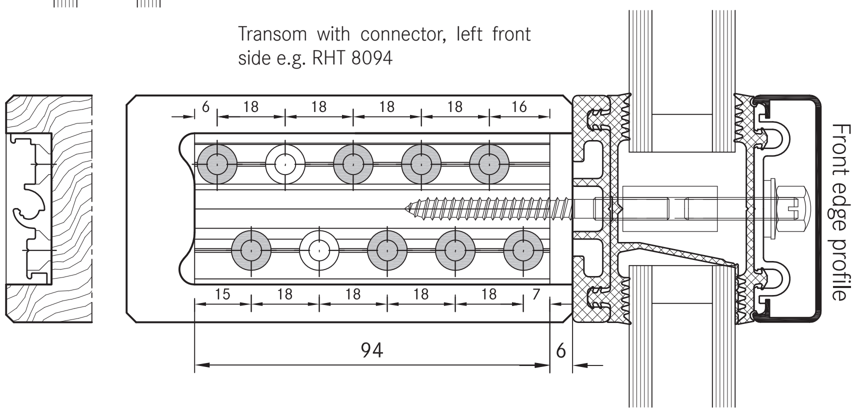
Transom with connector, right front side
e.g. RHT 8094



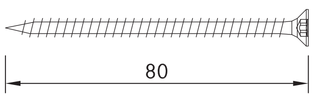
Transom assembly



Transom with connector, left front side e.g. RHT 8094



Screw fitting, transom Z 0127



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Mullion-transom joint

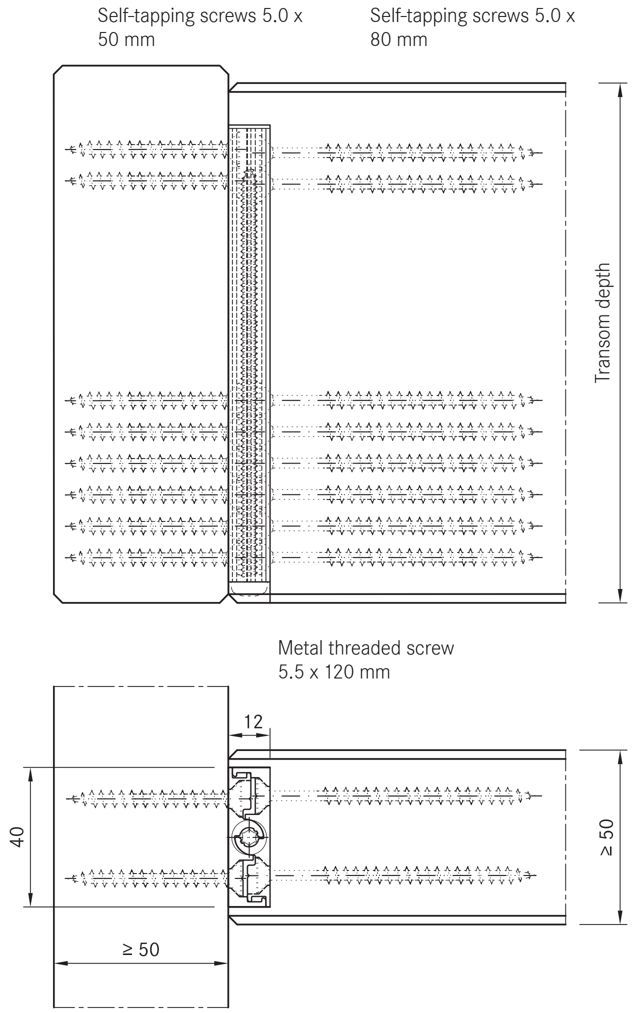
Constructing the timber joint

- The transom is pushed in from the inside to the outside.
- Screwing in the greased connecting screw allows the locked mullion-transom joint to be released in all three dimensions if necessary. This tightens the transom evenly to the mullion along the entire depth.

Linked connectors

- If the transom depth is over 300 mm, 2 connectors can be used along the entire length to improve tensioning of the mullion-transom joint.
- The connector type RHT 8220 is always used on the front edge of the profile. Another connector can be fitted on the RHT 8220 as required.
- A peg is inserted and positioned correctly by the into the connecting screw in order to improve tensioning of the second connector.
- The load-bearing capacity of the RHT 8220 applies in regard to resilience.

Example: RHT 8130 top and side views



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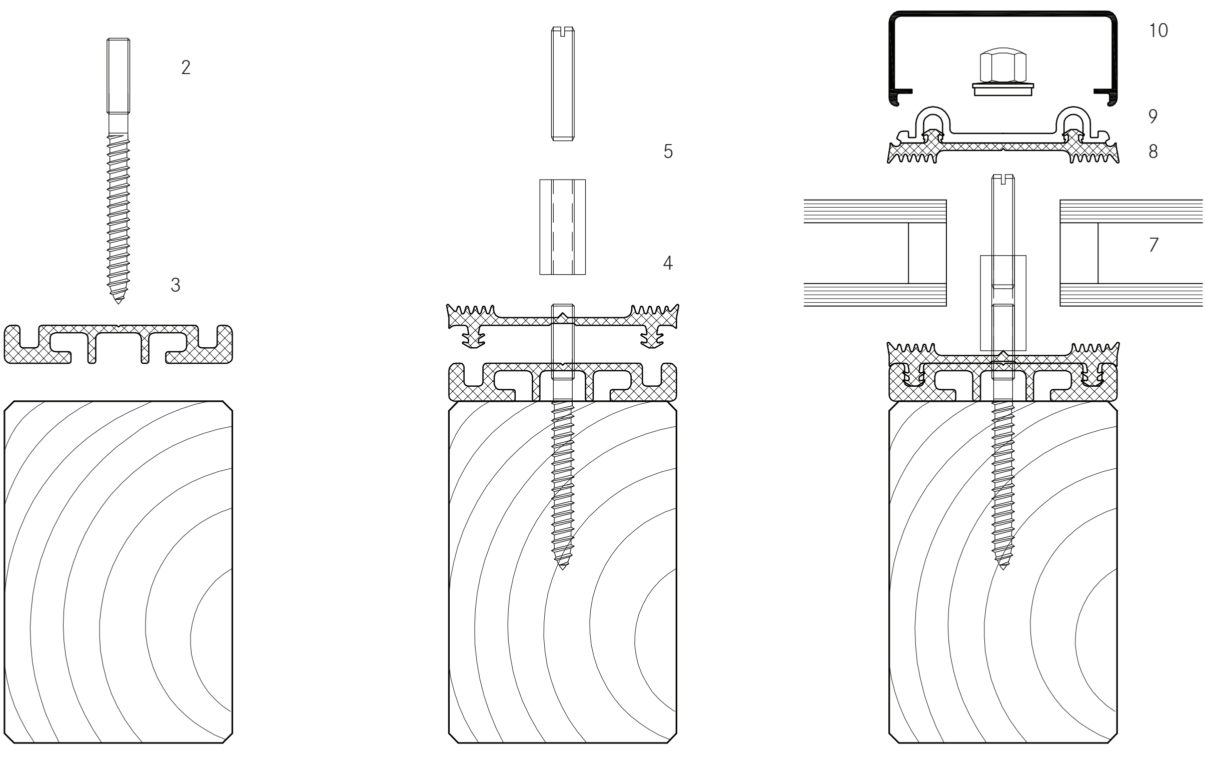
Assembly order

1. Carry out preparatory work on the wood as necessary for statically required glass supports.
2. Insert the hanger bolts, e.g. Z 0113, into the wooden supporting substructure (observe required distances)
3. Place the spacer strip, e.g. ZL 6053, over the hanger bolts (fixing materials). (The spacer strip must be predrilled at regular intervals).
4. Lay the inner seal, e.g. GD 6025.
5. Screw the threaded socket e.g. Z 0032 and threaded bars to the hanger bolts and screw in the threaded bars whilst paying attention to the clamping length.



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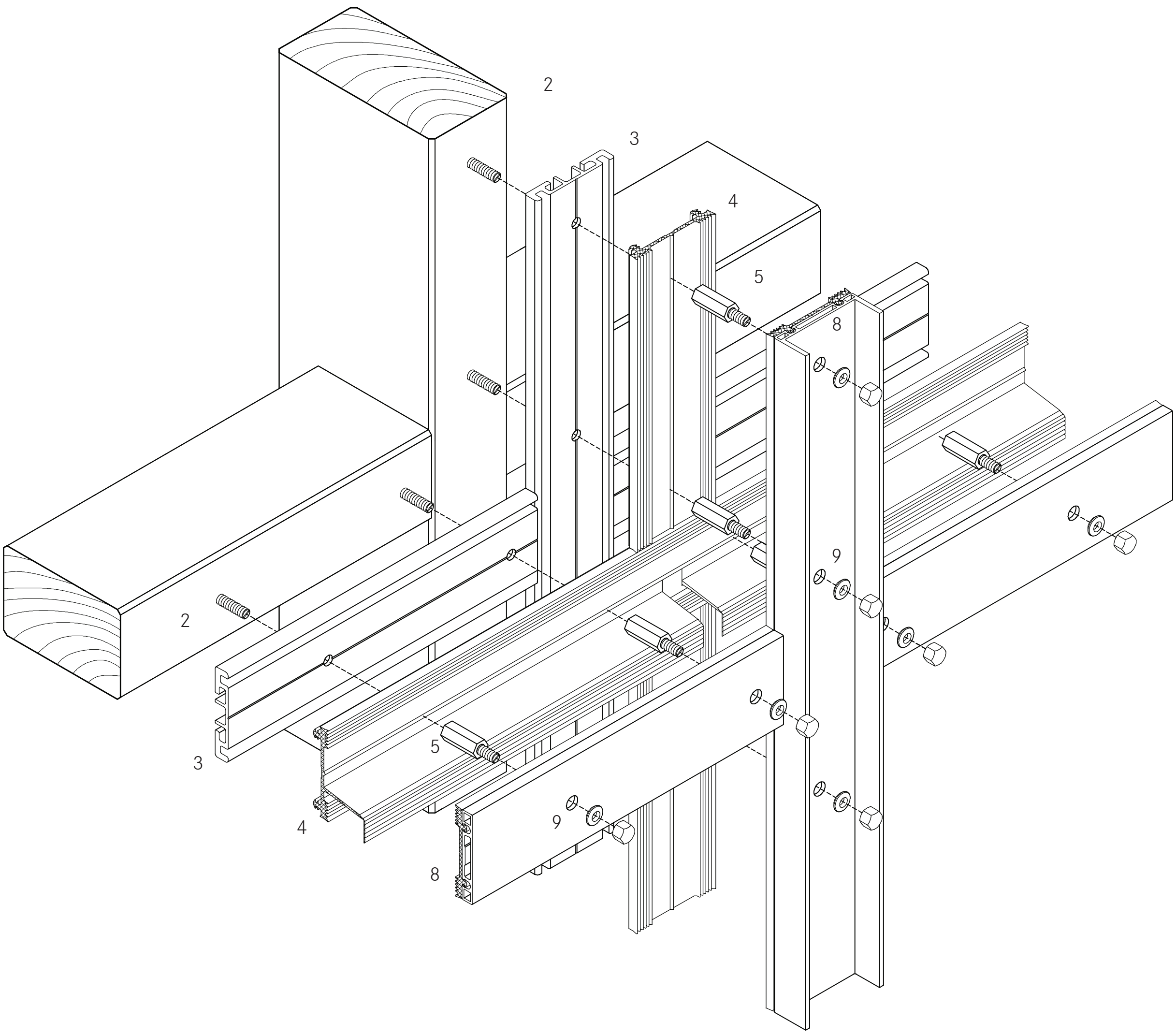
Assembly order

2.2
4

6. Attach the glass support e.g. GH 0888 using Z 0372
7. Attaching the filling elements.
8. Lay the outer seal, e.g. GD 6024 together with the clamping strip.
9. Attach the cover profile and pressure profile e.g. DL 6061 using sealing gasket Z 0086 and cap nut Z 0043.
10. Clip on the upper strip with concealed screw fittings.



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Attaching the spacer strip

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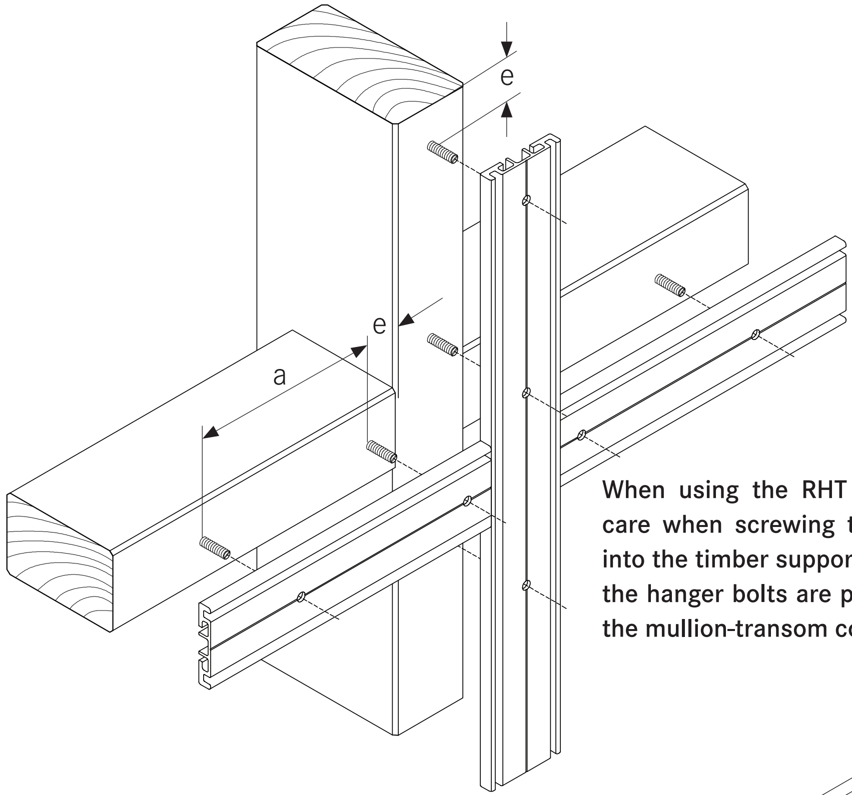
5

Mounting to the supporting structure

- Carry out any preparatory work on the timbers required for the glass supports before laying the spacer strip.
- The hanger bolts are screwed directly into the supporting structure.
- The spacer strip is pre-drilled at regular intervals of ⌀ 7 mm and placed over the hanger bolts.
- The distance for screw fittings is variable. The maximum distance is a = 250 mm.
- The distance from the edge for the first screw fitting should generally be in the region of 30 mm ≤ e ≤ 80 mm. The placement of the glass supports should also be taken into account. The distance from the edge should also be adapted when installing the RHT connector.
- Lay the spacer strips continuously and uninterrupted vertically and horizontally through over mullions.
- The length of the spacer strip generally corresponds to the length of the substructure for mullions and transoms.



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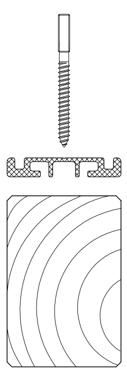
When using the RHT connector, take care when screwing the hanger bolts into the timber supports to ensure that the hanger bolts are placed away from the mullion-transom connection.



e.g.: Z 0113

e.g.: ZL 6053

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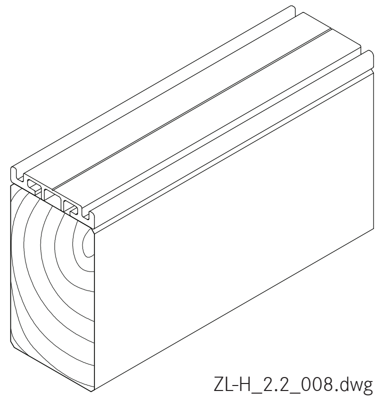
ZL 6053



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Tips for laying seals

Sealing system principle, general information about glazing seals

The Stabalux sealing system consists of the outer and inner sealing sections:

- The outer sealing section has the primary function of preventing the ingress of moisture. At the same time, the sealing section provides a flexible support for the glass panes.

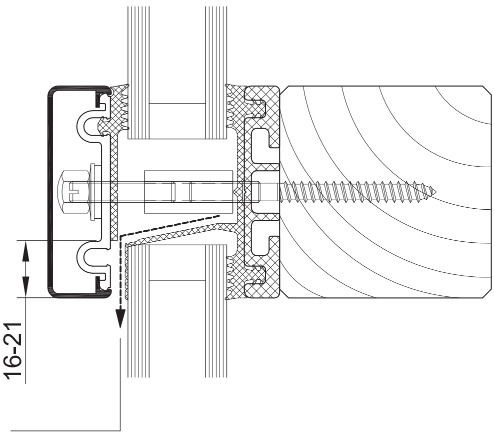
- The inner sealing section acts to protect the inner space, water guiding section and elastic glass supports from moisture and steam.

Both sealing sections must perform this function over a long period of time.

Seals should be adapted on the construction site, but may also be pre-cut to the required length in the factory and pulled into the spacer strips and/or clamping strips following the mounting instructions for seals. Always ensure that seals are not bearing any loads once installed and are firmly pressed onto joints. All joints should be sealed as the per the following descriptions.

Pressure equalisation and controlled drainage

Pressure equalisation is generally achieved via openings at the base, head and ridge points. Should additional ventilation be required in the area of the transom (e.g. where panes are only supported on 2 sides or where transom length is $\ell \geq 2$ m), then this ventilation should be created by placing holes into the cover profile and/or using notches on the lower sealing lips of the outer seal.



The pressure equalisation openings also serve to drain away moisture. The inner sealing section is formed in such a way that when the joints are properly sealed, any moisture that occurs and does not dissipate via the rebate ventilation will drain away downwards. In facades, water is guided via the seal flap into the mullions. There is a choice between using tested sealing systems with between 1 and 3 levels. With inclined glazing with 2 drainage levels, the higher sealing section of the transom overlaps the lower mullion seal. These principles must be consistently implemented down to the lowest point of the glazing so that the water-guiding level of the structure carries moisture to the outside. Film is placed beneath the seals accordingly. It must be ensured that the film will last for a long time.

Tips for laying seals

Inner sealing section

The structure of the inner sealing section is different for vertical facades and facades with an inward incline up to 20° as well as roof glazing.

Inner sealing for vertical glazing and glazing with an inward incline up to 20°:

- 5 mm high butt jointed seals with a drainage section for vertical facades (α=0°)
- 10 mm high seals with two drainage sections to safely guide away any moisture or condensation to the outside. These seals are created by overlapping the seal joints in which the higher sealing section of the transom goes underneath the lower level of the mullion. These seals can be used for vertical facades and facades with an incline up to 20°.
- 12 mm high seals follow the same principle, but allow an additional third drainage section for an intermediate mullion.
- The shaped seal flap protects the vulnerable area of the rebate and ensures that moisture is drained away via the vertical or up to 20° inwards inclined mullions.

Inner seals for glazed roofs:

- A special seal geometry for glazed roofs also allows for two-level stepped drainage. The 10 mm high seals are laid with overlapping joints.

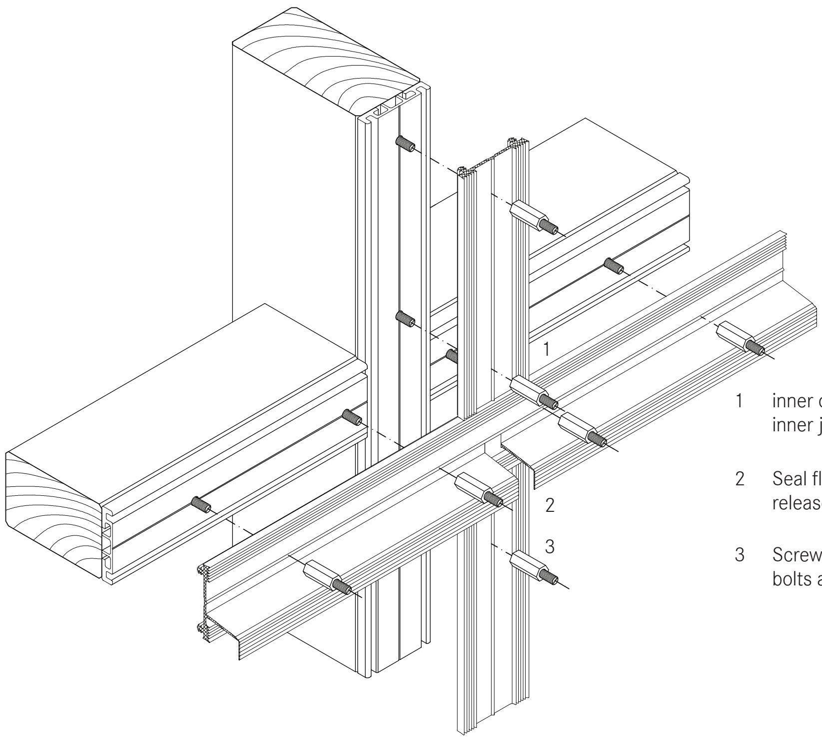
Some basic information for sealing and sticking down Stabalux seals

- All joints and seal penetrations must be waterproofed. An exception to this is the Stabalux system screw fittings where the hole diameter of the inner seal is at most the same as the core diameter of the M6 thread of the bolts and the seals are laid close together.
- Gasket joints should always be sealed using Stabalux sealant, regardless of whether they are butt joints or overlapping. (We recommend Stabalux connecting paste Z 0094. Pay attention to the directions provided by the manufacturer).
- For difficult to seal places we recommend first using a fixing adhesive such as the Stabalux quick fixing glue Z 0055.
- Before gluing, ensure all surfaces are free from moisture, dirt and grease.
- Weather conditions such as snow and rain prevent an effective seal.
- Temperatures below +5 °C are not suitable for fixing seals.
- The hardened connecting paste should not prevent level support of glass.

Seals - Facade

Assemble the inner seal on vertical facade glazing - 1 level join

- The horizontal transom seals are laid continuously across the mullion-transom joints. Ensure here that the clamping feet of the horizontal seal are released around the mullion.
- Mullion seals are butt jointed to the transom seals.
- The seal flaps should be released to a width of 10-15 mm at the mullion joint.
- The protruding length of the seal flap should be removed at the perforation once glazing is completed.
- In order to safely drain away moisture from transoms even at the edges of the facade, the inner transom seals must be laid into the released mullion seals. To release and remove the clamping feet we recommend using our release pliers Z 0078 for System 60 and Z 0077 for System 50.
- Ensure all joints are cleanly and solidly sealed. Excess sealant should be removed.



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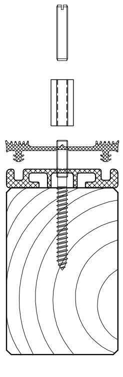
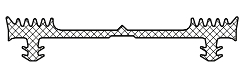
1 inner continuous transom seal, inner jointed mullion seal

2 Seal flap in mullion area released

3 Screw threaded sockets to hanger bolts and threaded bolts

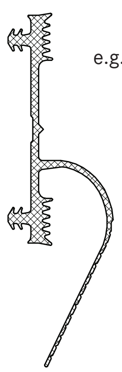


Inner seal mullions



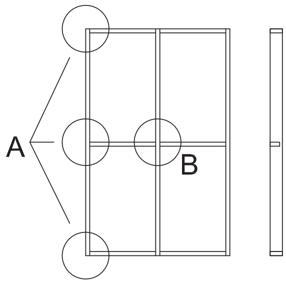
e.g. GD 6025

Inner seal transoms



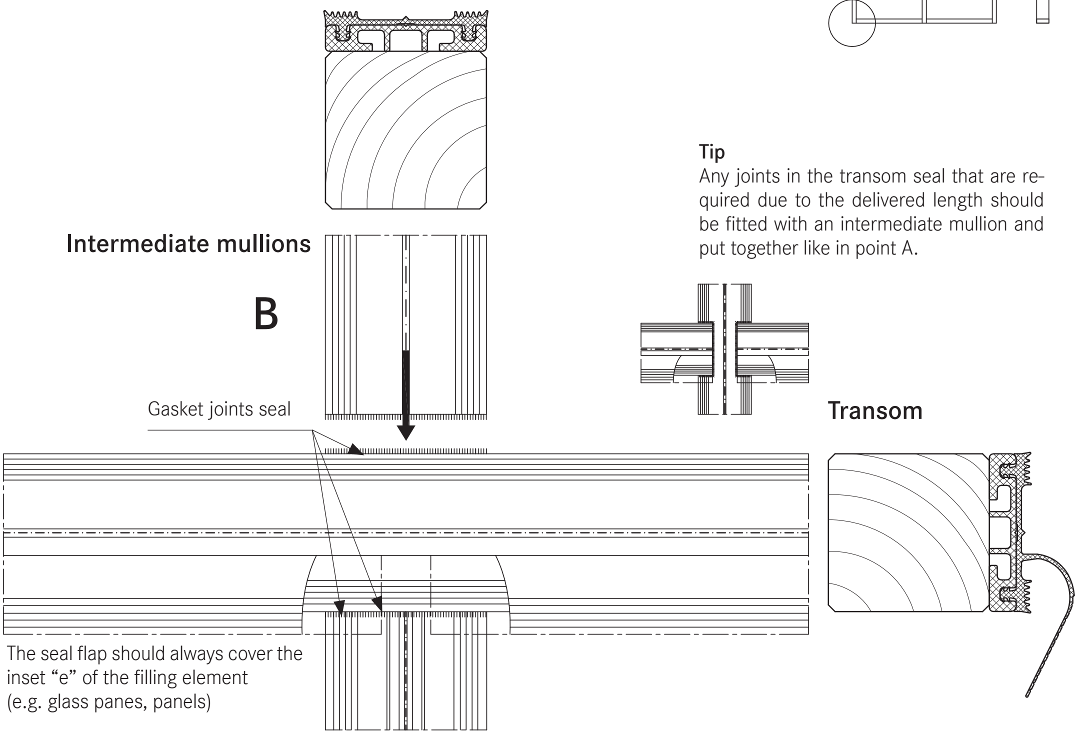
e.g. GD 6030

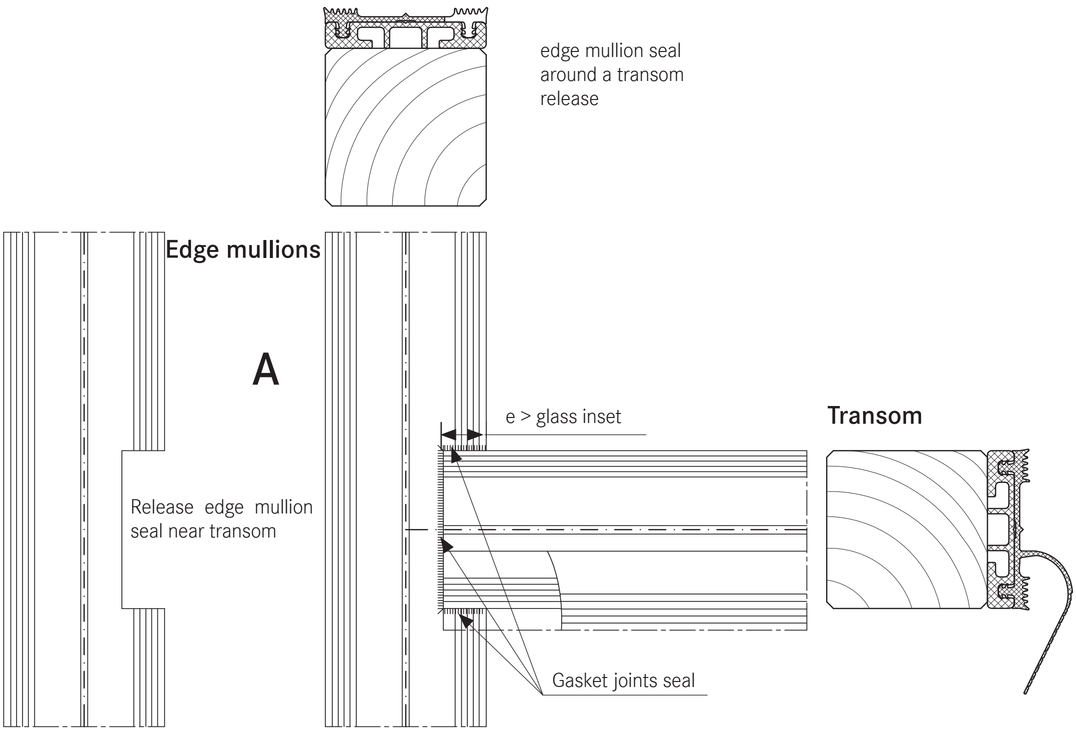
Seals - Facade



Assemble the inner seal on vertical facade glazing - 1 level join

Tip
Any joints in the transom seal that are required due to the delivered length should be fitted with an intermediate mullion and put together like in point A.





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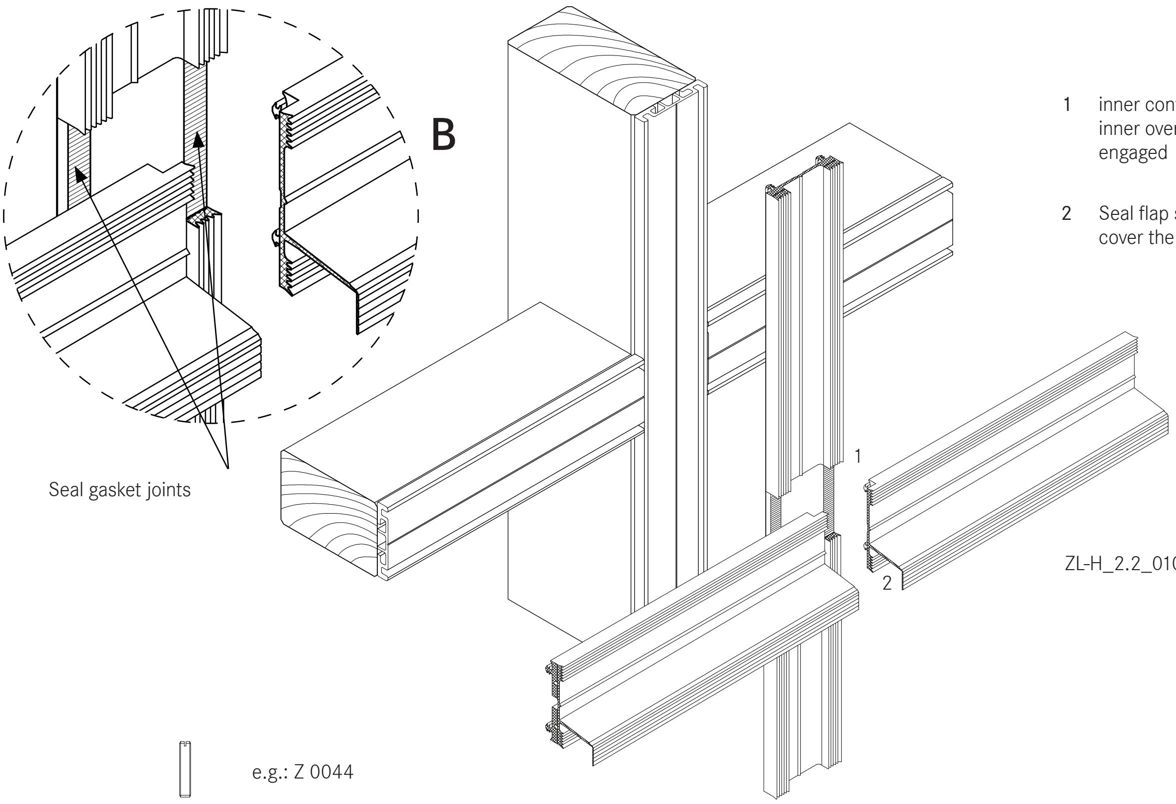
Seals - Facade

Assembly of the inner seal for vertical facade glazing and facade glazing with an incline of up to 20° - 2 overlapping sections

- The 10 mm high seals can be divided across their height to allow a simple overlap at critical transom joints.
- The vertical seals for the mullions (2nd drainage section) are laid continuously.
- The transom seals overlap the mullion seals.
- Moisture and condensation is guided away via the seal flap of the transom seal (1st drainage section) to the main mullion.
- The seal flap must always cover the inset depth of the glass panes and filling element.
- The protruding length of the seal flap should be removed at the perforation once glazing is completed.
- All joints must be sealed. Before laying seals, we recommend completely coating the support surfaces and edges with Stabalux connection paste.
- Ensure all joints are cleanly and solidly sealed. Excess sealant should be removed. Absolutely no unevenness in the glass support surface must occur from applying sealant too thickly.



1 inner continuous mullion seal, inner overlapping transom seal, engaged

2 Seal flap should always cover the filling element

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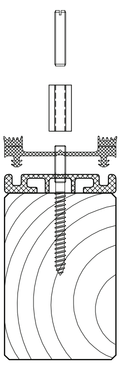
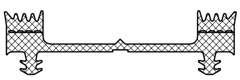
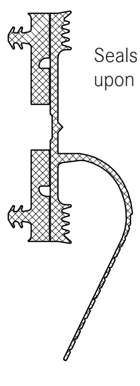


Inner seal mullions



e.g. GD 6033

Inner seal transoms



Seals upon request

Seals - Facade

2.2
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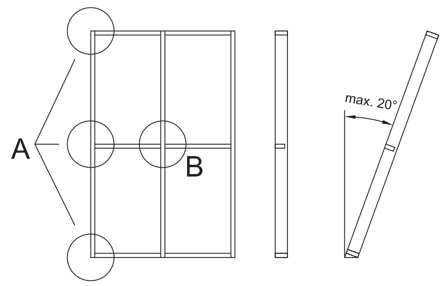
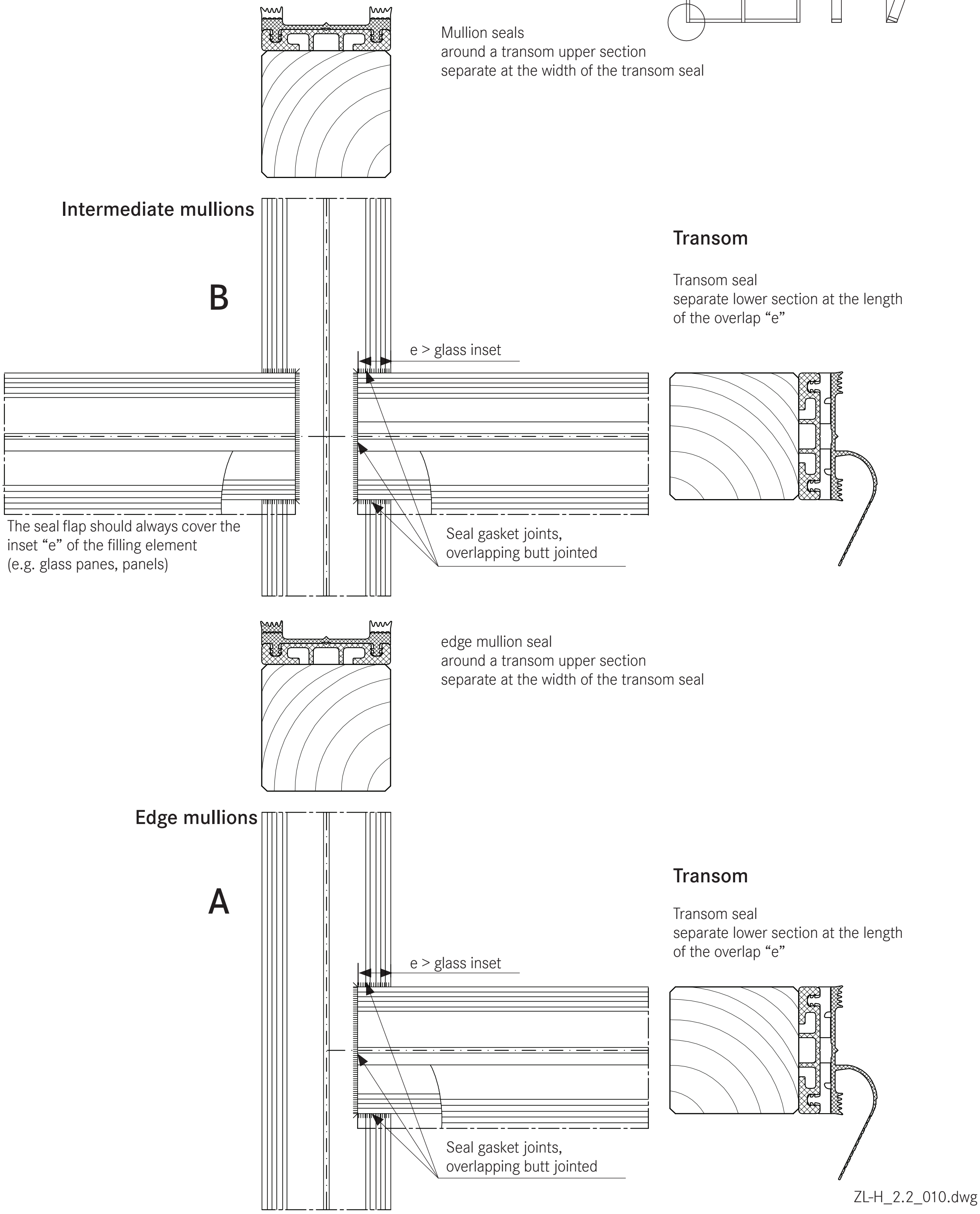
Assembly of the inner seal for vertical facade glazing and facade glazing with an incline of up to 20° - 2 overlapping sections

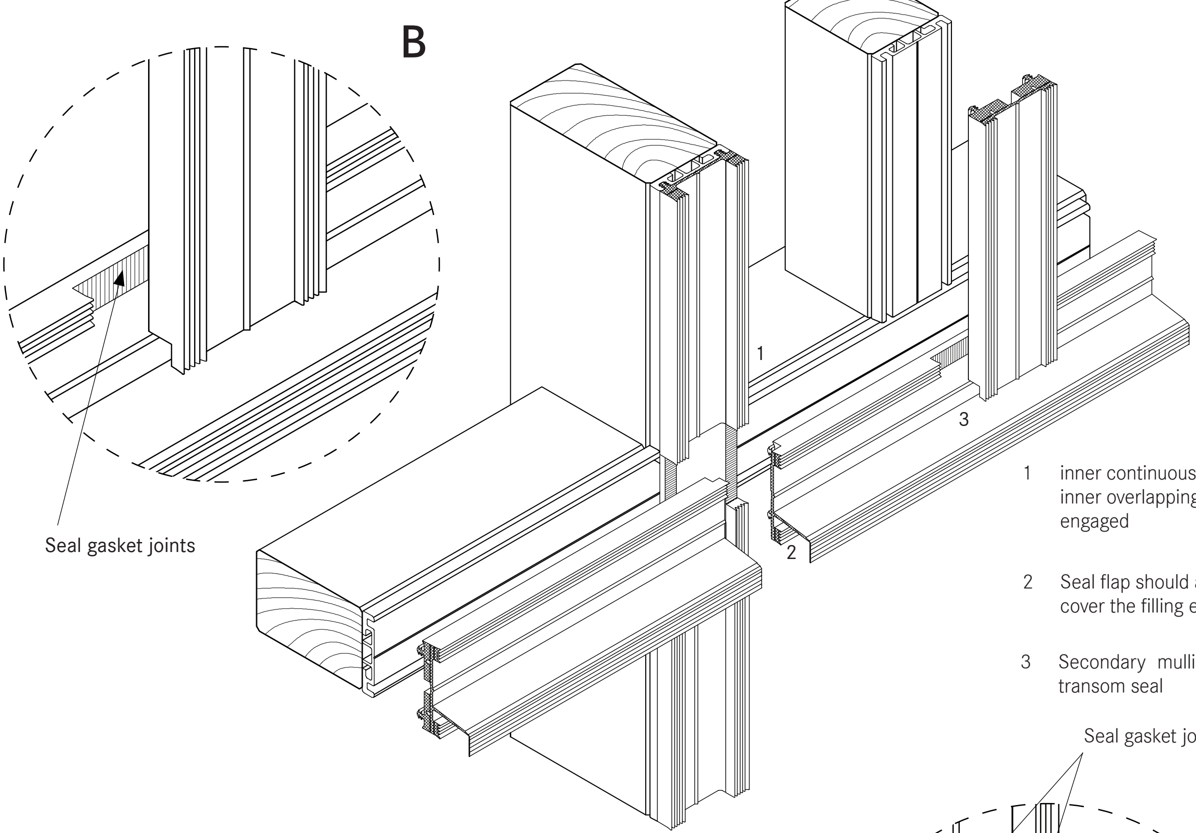




Seals - Facade

Assembly of the inner seal for vertical facade glazing and facade glazing with an incline of up to 20° - 3 overlapping sections

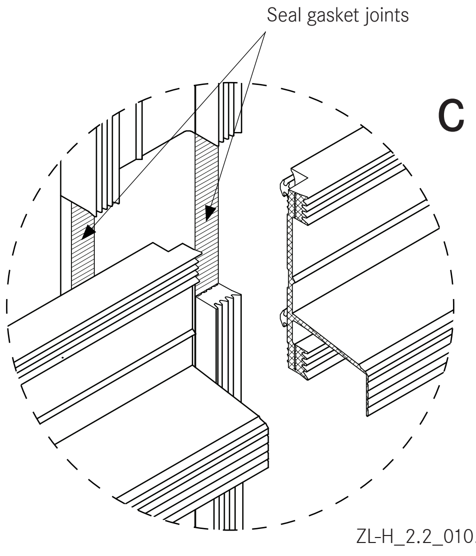
- Optionally, Stabalux seals with three offset water channels can be used in the facade area which safely drain any moisture or condensation to the outside.
- The 12 mm high seals can be divided across their height to allow a simple overlap at critical secondary mullion/transom joints and/or transom/primary mullion joints.
- The vertical seals for main mullions (3rd drainage section) are laid continuously.
- The transom seals overlap the main mullion seals.
- Along a transom, seals must be laid continuously.
- Moisture and condensation is guided away via the seal flap of the transom seal (2nd drainage section) to the main mullion.



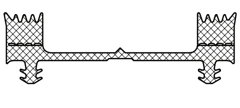
1 inner continuous mullion seal, inner overlapping transom seal, engaged

2 Seal flap should always cover the filling element

3 Secondary mullion seal overlaps the transom seal

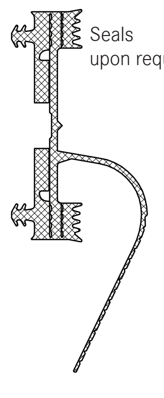


Inner seal main mullion



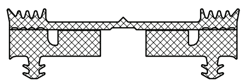
Seals upon request

Inner seal transoms



Seals upon request

Inner seal secondary mullion



Seals upon request

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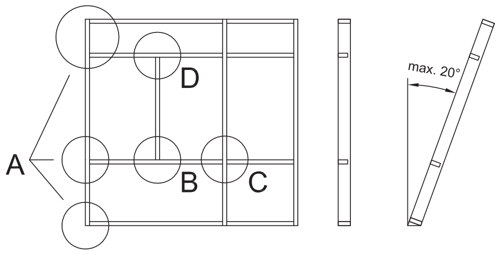
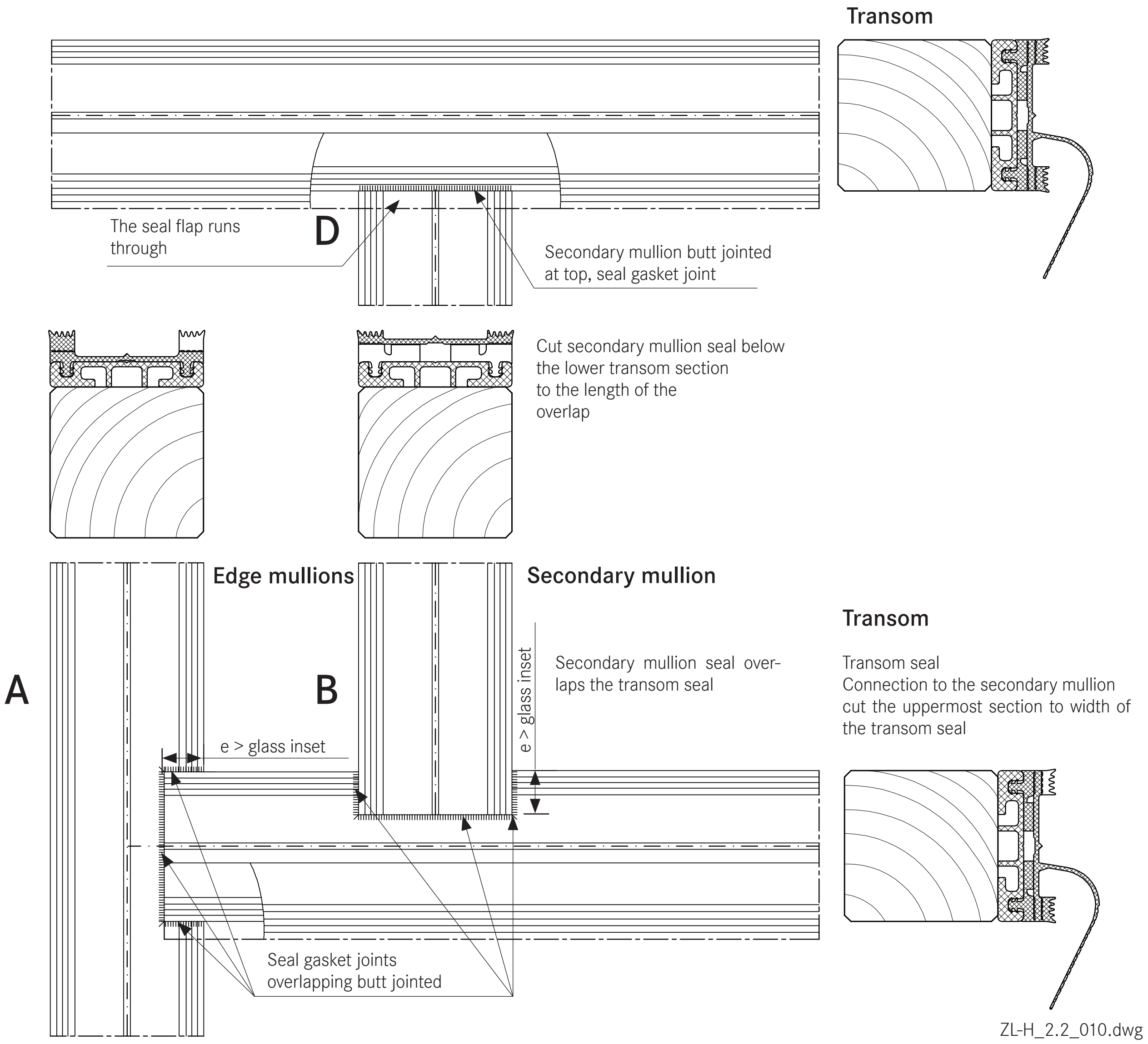
Seals - Facade

Assembly of the inner seal for vertical facade glazing and facade glazing with an incline of up to 20° - 3 overlapping sections



- The seal flap must always cover the inset depth of the glass panes and filling element.
- The protruding length of the seal flap should be removed at the perforation once glazing is completed.
- Vertical seals on the secondary mullion are butt jointed beneath the upper transom. The seal flap of the upper transom runs continuously in the upper part of the joint.
- Drainage of the secondary mullion (1st drainage section) is achieved by overlapping the seals of the secondary mullion with the seal of the upper transom.



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Seals - Facade

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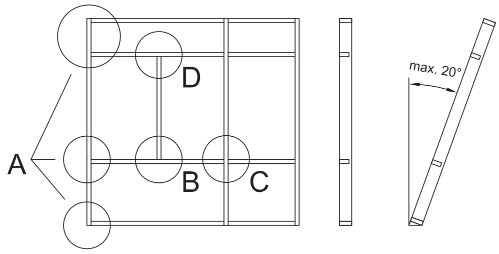
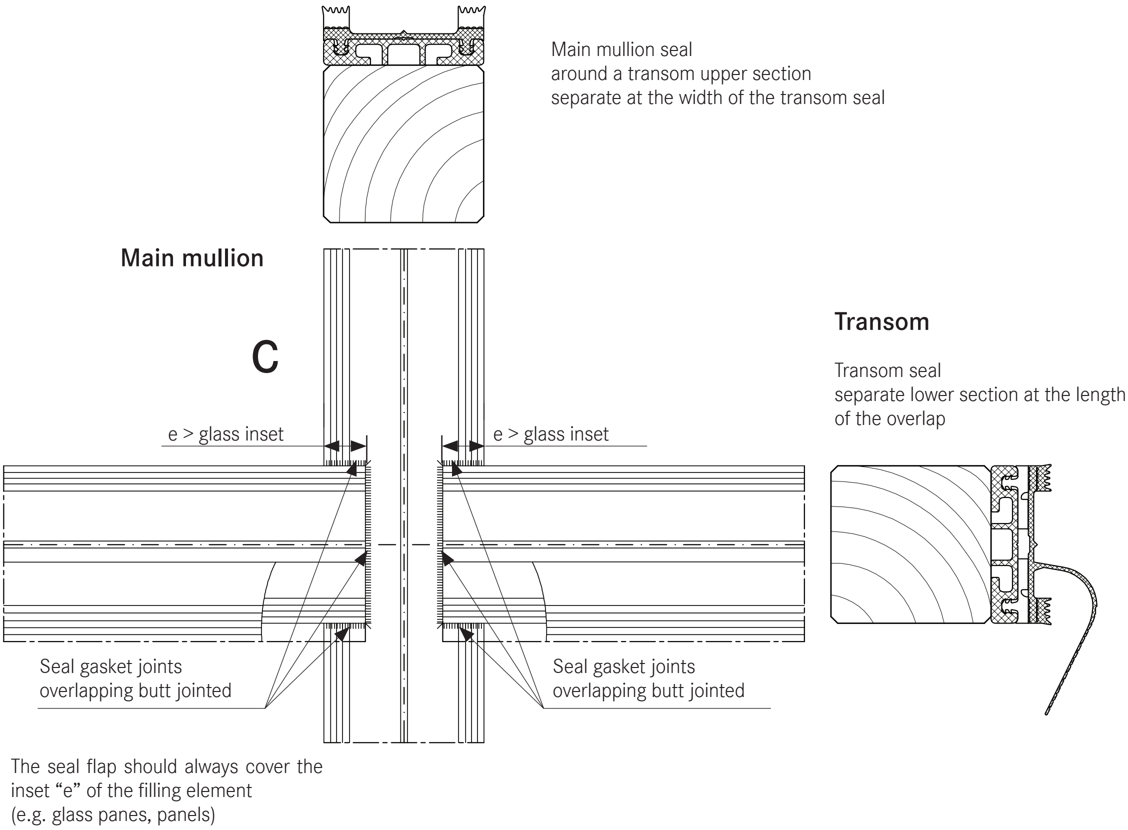
Assembly of the inner seal for vertical facade glazing and facade glazing with an incline of up to 20° - 3 overlapping sections



- All joints must be sealed. Before laying seals, we recommend completely coating the support surfaces and edges with Stabalux connection paste.
- Ensure all joints are cleanly and solidly sealed. Excess sealant should be removed. Absolutely no unevenness in the glass support surface must occur from applying sealant too thickly.



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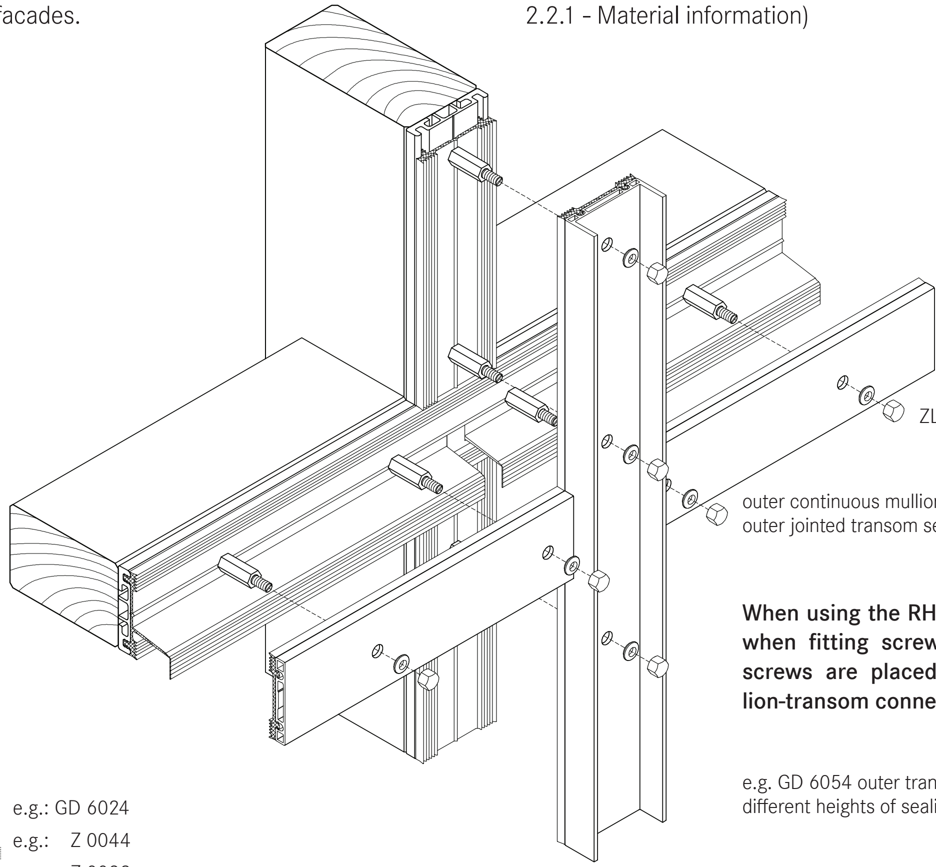
Seals - Facade

Assembly of the outer seal for vertical glass facades

- As well as gently clamping the glass in place, the outer sealing system has the primary task of protecting the rebate against moisture ingress.
- The outer sealing sections must be completely sealed except for the necessary openings for pressure equalisation and condensation dissipation.
- The outer mullion seals are laid continuously and the transom seals are joined.
- Sealant joints are to be laid flat with a slight excess in dimensions. Exact specifications depends on the situation in which the system is used.
- Tightly fitted sealant joints can be implemented without fixing the outer seal of the mullion-transom joint in vertical facades.
- The flag for the inner transom joint in combination with the outer seal creates additional safety.
- The seal flap should be separate at its perforations to match the thickness of the glass in order that this is clamped down and concealed under the outer seal.
- Different heights of sealing lips on the outer seal bridge the height different created by the seal flap in the outer sealing section.
- Differently high, split seals allow a balance between filling elements of different total thickness of up to 6 mm
- When mounting the clamping strip, be aware of aluminium profile expansion (see section 2.2.1 - Material information)



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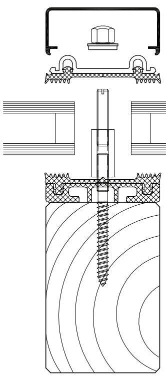
outer continuous mullion seal,
outer jointed transom seal

When using the RHT connector, take care when fitting screws to ensure that the screws are placed away from the mullion-transom connection.



e.g.: GD 6024
e.g.: Z 0044
e.g.: Z 0032
e.g.: GD 6025
e.g.: ZL 6053

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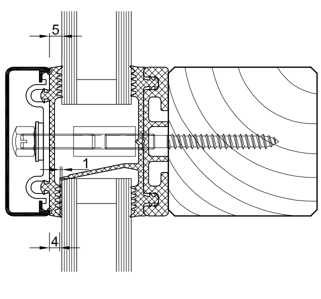
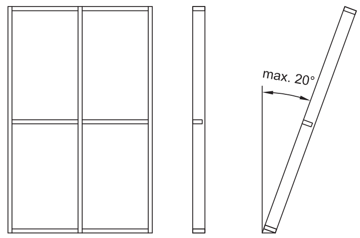
e.g. GD 6054 outer transom seal with different heights of sealing lip



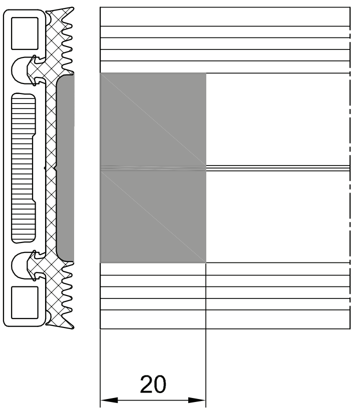
STABALUX

Seals - Facade

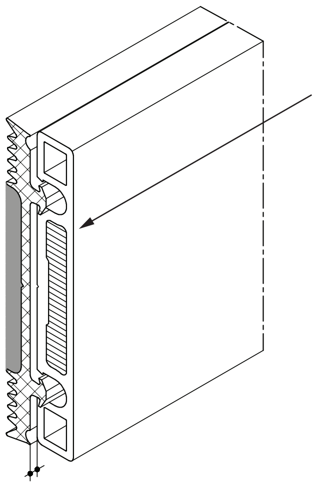
Assembly of the outer seal for facade glazing with an inwards incline up to 20°.



- If the facade is inclined inwards from the vertical (max. permitted incline 20°), the open ends of the outer transom seals must be closed up using Butyl.
- When constructing inwardly inclined facades (up to max. 20°), if flat cover profiles are used in the transoms (e.g. DL 5059, DL 6059, DL 5061, DL 6061, DL 5067, DL 6067, DL 5071, DL 6071, DL 6043, DL 6044) and flat lower and upper strips (e.g. UL 6005 with OL 6066), then the central hollows at each end must be sealed with silicone.



Seal open ends of the transom seals with Butyl on inwardly inclined facades (up to max. 20°).



Trim the seal to be slightly larger than required.

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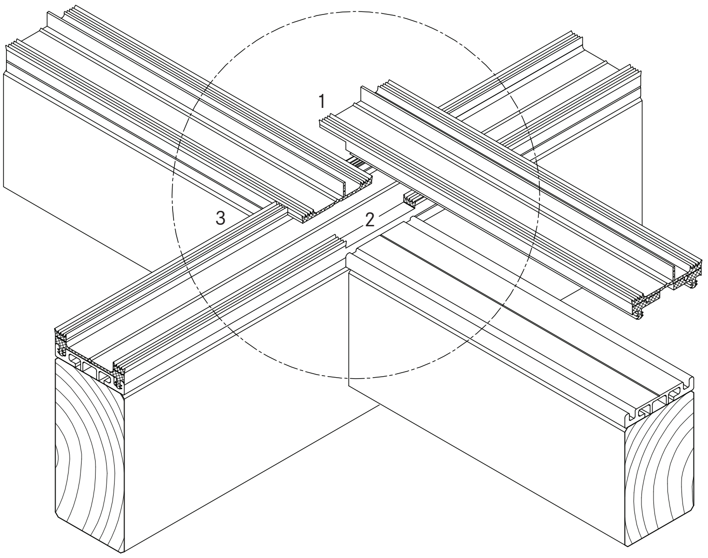
STABALUX

Seals - roof

2.2
8

Assemble the inner seal for roof glazing

- Optionally, Stabalux seals with offset water channels can be used in the facade area which safely drain any moisture or condensation to the outside.
- The 10 mm high seals can be divided across their height to allow a simple overlap at critical transom joints.
- The transom seals are geometrically shaped so as to create a condensation channel.
- This channel drains from the overlapping transom joint in the rafters.
- Along a transom, seals must be laid continuously.
- All joints must be sealed. Before laying transom seals, we recommend completely coating the support surfaces and edges. Absolutely no unevenness in the glass support surface must occur from applying sealant too thickly.



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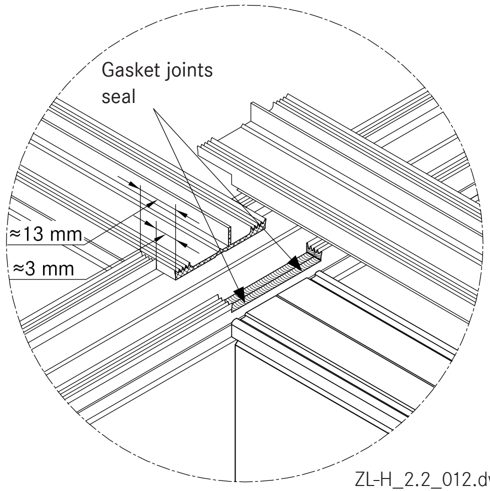
1 remove the lower perforated part and the clamping foot on the transom seal of the at around 15 mm

2 remove the upper perforated part on the rafter seal

3 length of transom seal = transom length + ~13 mm per side



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STABALUX

Seals - roof

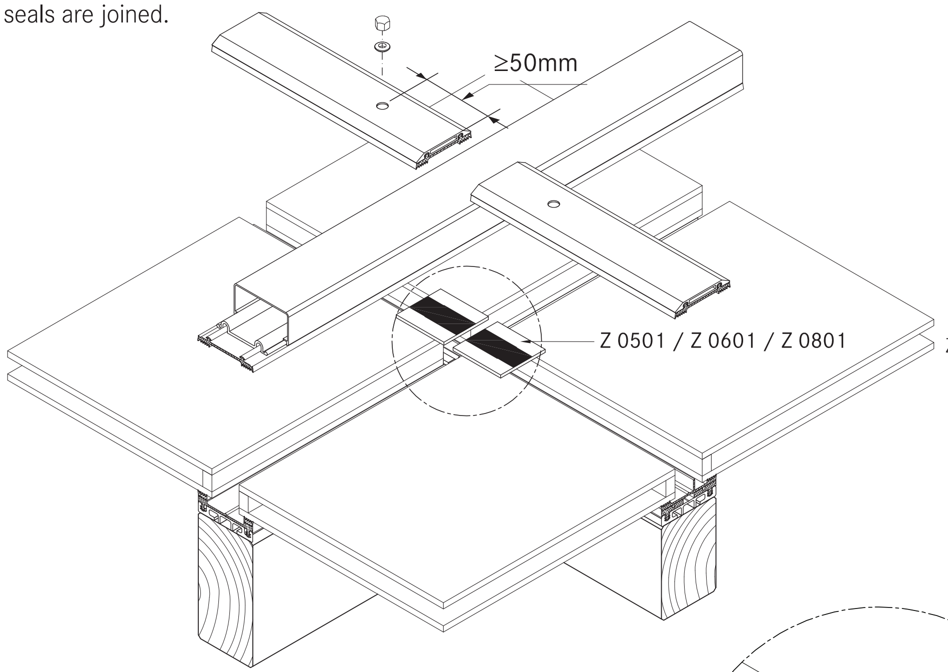
2.2
8

Assembly of the outer seal for for glazed roofing

- This are laid in fundamentally the same way as for vertical glazing. Split seals such as GD 1932 are not suitable for transom seals in roofs. Split seals can only be installed in mullions in combination with slab insulation. Each installation situation will differ to some degree and always check how well sealed it is.
- For cross joints we recommend using our self-adhesive stainless steel sealing plates Z 0801 for the system 80, Z 0601 for System 60 and Z 0501 for System 50. The stainless steel sealing plates are attached to the edge of the glass panes parallel to the mullion axis.
- Butyl tape is not suitable as a sealing tape between the glass and the outer seal.
- The outer mullion seals are laid continuously and the transom seals are joined.
- Sealant joints are to be laid flat with a slight excess in dimensions. Exact specifications depends on the situation in which the system is used.

Note:

- Horizontal clamping strips prevent the free run off of rain water and dirt.
- Cover strips and upper strips with angled edges reduce the build up of water in front of the clamping strip.
- To improve water drainage, clamping strips in the joint area of transoms should be shortened by 5 mm. Gasket joints, however, are to be laid flat with a slight excess in dimensions. Open ends of transom clamping strips (upper and cover profiles) should be sealed.



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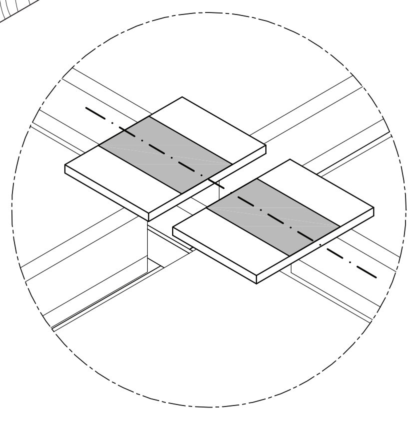
Detail of sealing plate Z 0501 = 60 x 40 mm
Z 0601 = 60 x 50 mm
Z 0801 = 70 x 70 mm

Attention: The sealing plates must be placed central to the transom axis!

For glass insets of 15 mm, the first screw fittings for the transom cover profile begin 50 mm from the end of the cover profile.



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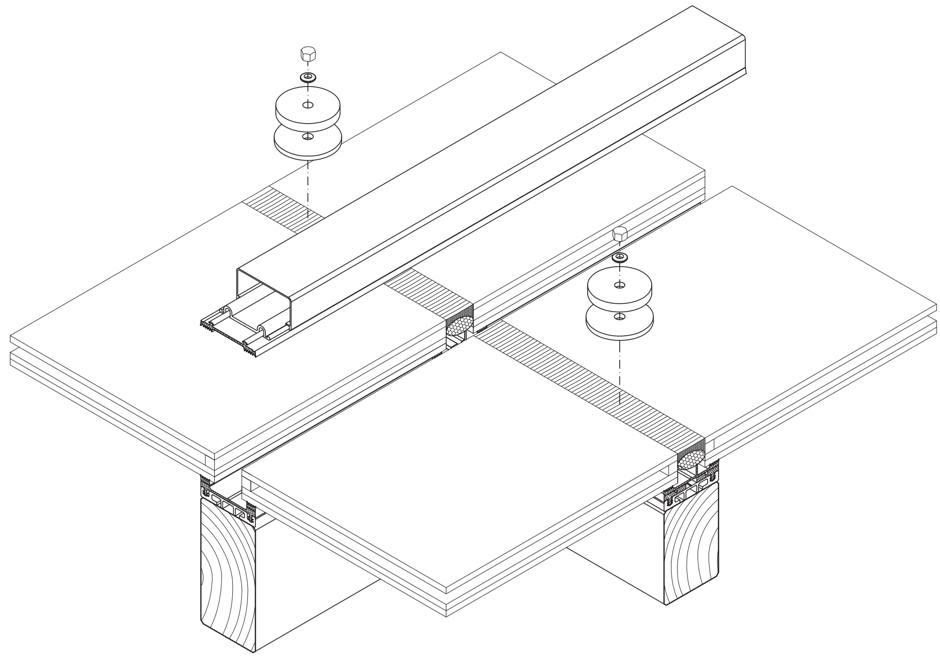
Seals - roof

Assembly of the outer seal for for inclined glazed roofing up to 2°.

- This are laid in fundamentally the same way as for vertical glazing. Split seals around the mullions in roofs such as GD 1932 are only suitable when using in combination with slab insulation. Each installation situation will differ to some degree and always check how well sealed it is.
- To ensure free run-off of rain water and dirt on roofs inclined up to 2°, we recommend not using clamping strips in the transoms.
- Instead, the rebate spaces should be sealed with all-weather silicone.
- Implementation of the outer sealing section around mullions is done in the same way as conventional roofs with an inclination up to 15°.
- At the high point or ridge area of the inclined glazing, it is recommended to also install and outer sealing section in the transoms with clamping strips.
- Only certified sealing materials may be used for sealing the transom rebate space.
- Pay attention to all information provided by the manufacturer and the sealing work must be carried out by trained persons. It is recommended that a licensed and certified specialist contractor is hired for this purpose. We further refer you to the DIN 52460 standard and IVD data sheets (Trade Association for Sealants).



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Tips for all roof designs:

When using aluminium cover profiles on roofs, take account of the expansion factor as a result of the high degree of heat absorption when selecting the length to use. Equally, the use of single-piece cover profiles should be carefully considered. In this case it is recommended that holes for screwing on the cover profile are created with a diameter of d = 9 mm. (see section 2.2.1 - Material information).

For wide spans we recommend using concealed screw fittings when selecting the clamping strips (lower + upper strip). This is the preferred option for rafters. Unused holes in the pressure profile must be sealed.
Some roof areas, such as the eaves, see the use of several different materials (glass, silicone, aluminium sheets, ...) each with different expansion coefficients. To avoid the formation of cracks, aluminium sheets should be installed with expansion joints.

STABALUX

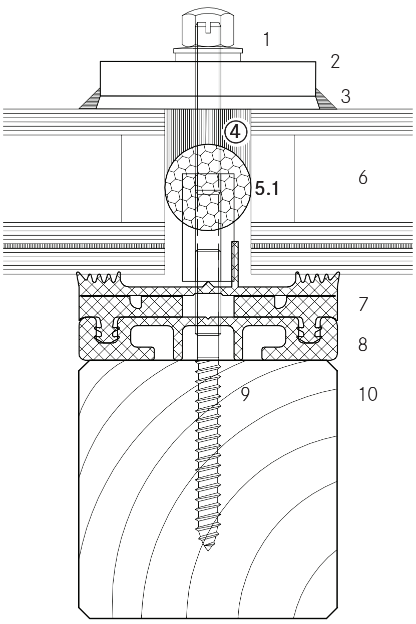
Seals - roof

2.2
8

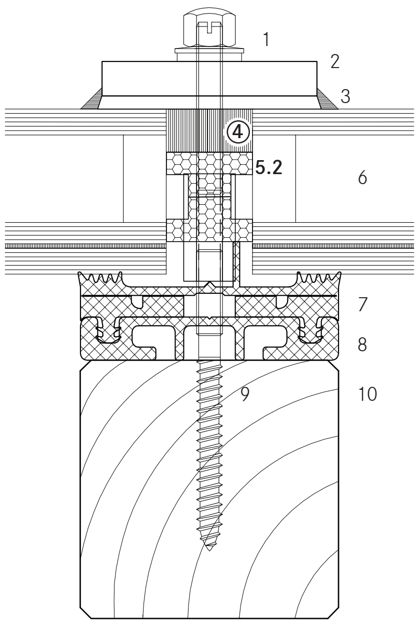
Assembly of the outer seal for for inclined glazed roofing up to 2°.

- The compatibility of the materials is particularly important when using all-weather silicone. In this case, the compatibility of the sealant with the edge bonding of the glass and the backfill of the joints. If self-cleaning glass is used, the compatibility must be established in advance.
- Glass sealants and edge bonding must be UV-resistant. The incline of roofs should also be taken into account. Information about UV-resistance can be requested from the manufacturer. Silicone edge bonding generally provides better UV-resistance than polysulfide-based materials. The advantage lies in its high vapour sealing properties which is particularly useful when using more volatile argon fillings.
- Highly elastic, weatherproof and UV-resistant seals meet the widest range of demands for reliable joints.
- If the silicone joint is created without additional mechanical safety devices, ensure that the glass is supported from two sides only. Selective installation of holding clamps can be used to achieve all round support for glass edges.
- The clamps are made from stainless steal with silicone washers and are screwed in the same as pressure strips. The hold-down clamp should be additionally sealed around the perimeter with silicone sealant. The design is based upon the dimensions of the glass as documented in the glass static analysis.

Transom inclined glazing up to 2° inclination with all-weather silicone and round section rope seal.



Transom inclined glazing up to 2° inclination with all-weather silicone and slab insulation.



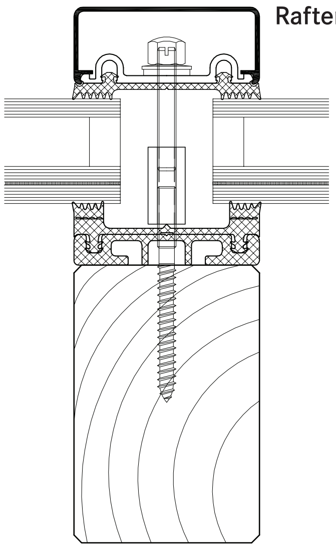
1	Hold-down clamp
2	Silicone washer
3	Silicone sealant / seal around the clamp
4	All weather silicone seal
5.1	Round section rope seal
5.2	Slab insulation
6	Glass / filling element
7	Inner seal 10 mm transom
8	Spacer strip
9	System screw fittings
10	Timber profile

ZL-H_2.2_013.dwg

Seals - roof

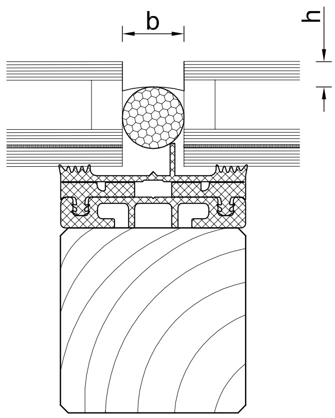
Assembly of the outer seal for for inclined glazed roofing up to 2°.

- Joint widths and heights are set out in the Stabalux ZL-H System with w x h = 20 mm x 10 mm. These measurements should always checked when selecting the sealing material and adapted if necessary. Generally: w : h = 2 : 1 - 3.5 : 1
- PE round section seals or Stabalux slab insulation is suitable as a back fill material.
- Silicone sealant should be applied before laying the mullion seals and cover profiles.
- After the specified setting time, the seals and screw fittings can be installed in the areas around mullions.
- The mullion-transom joints around the clamps are then sealed.
- Before applying this second layer, the joints around transoms must have completely set.

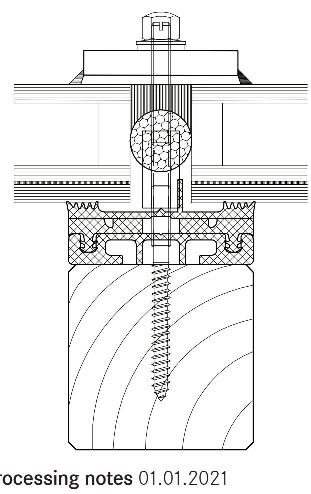


Rafters with clamping strips

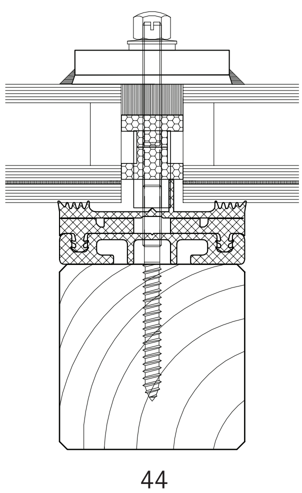
Joint design according to manufacturers specifications!
generally:
w : h = 2 : 1 - 3.5 : 1



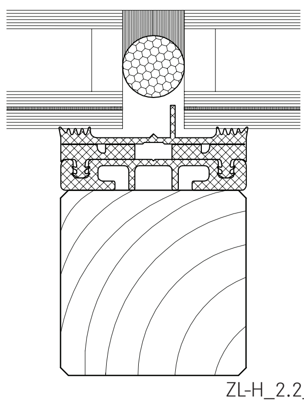
Transom with clamp, All weather silicone seal and round section rope seal



Transom with clamp, All weather silicone seal and slab insulation



Transom with all-weather silicone and round section rope seal



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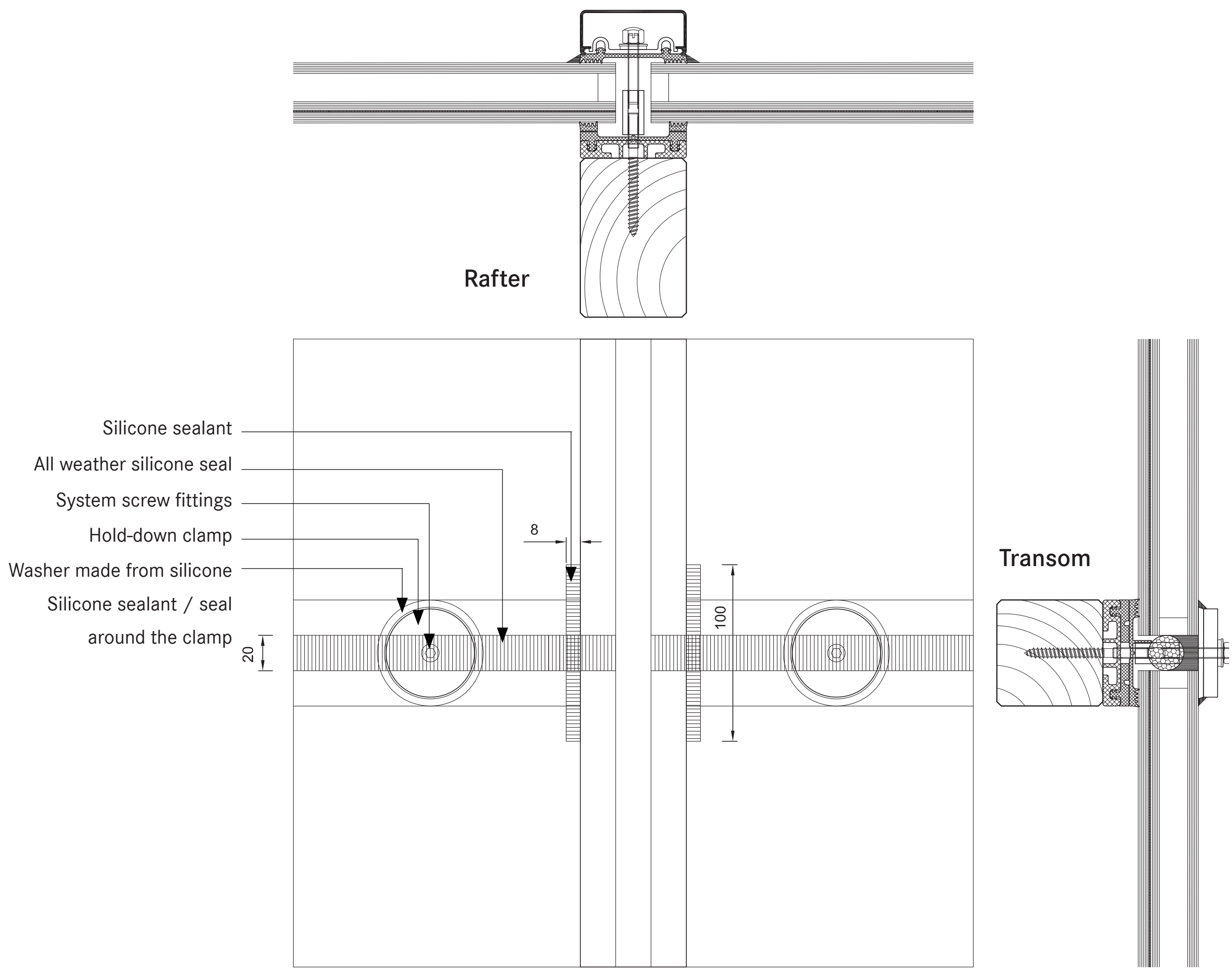
Seals - roof

Steps for implementing the seal with silicone

- Test silicone sealant and glass edge bondings and other contact surfaces (e.g. panels) for suitability.
- Clean edge bonding adhesive impurities from the surfaces to which sealant will be applied following manufacturer's directions.
- Fill the joints as per the joint dimensions using only non-water absorbent closed-cell PE profiles (no damage to the edge bonding).
- The remaining space in the glass rebate must be large enough that the pressure is able to equalise and a drainage level is available.
- Clean any impurities from the surfaces to which the sealing material is to be applied and any adjacent surfaces according to manufacturer's directions.
- Be particularly aware of any adjacent metal components. Prime according to manufacturer's directions.
- Seal joints without leaving any cavities or bubbles. Mask any adjacent components in advance where necessary.
- Smooth out the filled joints using the manufacturer's smoothing agents and conventional tools with as little water as possible. Remove adhesive tape.
- If two or more reactive sealants are used in combination, the first must completely set before the second is applied.



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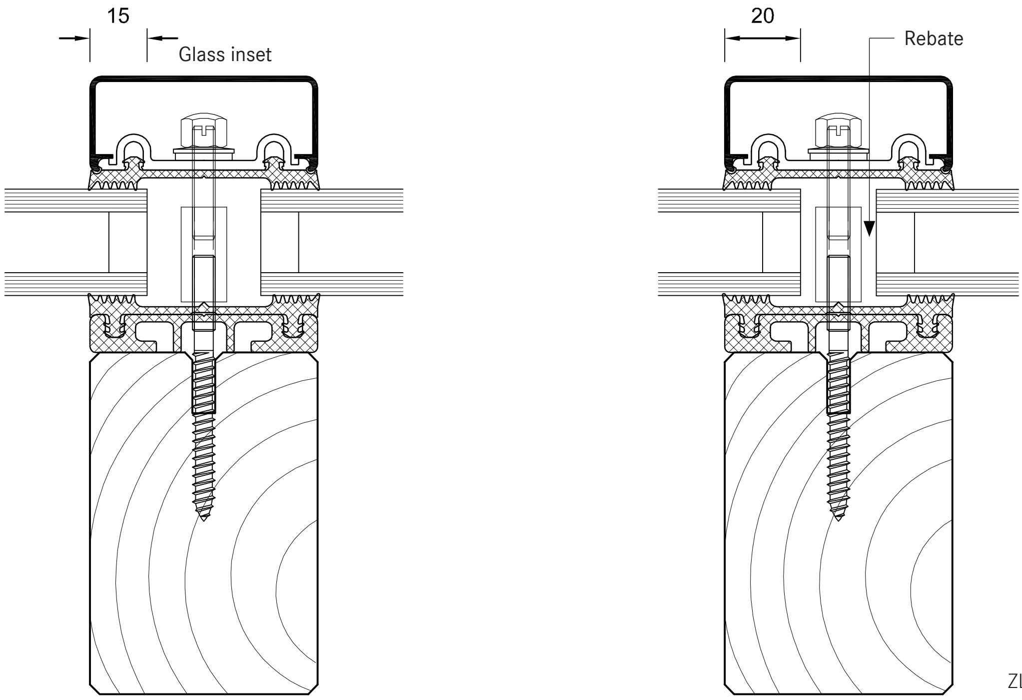
Glass inset and glass support

Glass inset

- Glass industry guidelines must be observed.
- The glass inset is generally 15 mm.
- An increase to 20 mm has a beneficial effect on the heat transfer coefficient U_f of the frame structure.



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Glass inset and glass support

Glass support types and choosing the glass support

The Stabalux ZL-H system uses two different types and techniques for attaching glass supports:

- Glass support GH 5053 and GH 5055 with hanger bolts.
- Glass support GH 5053 and GH 5055 with hardwood cylinders and bolts.

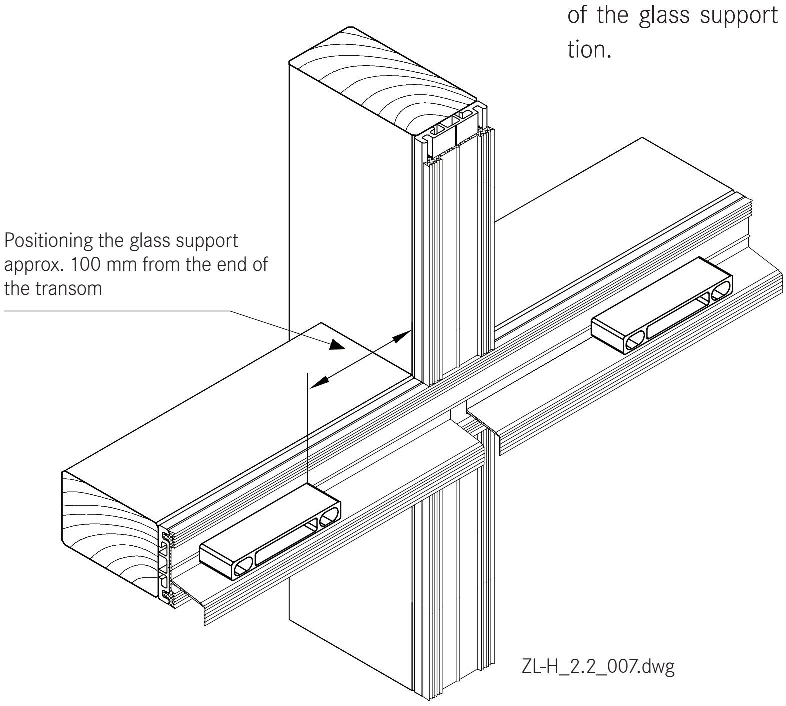
The glass supports used are determined by the type of wood, glass construction and glass weight (see section 9). A rigid mullion-transom connection is required, i.e. no twisting of the transom may occur at the connection that would cause further sinking of the glass support.

Mounting the glass supports

- Positioning the glass supports and glazing according to glass industry guidelines and guidelines of the Institute for Window Technology.
- The weight of the glass panes is distributed via the glass supports attached to the transoms.
- Glass supports should be attached at a distance of 100 mm from the end of the transom. When doing so, avoid a collision with the cover profile screw fittings at the end of the transom.

Glazing blocks

- Glazing blocks must be compatible with the edge bonding of the insulated glass panes.
- They should be stable under constant pressure and be able to withstand loads, aging and temperature changes.
- It is important that the glazing allows sufficient surrounding space for pressure equalisation and that drainage of condensation is not obstructed as well as allowing the glass edges to be offset and small design tolerances to be accommodated.
- If the length of the glass support is more than 100 mm, blocks should be placed along the entire length of the glass support to ensure equal load distribution.



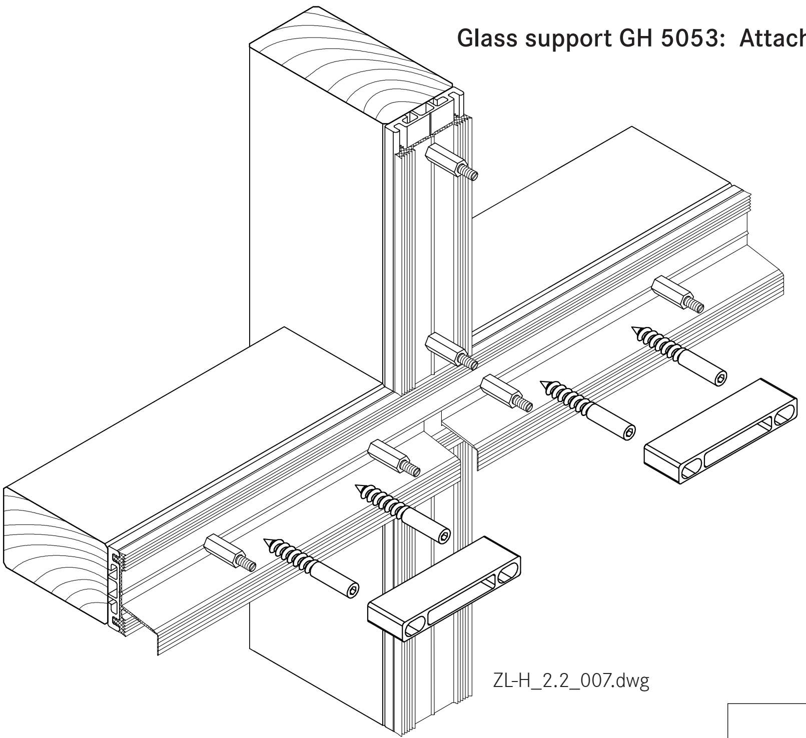
Glass inset and glass support

2.2
9

Glass support GH 5053 with hanger bolts.

- The certified system components consist of the glass support GH 5053 and 2 hanger bolts ∅ 10 mm with a 45 mm wood thread and a shaft of a different length.
- The hanger bolts are screwed directly into the timber at intervals of 80 mm. A ∅ 7 mm hole needs to be pre-drilled for this purpose.
- The spacer strip should also be pre-drilled with ∅ 11 mm holes at the relevant points.
- Screw fittings should be vertical to the transom axis.
- The depth for hanger bolts is at least 45 mm measured from the front edge of the timber.
- For glass support GH 5053, the required depths are delivered corresponding to the thickness of the glass and placed onto the hanger bolts.
- Blocks must be placed under the glass panes along the entire length of the glass supports.
- Details of the approved pane weights, geometries and classification of system components are provided in section 9.

Glass support GH 5053: Attachment with hanger bolts



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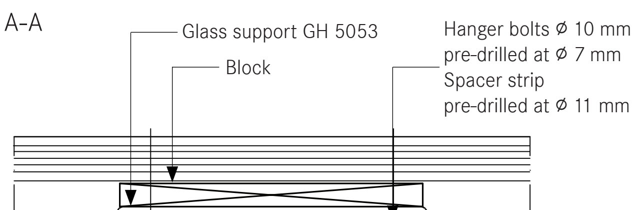

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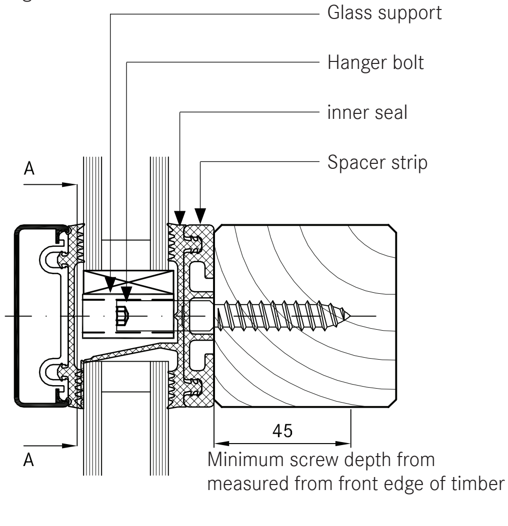
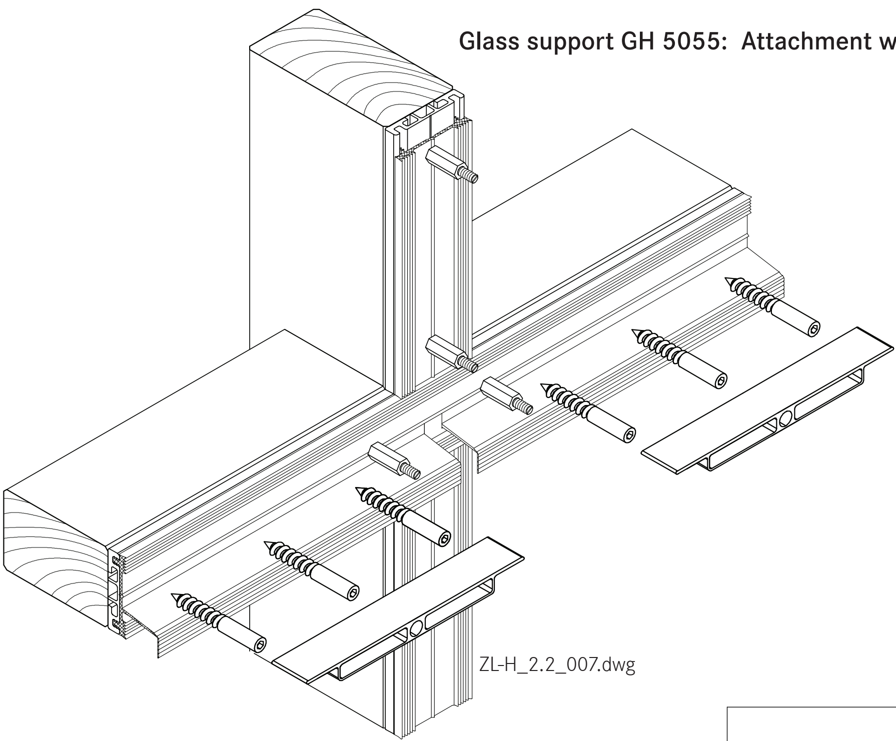


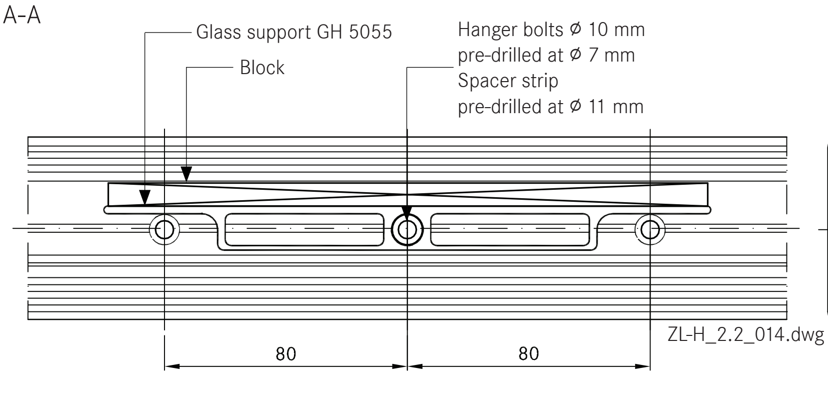
Glass inset and glass support

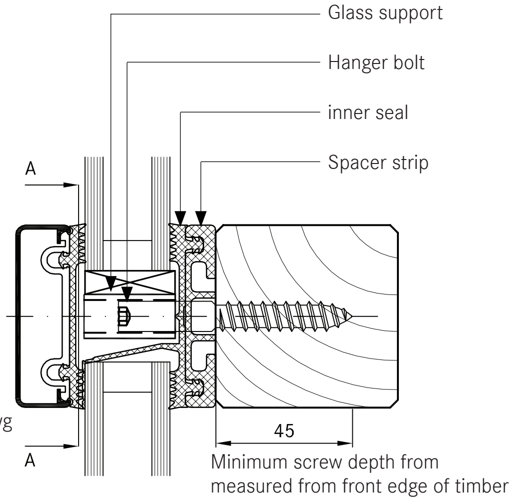
Glass support GH 5055 with hanger bolts

- Based on the test results for the system component GH 5053, a load bearing model was designed and the suitability of the GH 5055 glass support calculated.
- Installation is done the same way as GH 5053, but using three screws spaced 80 mm apart.
- Details of the approved pane weights, geometries and classification of system components are provided in section 9.

Glass support GH 5055: Attachment with hanger bolts







Glass inset and glass support

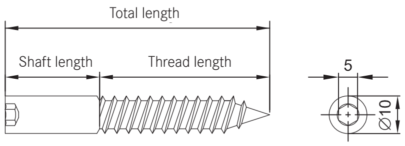
Classification of system components

Table 1:
Vertical glazing | System 50, 60, 80 | Hanger bolts

Row	Total glass thickness t_{Glass} (mm) for vertical glazing	Hanger bolts [2]		Glass supports [1]		
		Inner seal height		GH 5053	GH 5055	Depth (mm)
		5 mm	10 mm			
1	4, 5, 6, 7	Z 0371 [3]	Z 0371	GH 0081	Pre-cut	9
2	8, 9	Z 0371	Z 0371	Pre-cut	Pre-cut	12
3	10, 11	Z 0371	Z 0372	Pre-cut	Pre-cut	14
4	12, 13	Z 0371	Z 0372	Pre-cut	Pre-cut	16
5	14, 15	Z 0371	Z 0372	Pre-cut	Pre-cut	18
6	16, 17	Z 0372	Z 0372	Pre-cut	Pre-cut	20
7	18, 19	Z 0372	Z 0372	Pre-cut	Pre-cut	22
8	20, 21	Z 0372	Z 0372	GH 0082	Pre-cut	24
9	22, 23	Z 0372	Z 0372	GH 0083	GH 0851	26
10	24, 25	Z 0372	Z 0373	GH 0084	GH 0852	28
11	26, 27	Z 0372	Z 0373	GH 0085	GH 0853	30
12	28, 29, 30	Z 0373	Z 0373	GH 0886	GH 0854	32
13	31, 32, 33,	Z 0373	Z 0373	GH 0887	GH 0855	35
14	34, 35, 36	Z 0373	Z 0373	GH 0888	GH 0856	38
15	37, 38, 39	Z 0373	-	GH 0889	GH 0857	41
16	40, 41, 42	Z 0373	-	GH 0890	GH 0858	44
17	43, 44	Z 0373	-	GH 0891	GH 0859	47

1) Cut from GH 5053 or GH 5055.
2) Generally: The depth for hanger bolts = 45 mm thread length measured from the front edge of the timber.
3) The depth for hanger bolts = 45 mm thread length + 4 mm shaft length measured from the front edge of the timber.
This represents a visible shaft of 21 mm measured from the front edge of the timber.

Hanger bolts



Item	Total length (mm)	Shaft length (mm)	Thread length (mm)
Z 0371	70	25	45
Z 0372	77	32	45
Z 0373	90	45	45

Glass inset and glass support

Classification of system components

Table 2:
Inclined glazing | System 50, 60, 80 | Hanger bolts

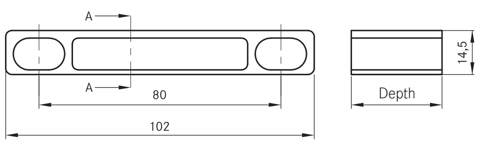
Row	Total glass thickness t_{Glass} (mm) for inclined glazing 1)	Hanger bolts 2)	Glass supports 3)		
			GH 5053	GH 5055	Depth (mm)
1	24, 25, 26	Z 0373	Pre-cut	Pre-cut	18
2	27, 28	Z 0373	Pre-cut	Pre-cut	20
3	29, 30	Z 0373	Pre-cut	Pre-cut	22
4	31, 32	Z 0373	GH 0082	Pre-cut	24
5	33, 34	Z 0373	GH 0083	GH 0851	26

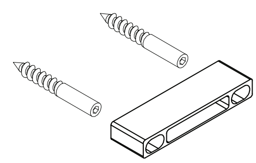
1) Accounting for a 10 mm inner seal.

2) The depth for hanger bolts = 45 mm thread length measured from the front edge of the timber.

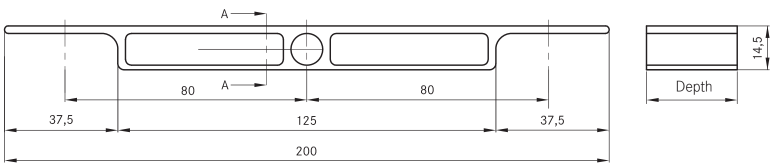
3) Cut from GH 5053 or GH 5055.

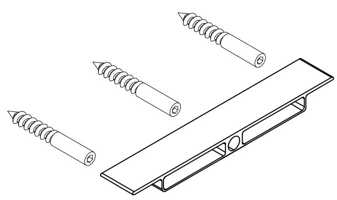
Glass support GH 5053





Glass support GH 5055





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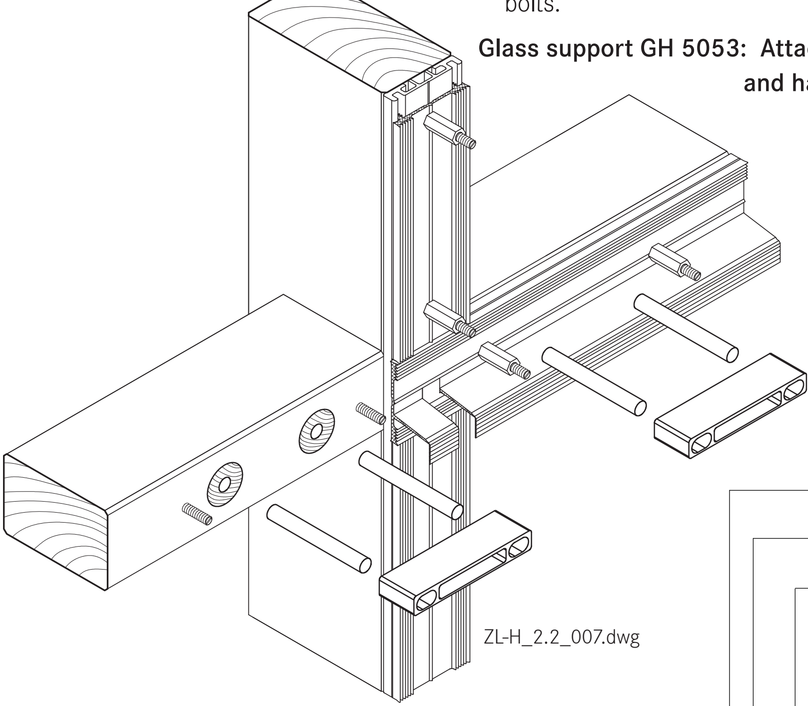
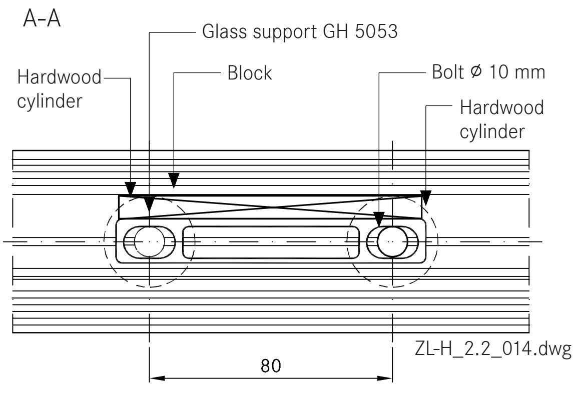
Glass inset and glass support

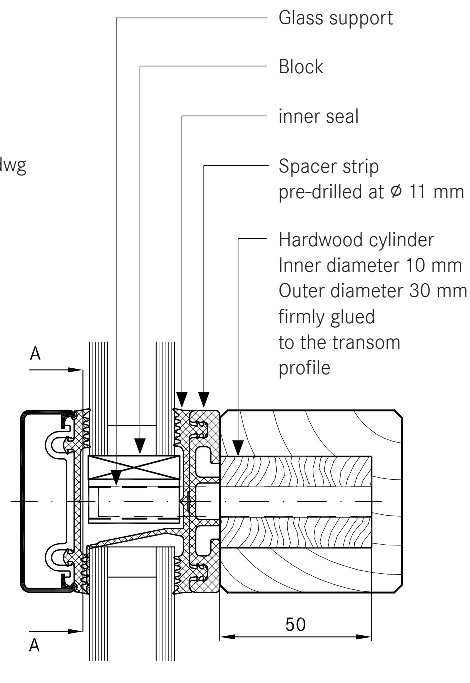
Glass support GH 5053 and GH 5055 with pins and hardwood cylinders

- Certified system components consist of glass support GH 5053 and GH 5055 with pins and hardwood cylinders.
- Depending on the width of supports, 2 or 3 bolts with a diameter of 10 mm are needed.
- The bolt length should be adapted to the thickness of the glass.
- To anchor the bolts in place, 50 mm wooden cylinders with a outer diameter of 30 mm and an axial core of Ø 10 mm are solidly glued into the timber.
- Additionally, holes with a depth of 50 mm and diameter of 30 mm are to be drilled into the transom profile vertical to the transom axis with 80 mm spacing.
- The glue or adhesive used must be suitable and must not swell.
- The spacer strip should also be pre-drilled with Ø 11 mm holes at the relevant points.
- The bolts should be hammered in along the entire length of the transom.
- For glass supports GH 5053 and GH 5055, the required depths are delivered corresponding to the thickness of the glass and placed onto the hanger bolts.

Glass support GH 5053: Attachment with bolts and hardwood cylinders







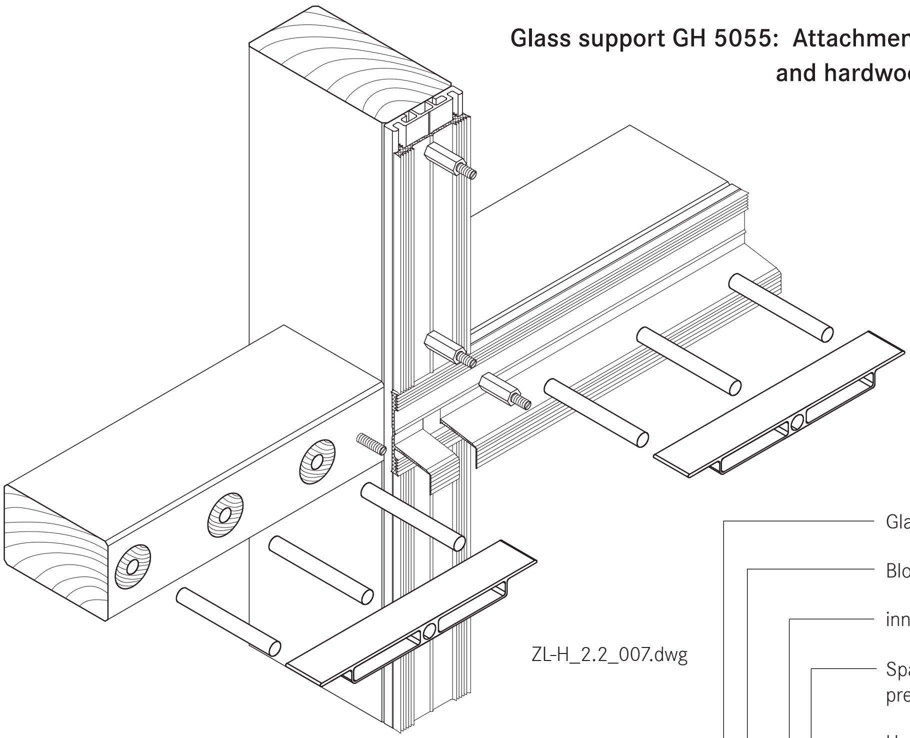
STABALUX

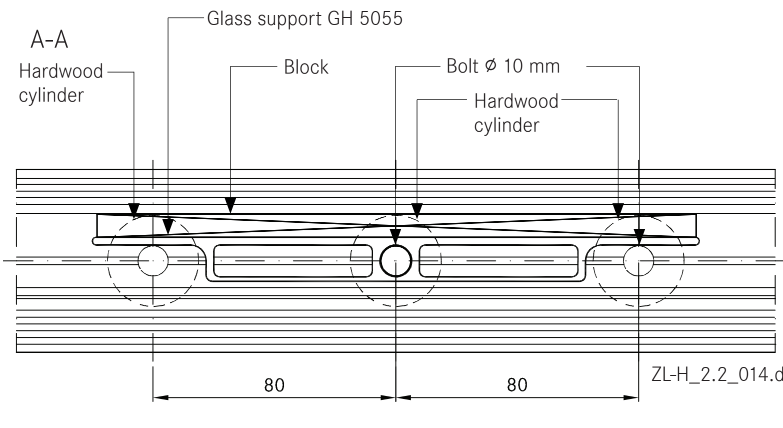
Glass inset and glass support

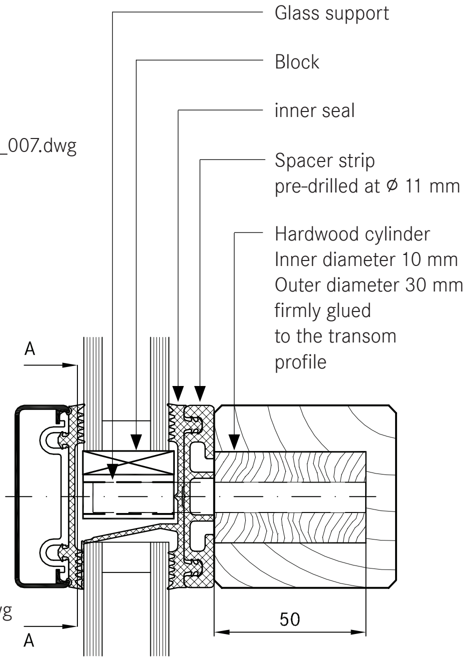
Glass support GH 5053 and GH 5055 with pins and hardwood cylinders

- Blocks must be placed under the glass panes along the entire length of the glass supports.
- Details of the approved pane weights, geometries and classification of system components are provided in section 9.

Glass support GH 5055: Attachment with bolts and hardwood cylinders







Glass inset and glass support

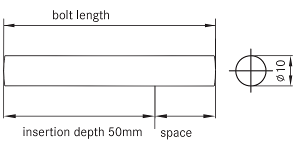
Classification of system components

Table 3:
Vertical glazing | System 50, 60, 80 | Hardwood cylinders & bolts

Row	Total glass thickness t_{Glass} (mm) for vertical glazing	Hardwood cylinder	Bolt		Glass supports [1]		
			Inner seal height		GH 5053	GH 5055	Depth (mm)
			5 mm	10 mm			
1	4, 5, 6, 7	Z 0073	Z 0047	-	GH 0081	Pre-cut	9
2	8, 9	Z 0073	Z 0047	-	Pre-cut	Pre-cut	12
3	10, 11	Z 0073	Z 0047	Z 0048	Pre-cut	Pre-cut	14
4	12, 13	Z 0073	Z 0047	Z 0048	Pre-cut	Pre-cut	16
5	14, 15	Z 0073	Z 0048	Z 0048	Pre-cut	Pre-cut	18
6	16, 17	Z 0073	Z 0048	Z 0048	Pre-cut	Pre-cut	20
7	18, 19	Z 0073	Z 0048	Z 0049	Pre-cut	Pre-cut	22
8	20, 21	Z 0073	Z 0048	Z 0049	GH 0082	Pre-cut	24
9	22, 23	Z 0073	Z 0048	Z 0049	GH 0083	GH 0851	26
10	24, 25	Z 0073	Z 0049	Z 0049	GH 0084	GH 0852	28
11	26, 27	Z 0073	Z 0049	Z 0049	GH 0085	GH 0853	30
12	28, 29, 30	Z 0073	Z 0049	Z 0049	GH 0886	GH 0854	32
13	31, 32, 33	Z 0073	Z 0049	Z 0051	GH 0887	GH 0855	35
14	34, 35, 36	Z 0073	Z 0049	Z 0051	GH 0888	GH 0856	38
15	37, 38, 39	Z 0073	Z 0051	-	GH 0889	GH 0857	41
16	40, 41, 42,	Z 0073	Z 0051	-	GH 0890	GH 0858	44
17	43, 44	Z 0073	Z 0051	-	GH 0891	GH 0859	47

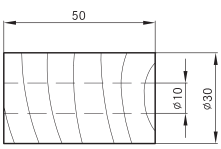
1) Cut from GH 5053 or GH 5055.

Bolt



Item	Bolt length (mm)
Z 0047	70
Z 0048	80
Z 0049	90
Z 0051	100

Hardwood cylinder Z 0073



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Glass inset and glass support

Classification of system components

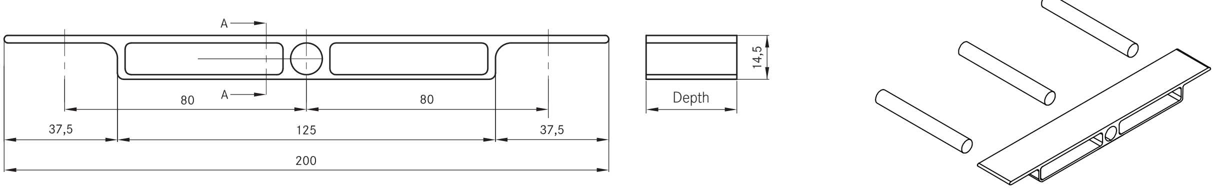
Table 4:
Inclined glazing | System 50, 60, 80 | Hardwood cylinders & bolts

Row	Total glass thickness t_{Glass} (mm) for inclined glazing [1]	Hardwood cylinder	Bolt	Glass supports [2]		
				GH 5053	GH 5055	Depth (mm)
1	20, 21, 22	Z 0073	Z 0049	Pre-cut	Pre-cut	14
2	23, 24	Z 0073	Z 0049	Pre-cut	Pre-cut	16
3	25, 26	Z 0073	Z 0049	Pre-cut	Pre-cut	18
4	27, 28	Z 0073	Z 0049	Pre-cut	Pre-cut	20
5	29, 30	Z 0073	Z 0051	Pre-cut	Pre-cut	22
6	31, 32	Z 0073	Z 0051	GH 0082	Pre-cut	24
7	33, 34	Z 0073	Z 0051	GH 0083	GH 0851	26

1) Accounting for a 10 mm inner seal.
2) Cut from GH 5053 or GH 5055.

Glass support GH 5053

Glass support GH 5055



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Screw fittings

Fastenings

- The screw fittings used by the system are a combination of basic room-side screw fittings (hanger bolts), a coupling using a threaded socket that allows thermal separation in the rebate and a flexible bolt-nut connection or screw connection on the glazing side.
- The length of the bolts and screws is variable and depends on the height of the inner seal and thickness of the glass. A sufficient screw depth must be ensured.
- Stainless steel 1.4301 DIN EN 10088 is the material used to produce screws for the Stabalux system.
- Depending on the type of screw fittings selected, special 2 and 4 mm vulcanised EPDM washers are available.
- Screws/threaded bolts of various lengths are available for all common glass thicknesses. The length of bolt required can usually be determined using a table of figures. The combination chosen for the clamp connection will depend on the specific situation.
- The distance for screw fittings is variable. The maximum distance is a = 250 mm.
- The distance from the edge for the first screw fitting should generally be in the region of 30 mm $\leq a \leq$ 80 mm. The placement of the glass supports and the choice of mullion-crossbar connection should also be taken into account.
- The clamp connection is exclusively subject to tensile forces. The pressure strips are connected using Stabalux system components. To determine the stress limit (maximum tensile force) and permitted tensile forces for the connection, the conditions in the relevant general building regulations and the Eurocode 5 (DIN EN 1995-1) and Eurocode 3 (DIN EN 1993-3) standards apply.
- Screw fittings are applied using a conventional electric screwdriver with depth stop. This guarantees uniform application of pressure. The depth setting should be chosen so that when using 4 mm EPDM washers, a washer compression of 1.5 - 1.8 mm is achieved.

Concealed screw fittings

- Choice of pre-drilled pressure strips (UL 5009-L, UL 6009-L and UL 8009-L, slot 7 x 10 mm, a = 125 mm) with clippable upper strips make assembly easier. The remaining pressure strips should be provided with a round hold of d = 8 mm. The functionality of the clip procedure can be checked after the first upper strip has been pushed against the pressure profile.

Note:

When using aluminium cover profiles on roofs, take account of the expansion factor as a result of the high degree of heat absorption when selecting the length to use. In this case it is recommended that holes for screwing on the clamping strip are created with a diameter of d = 9 mm. Equally, the use of single-piece cover profiles should be carefully considered. Some lower and upper strips (e.g.: UL 6005, OL 6016, OL 6056, OL 6063, OL 6066, OL 6069, OL 5022, OL 5025, DL 5073/DL 6073, OL 50212/OL 60212/ OL 80212) cannot be screwed on using threaded pins, washers and cap nuts as these are too flat. (See item: visible recessed screw fittings)

Visible screw fittings

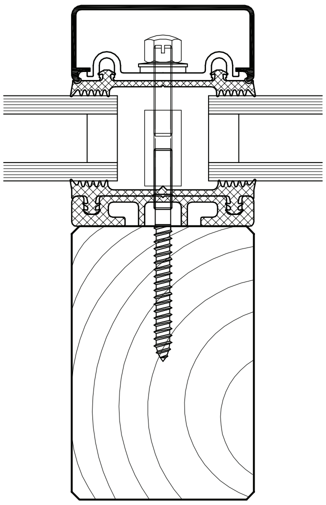
- Cover strips should be drilling with a round hole of d = 8 mm.
  (see **Note** on covered screw fittings)

Visible recessed screw fittings

- When creating visible recessed screw fittings a stepped bore is required. The lower part of the cover profile should be drilled with a d = 7 mm diameter. The upper part of the cover profile needs a d = 11 mm diameter for the screw head.
- The exact use case for the specific project should be checked. Stainless steel cylinder head screws Ø 10 mm with a maximum 5 mm head are used here. Screw fittings can only be installed with an internal mount (e.g. inner hex socket). Alternatively, check if the use of direct screw fittings is suitable. It is recommended to install a washer (PA washer, e.g. Z 0033) with all screw fittings.

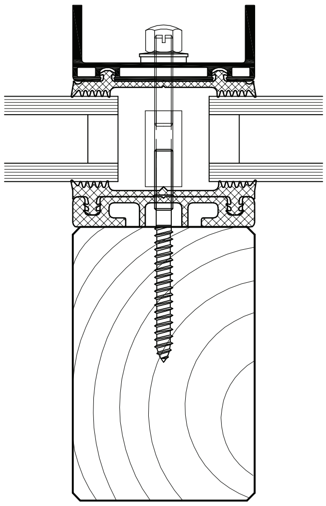
Screw fittings

Fastenings



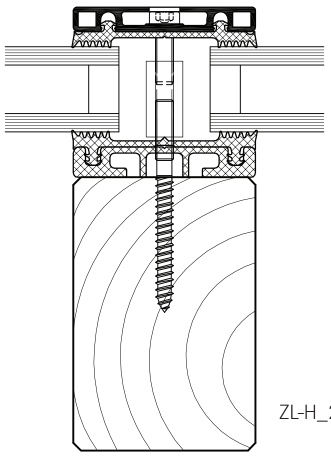
Concealed screw fittings

Hanger bolt M6 e.g. Z 0113;
Threaded socket M6 e.g. Z 0029;
Threaded bolt M6 e.g. Z 0040;
Sealing washer e.g. Z 0086;
Cap nut M6 Z 0043



Visible screw fittings

Hanger bolt M6 e.g. Z 0113;
Threaded socket M6 e.g. Z 0029;
Threaded bolt M6 e.g. Z 0040;
Sealing washer e.g. Z 0086;
Cap nut M6 Z 0043



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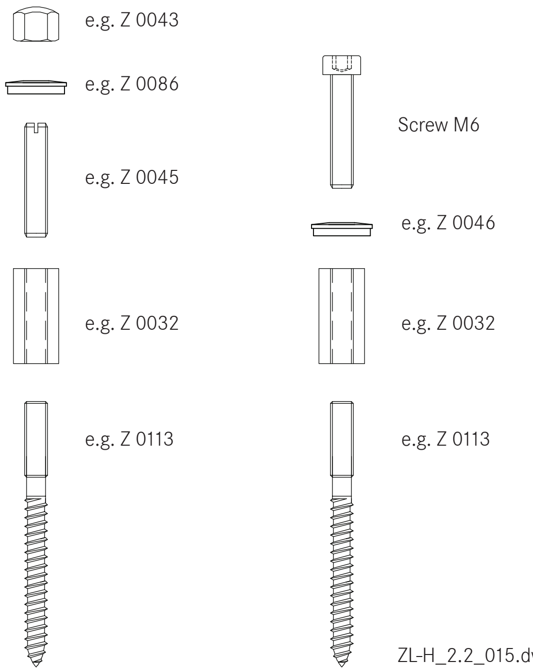
Visible recessed screw fittings

Hanger bolt M6 e.g. Z 0113;
Threaded socket M6 e.g. Z 0029;
Inner hexagonal screw M6 DIN 6912 and
PA washer Z 0033



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Note:

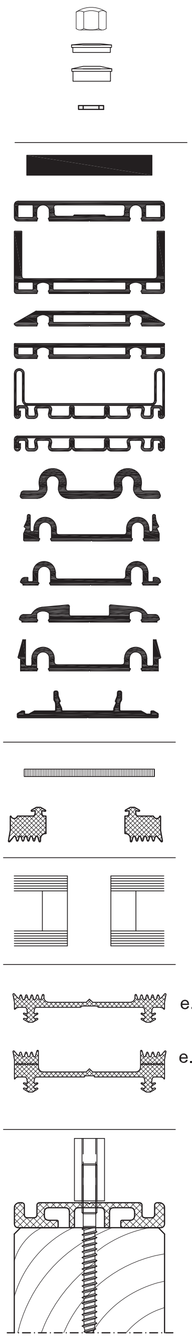
Direct application of screws is also possible. In this case the spacer strip must be appropriately pre-drilled.

According to DIN 6912:

- Screw M6
- Stainless steel 1.4301-A2
- Threaded to the head
- Ø 10 mm, ISK 5 mm
- Head height ≤ 5 mm

Screw fittings

Calculating the screw length

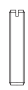


System width 60 mm		System width 80 mm		
cap nut	7,0 mm			
sealing washer Z 0046	2,5 mm			
sealing washer Z 0086	4,0 mm	sealing washer	4,0 mm	mm
PA washer (*)	1,5 mm	PA washer	1,5 mm	
				+
Z 0020	8,0 mm			
DL 5059 / DL 6059 (*)	(2,5) 8,0 mm	DL 8059	(3,5) 8,0 mm	
DL 5061 / DL 6061 (*)	(1,5) 6,0 mm	DL 8061 (*)	(2,0) 7,0 mm	
DL 5067 / DL 6067 (*)	(1,5) 6,0 mm	DL 8067 (*)	(2,0) 7,0 mm	
DL 5071 / DL 6071 (*)	(1,5) 6,0 mm	DL 8071 (*)	(2,0) 7,0 mm	
DL 6044	6,0 mm			mm
DL 6043	6,0 mm			
UL 5110 / UL 6110	3,0 mm	UL 8110	3,0 mm	
UL 6009	2,5 mm	UL 8009	3,5 mm	
UL 5009	2,5 mm			
UL 6005	2,5 mm	UL 8005	3,5 mm	
UL 6007 / UL 6008	2,5 mm	UL 8007 / UL 8008	3,5 mm	
UL 6003	2,5 mm	UL 8003	3,5 mm	
				+
The thickness of the outer seal can be found in the list on catalog pages 14 and 15. GD 5009 e.g. 3 mm or GD 1940 e.g. 10 mm.				mm
				+
Glas thickness				mm
				+
e.g. GD 5025 / GD 6025 / GD 5030 GD 6030	5,0 mm	e.g. GD 8025 / GD 8030	5,0 mm	mm
e.g. GD 5033 GD 6033	10,0 mm	e.g. GD 8033	10,0 mm	
				-
at 5 mm facade seal	-12 mm			mm
at 10 mm facade seal	-5 mm			
				=

(*) For visible recessed screw fittings PA-washers have to be used. The values in ( ) must be considered for the calculation of the screw length.

The use of a glas thickness < 22 mm within facade and roof has to be checked!

mm = Screw length



Result has to be round down to the next five-part division

Representation and item numbers are examples for System 60. System width 50 are analogous.

1) Use the cap nut without sealing washer for wooden pressure profiles

2) Delivered upon request

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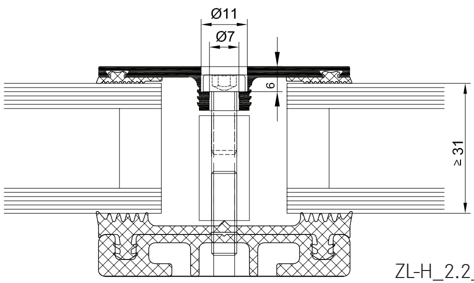
Screw fittings

Calculating the screw length



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Attention!

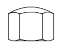
The calculation to determine screw lengths for the special cover profiles DL 5073 / DL 6073 is:

Glass thickness - 14 mm with facade seal (5 mm)
Glass thickness - 9 mm with facade seal (10 mm)
Glass thickness - 7 mm with facade seal (12 mm)

Screw fittings

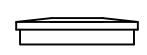
System screws for Stabalux ZL-H

Cap nut



Z0043	Cap nut Stainless steel M6	

Sealing washers

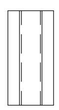


Z0046	U Washer stainless steel	with 2 mm seal
Z0086	U Washer stainless steel	with 4 mm seal

Threaded bolts

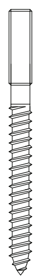
Z0034	threaded bolt stainless steel	M6 x 20 mm
Z0038	threaded bolt stainless steel	M6 x 25 mm
Z0035	threaded bolt stainless steel	M6 x 30 mm
Z0040	threaded bolt stainless steel	M6 x 35 mm
Z0036	threaded bolt stainless steel	M6 x 40 mm
Z0037	threaded bolt stainless steel	M6 x 50 mm
Z0044	threaded bolt stainless steel	M6 x 60 mm
Z0045	threaded bolt stainless steel	M6 x 75 mm
Z0039	threaded bolt stainless steel	M6 x 90 mm
Z0053	threaded bolt stainless steel	M6 x 100 mm
Z0054	threaded bolt stainless steel	M6 x 120 mm

Threaded sockets



Z0029	threaded socket stainless steel	M6 x 25 mm
Z0032	threaded socket stainless steel	M6 x 25 mm

Hanger bolts



Z0113	hanger bolts stainless steel	M6 x 70 mm

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Flat cover profile DL 5073 / DL 6073

Tips for laying cover profiles DL 5073 / DL 6073

We assume that this cover profile will be used with glass panes that are supported on two sides and the recessed screw head is concealed. In this case, a cylinder head screw with inner hex is to be used (e.g. M6 DIN 6912 stainless steel A2 with low head). When covering with a 2 mm cover plug Z 0089, a bore depth of 6 mm is calculated.

Depending on the precision of the bore, it should be decided on case by case basis if any slight changes to this depth are necessary. The cover plug Z 0089 does not need to be glued in place, but may be levelled using levelling compound.

Coating the cover profile

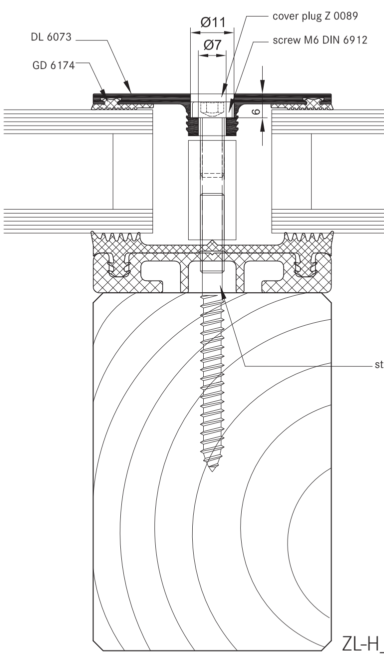
Profile production (aluminium extrusion moulding) with different mass distribution is extremely difficult. Lengthwise shadow formation may result. Resulting actions are to be taken with the agreement of the coater.

Intersections

Due to the special shape of the strip (the material extends into the rebate), there is no closed sealing section available at intersections. We therefore recommend placing particular attention to ensure tightness of the joints and fill will Stabalux connecting paste Z 0094.

Glass supports/blocking

Special attention should be given to dimensional proportions. To support the outer pane, a sufficiently large glazing block must be installed that can carry the load to safely ensure the glass load is distributed effectively.



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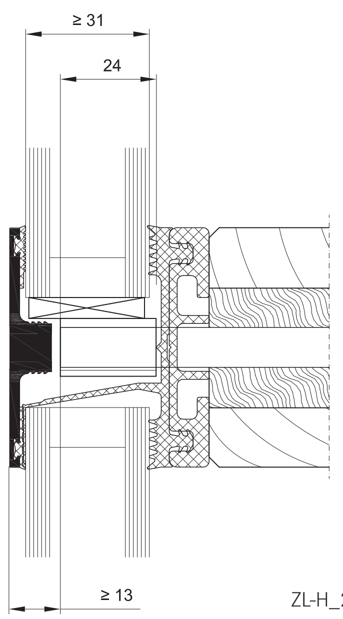

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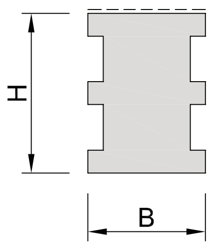
Slab insulation

Using slab insulation

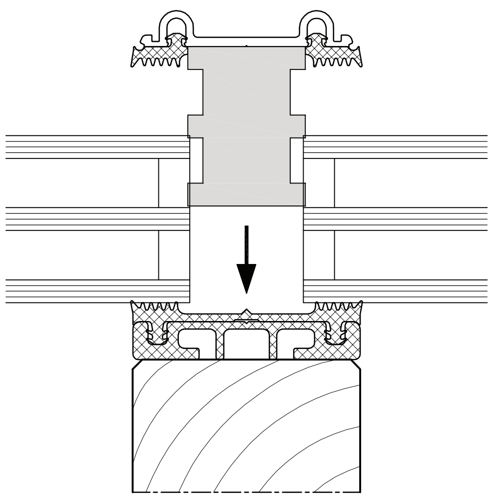
- Using slab insulation significantly reduces heat dissipation.
- The highly effective insulation blocks have a permanently adhesive HOT-MELT.
- Depending on the situation where they are used, slab insulation can be directly applied to the cover profile/pressure profile (direct screw fittings recommended), or cut into the screw locations, placed into the rebate over the screw fittings and pushed into position using the cover profile/pressure profile.

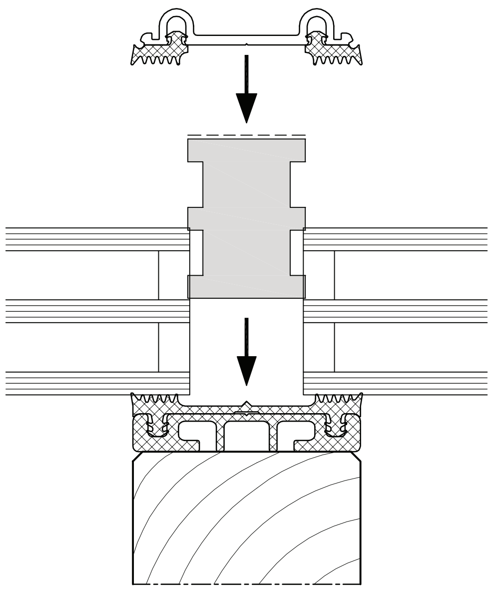
Note:

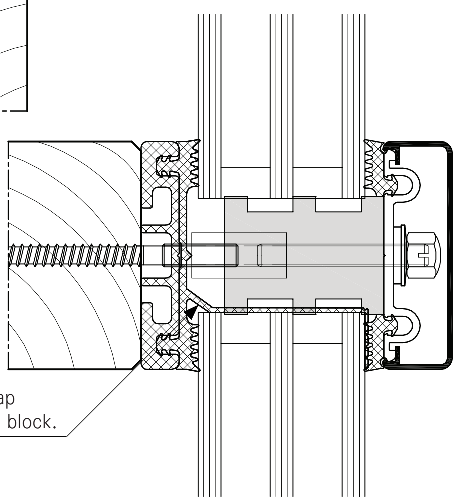
- The use of slab insulation with cover profiles DL 5073 / DL 6073 should be tested for each individual situation.
- With system width 80 mm and a 40 mm rebate 2 x 20 mm wide slab insulation blocks can be combined (40 mm wide insulation blocks available upon request).
- 2-piece outer seals are always used with slab insulation blocks:
- for a glass inset of 15 mm, outer seal **GD 1932**
- for a glass inset of 20 mm, outer seal **GD 1932**



Slab insulation block	Width (Rebate)	Height
Z 0605 slab insulation 20/42	20 mm	42 mm, glass thickness from 44 mm
Z 0606 slab insulation 20/26	20 mm	26 mm, glass thickness from 28 mm
Z 0607 slab insulation 30/42	30 mm	42 mm, glass thickness from 44 mm
Z 0608 slab insulation 30/26	30 mm	26 mm, glass thickness from 28 mm







Correctly position the seal flap
when installing the insulation block.

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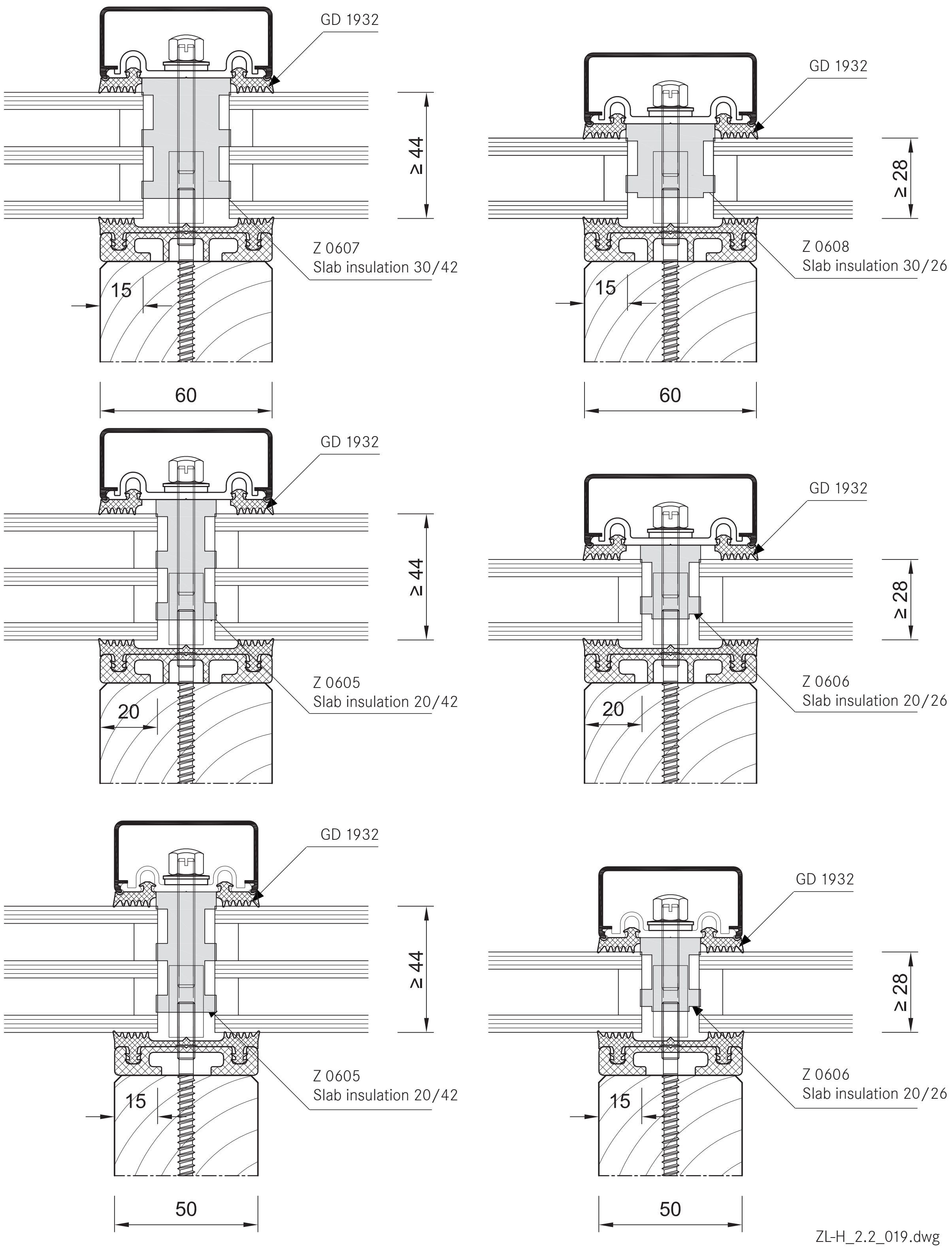
Slab insulation

Examples:



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Pane support variants

Special design

Glass structures that partially refrain from using visible cover profiles are considered special designs.

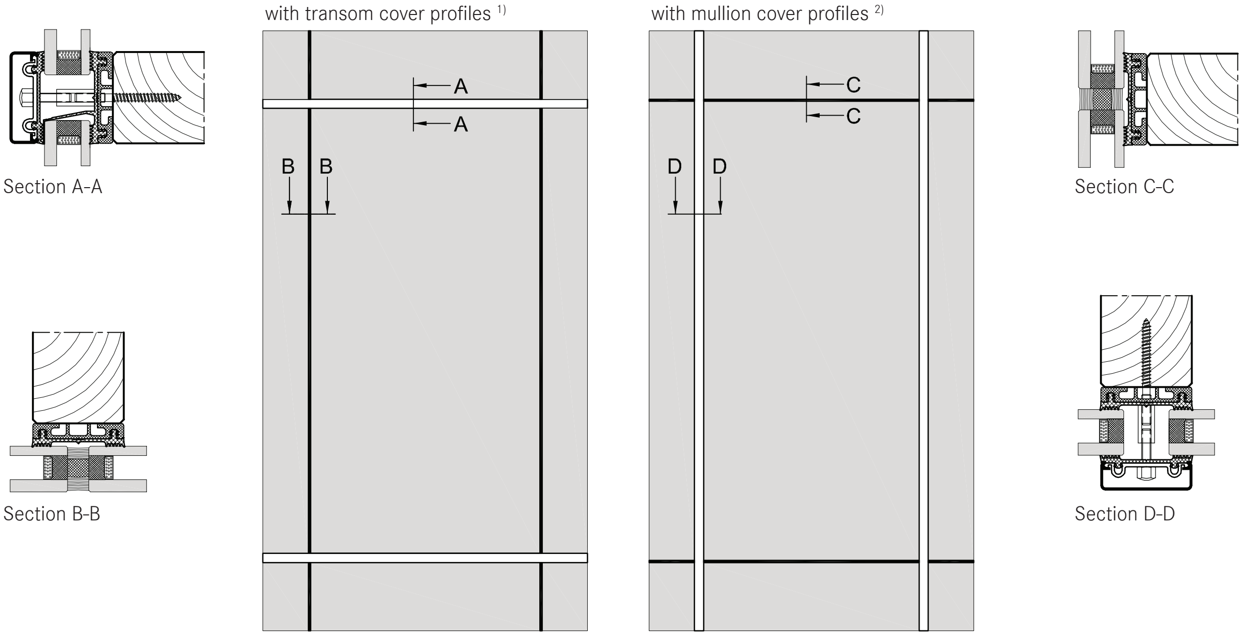
These designs do not conform to the intended uses of the system. No guarantees are made for e.g. quality of seals, durability and structural stability. Responsibility here lies entirely with the company implementing the design.

Based on our experience we recommend paying close attention to the points made on the following pages during planning and implementation.

Mullion-transom structure, 2-sided cover profile

Mullion-transom structure with transom cover profiles [1)]

Mullion-transom structure with mullion cover profiles [2)]



[1)] Seals with 1, 2 or 3 sections are possible

[2)] Use of mullion seals with 1 section in mullions and transoms

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Pane support variants

Vapour seal:

When using this type of structure, it is important to be aware that any loss of contact pressure can affect the room-side permeability. There is an increased risk of condensation build up in the rebate.

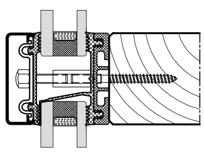
vertical clamping strips:

The glass supports should be placed to below the outer pane and sealed with it.

horizontal clamping strips:

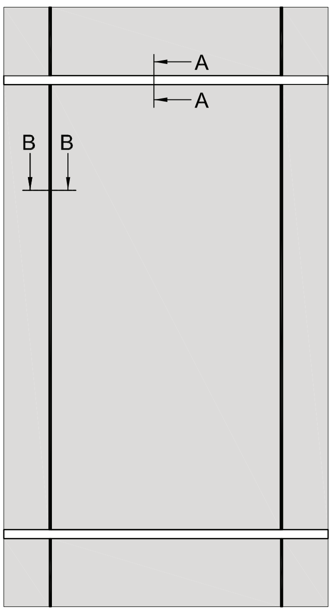
Ventilation and condensation drainage is achieved via a recess in the lower sealing lip in the centre of the outer seal or at one third intervals.

Transom structure, mullion structure
2-sided cover profile

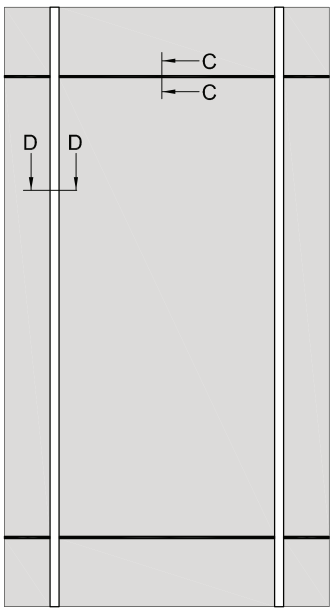


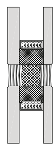
Section A-A

Transom structure

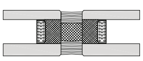


Mullion structure

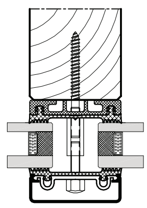




Section C-C



Section B-B



Section D-D

ZL-H_2.3_024.dwg

Pane support variants

Requirements for special designs

1 Vapour seal

The room-side level of glazing must have the best possible vapour seal. In this regard, the vapour diffusion properties of the silicone sealant to be used should be tested. Ensure that there are no permeable areas around concave cross joints.

2 Rebate ventilation, pressure equalisation and condensation drainage

Systems with partially sealed rebate represent a limitation to rebate ventilation. Check on a case-by-case basis that no damage will be caused by standing condensation. It is especially critical that designs with sealed vertical joints are evaluated. To allow ventilation of the horizontal rebate we recommend installing a suitable vertical ventilation space. Alternatively, ventilation can be achieved using the outer joints.

3 Weatherproofing

The outward facing seals must be watertight. In cross joints, it is especially important to ensure a firm join between the Stabalux profile seal and the silicone joints. We recommend sealing up to the outer edge of the glass before mounting the cover profiles.
We would like to once again emphasise that our profile seals will not make a permanent bond with commonly used silicone sealants. A seal can only be created at contact points through permanent application of pressure.

4 Mechanical strength screw fittings

Ensure screw fittings are sufficiently planned for. Special attention should be given to the effects of wind suction and the reduced support.

5 Glass weight distribution

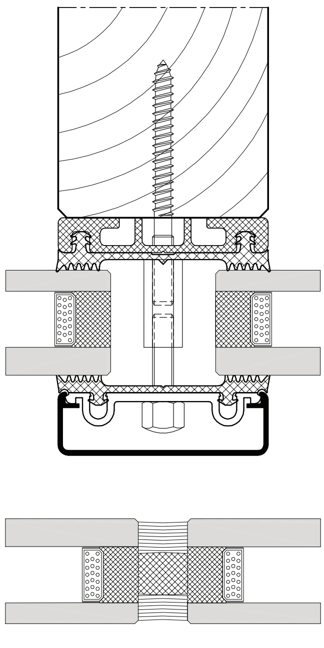
Mechanical distribution of the weight of the glass panes through the structure must be ensured. System glass supports can be used for existing horizontal transoms. Designs using “only” mullions require special glass supports which carry the weight of the glass directly into the mullions.

6 Glass sizing

Attention should be given to the reduced support of panes when dimensioning the glass. For example, only the vertical or horizontal cover profiles are effective in the event of wind suction stresses or stress on the fall protection.

7 Material compatibility

Compatibility of the silicone sealants with our profile sealants and the edge bonding of the glass must be ensured. We recommend the exclusive use of tested silicone sealants from the whole-glass facades sector. Approval is usually given by the silicone manufacturer.

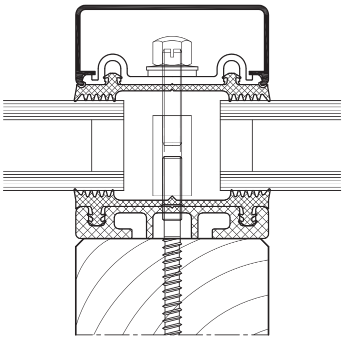


ZL-H_2.3_024.dwg

System cross sections

Examples:

1



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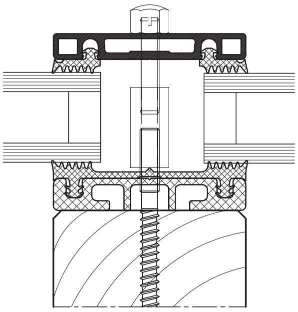

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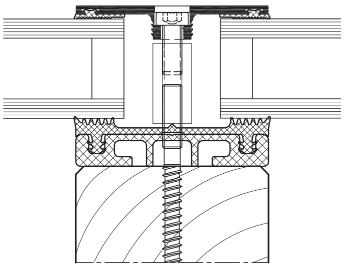

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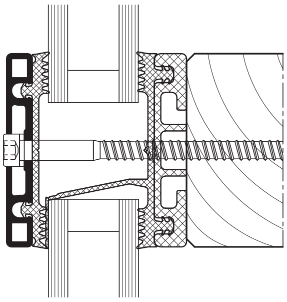

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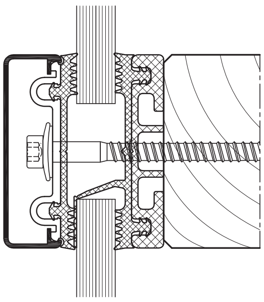

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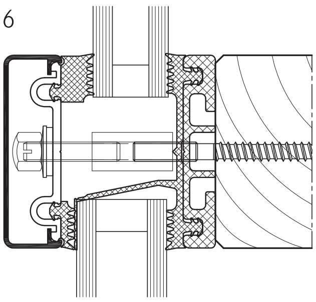

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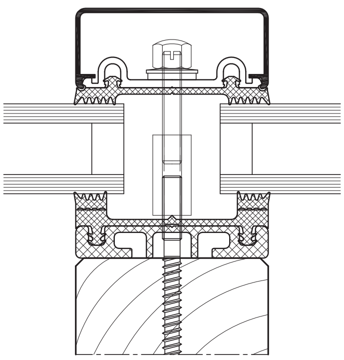

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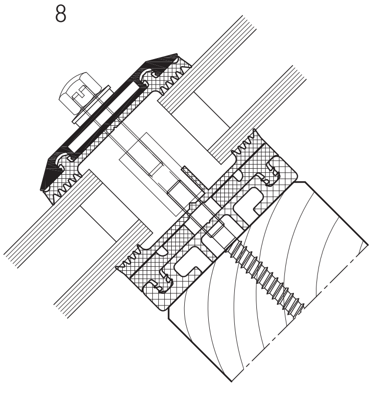


1 Vertical glazing, mullions
concealed screw fittings

2 Vertical glazing, mullions
visible screw fittings

3 Vertical glazing, mullions
Flat cover profile DL 5073 / DL 6073

4 Vertical glazing, transoms
visible recessed screw fittings

5 Vertical glazing, transoms
concealed screw fittings
Single glazing
Direct screw fittings

6 Vertical glazing, transoms
concealed screw fittings
Outer seal for height compensation

7 Inclined glazing, mullions
concealed screw fittings

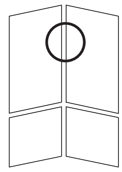
8 Inclined glazing, transoms
visible screw fittings

ZL-H_2.3_001.dwg

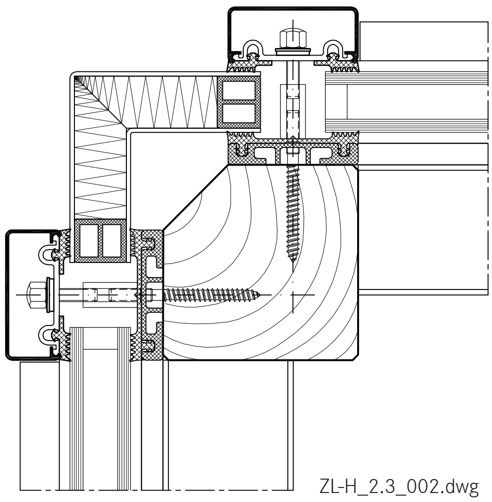
System details

Creating facade corners

At exposed areas such as glass facade corners, consideration must be made to ensure sufficient heat insulation in order to avoid the creation of thermal bridges and prevent condensation build up. Thermal current calculations provide information about the actual heat loss.



Outer corner



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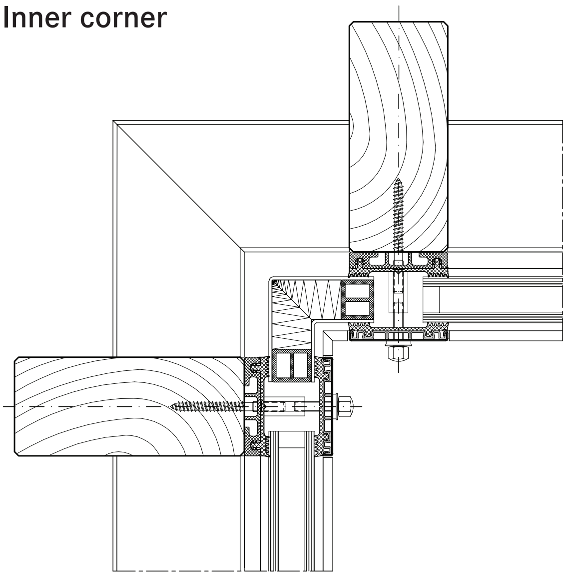
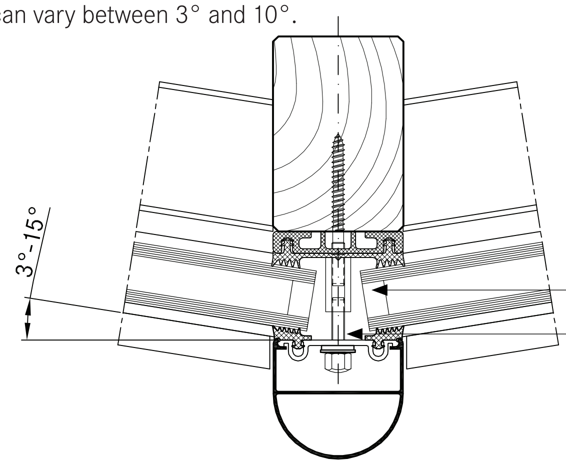
Inner corner



ZL-H_2.3_003.dwg

Facade polygon

Special seal allow a polygon shaped arrangement of the facade mullions. For convex glass surfaces an angle between 3° and 15° can be freely chosen. For concave glass surfaces the angle can vary between 3° and 10°.

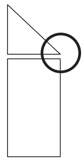


ATTENTION!
Observe the minimum glass inset!
Geometrically check the feasibility.
Recommendation: Use System 60 at minimum

Determine the threaded bolt length using the angle!

ZL-H_2.3_004.dwg

System details



Eaves with glass roof connection

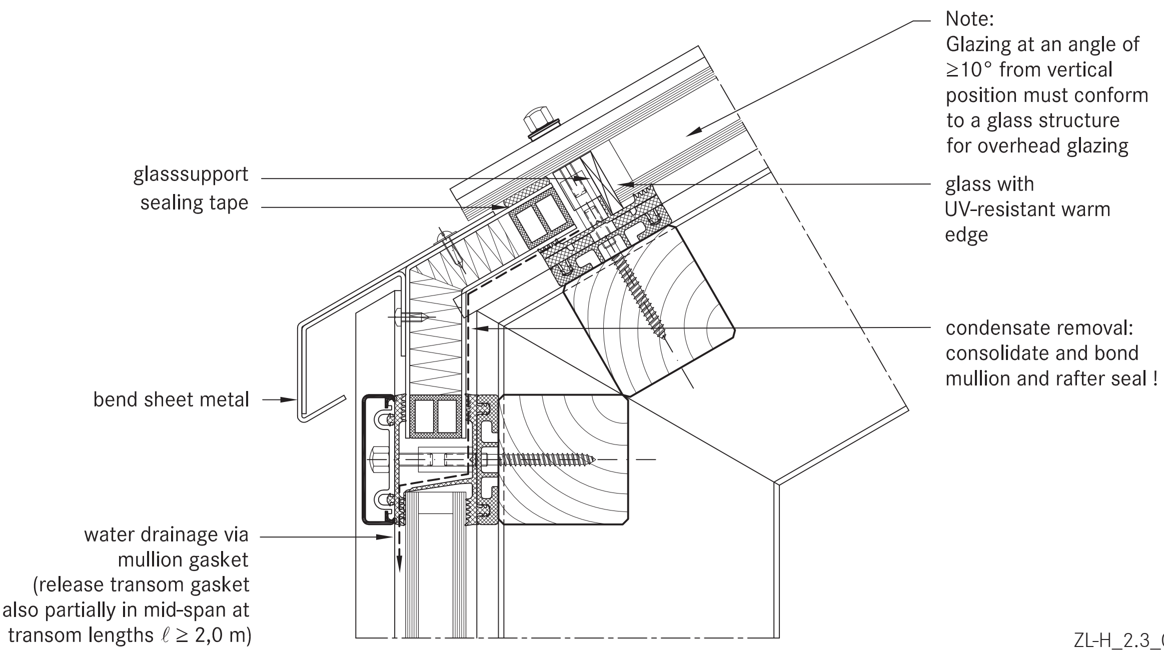
- Depending on the construction of the transoms, a design with or without rain gutters and the choice of stepped glazing or closable cover profiles gives us different variants for implementation.
- All options require condensation and moisture to be drained away at the eaves.

Design with stepped glazing

- With a stepped glazing design it is important to select a UV-resistant edge bonding for the glass. This edge bonding systems, usually silicone-based, are quite permeable to gases and are therefore unable to achieve the required high values for sound and heat insulation of conventional systems and require additional sealing around the edges.
- Our thermal calculations show that stepped glass panes, compared to covered glass edges, have a much less favourable isothermal movement.
- Stepped glass panes must also be statically measured according to their reduced hold against wind suction.
- The additional thermal loads that occur in stepped glass panes should countered by the use of pre-tensioned glass (TVG, ESG) for the outer panes.
- Stepped glass panes should be preferred for flatter inclined roofs as water can drain away at the eaves unhindered.

Example 1:

Design with stepped glazing



ZL-H_2.3_005.dwg

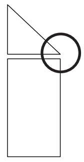
System details

Eaves with glass roof connection
Design using cover profiles

- Horizontal pressure strips prevent the free run off of rain water and dirt.
- Cover strips with angled edges reduce the build up of water in front of the cover profile.
- The outer sealing level on glass roofs must also be thoroughly sealed.
- In combination with our butyl clad stainless steel panels, glazing with pressure strips on 4 sides achieves a higher level of safety.
- Make sure that the inner sealing section provides guaranteed drainage for condensation.
- To improve drainage and heat-induced expansion, cover profiles should be shortened by 5 mm at transom joints. Gasket joints, however, are to be laid flat with a slight excess in dimensions. Open ends of the transom cover profiles must be sealed.

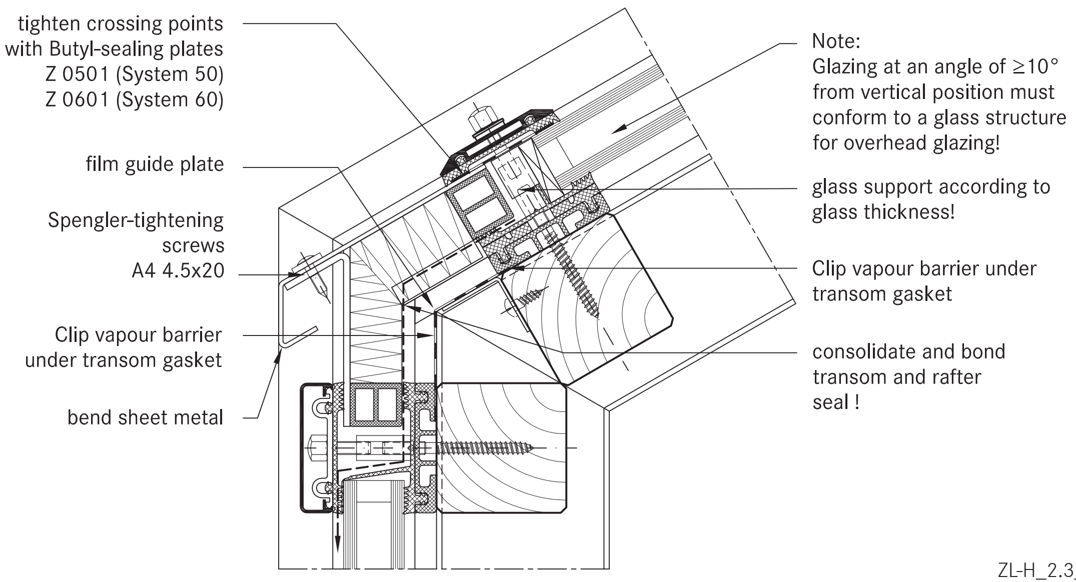
Note:

Due to the increased thermal stresses in the roof, we recommend using concealed screw fitting when choosing clamping strips for larger system lengths and in rafters. Unused holes in the pressure profile must be sealed.



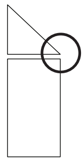
Example 2:

Design using cover profiles



ZL-H_2.3_006.dwg

System details

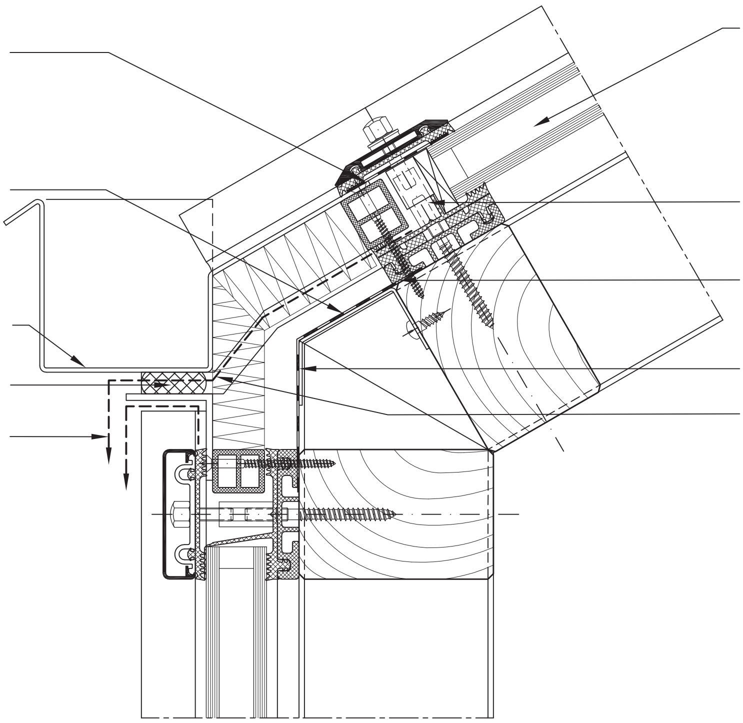


Eaves with glass roof connection
Design with gutter

- The gutter must be able to take its own weight and mounted in such a way that stresses from its own weight, water and ice will not lead to deformations and directly apply a load to the glazing.
- Overflowing water must not be able to get inside the structure. Alongside the gutter-shaped outer rafter seal, the moisture barrier installed over the guide plate also acts to drain away condensation.

Example 3:

Design with gutter



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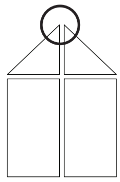
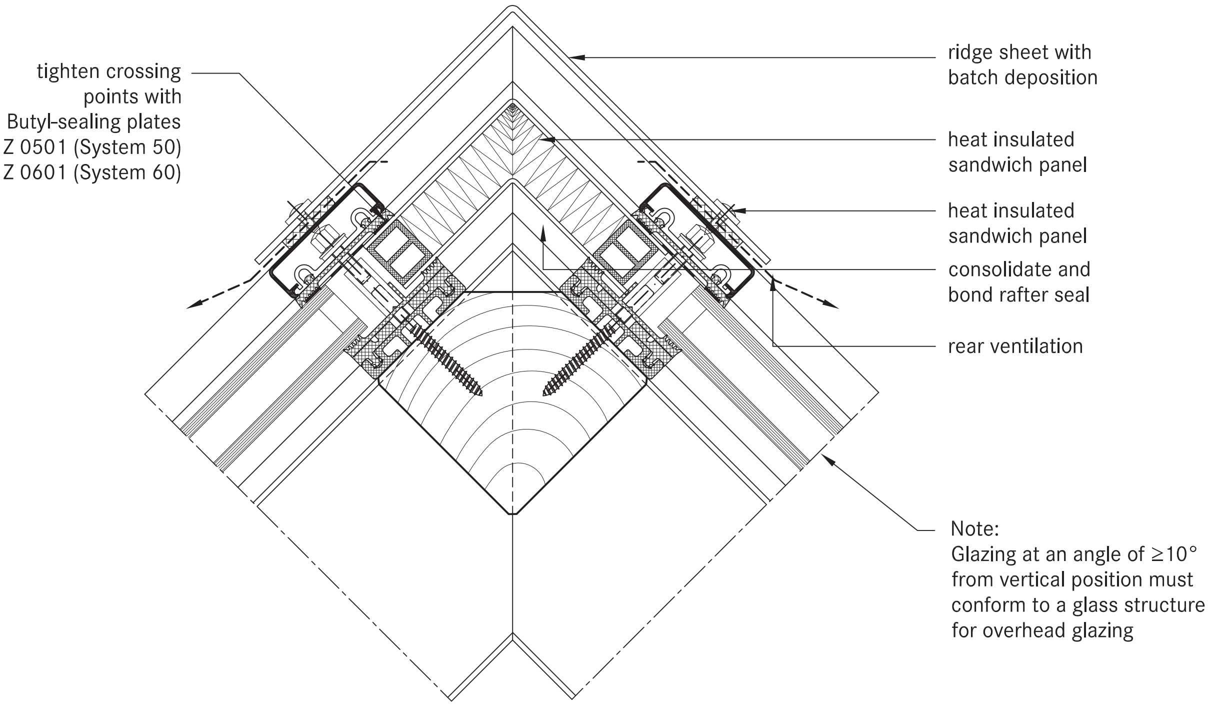
System details

Roof ridge design

- When designing the ridge cap, ensure that the rafter cover profiles are pulled under the ridge cap.





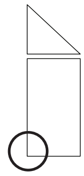
ZL-H_2.3_008.dwg

Structural attachments

Structural attachment film baffles

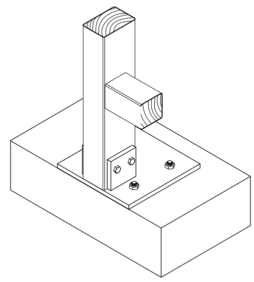
- Attachment of glazing to the building structure requires a well thought out approach.
- Moisture damage can occur if moisture condenses at any thermal bridges.
- Thermal bridges must be avoided and warm air from the inside spaces must not penetrate too deeply into the structure.
- The required moisture barriers must be installed as deeply as possible into the inner space using impermeable structural film baffles. This prevents moisture penetration into the structure via condensation from the air inside.
- An additional foil to seal against rainwater must be permeable to moisture. Only if this foil has a water vapour diffusion resistance value μ of max. μ = 3000 can a dry structure be guaranteed in the transition zones.

Structural attachments



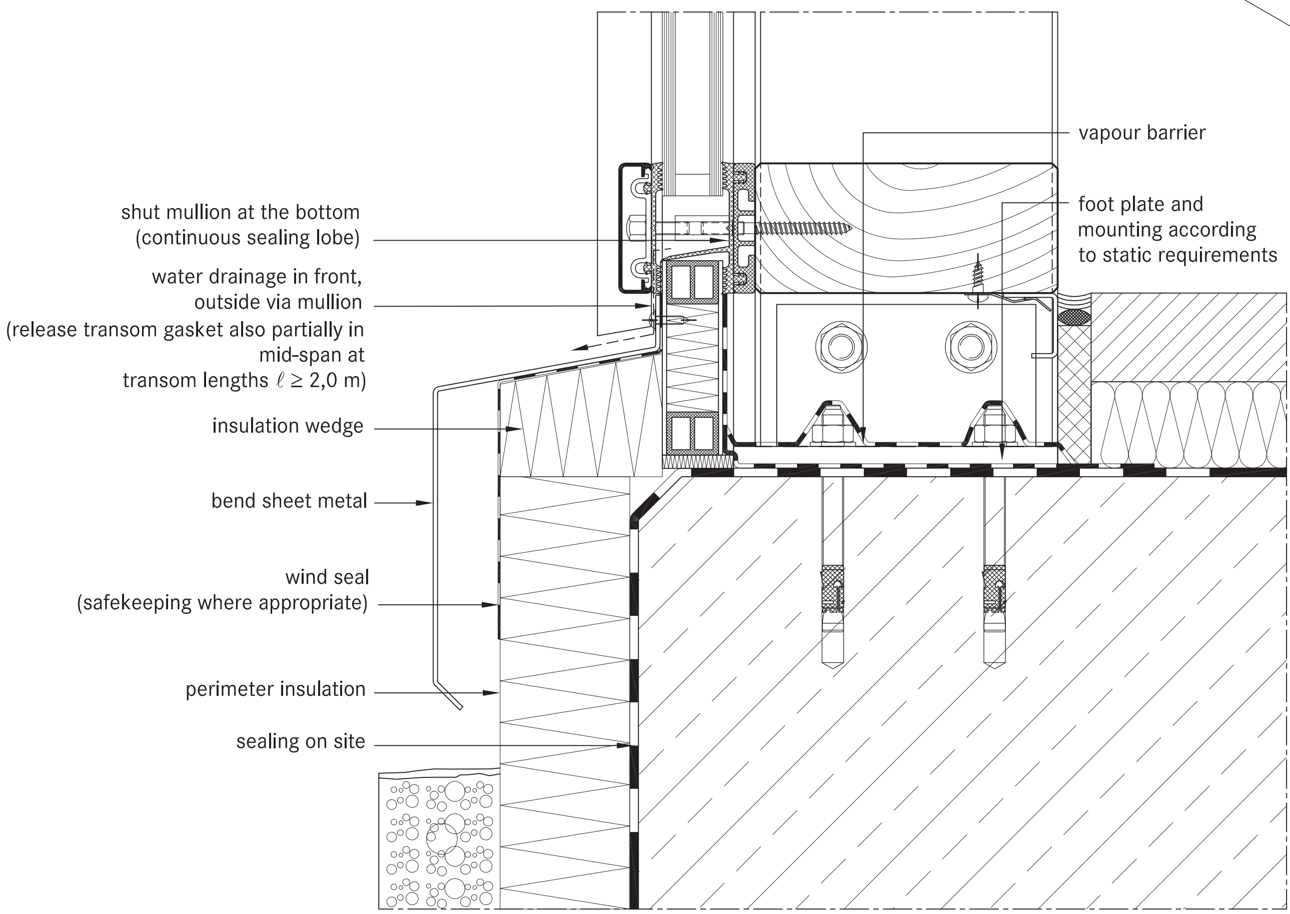
Facade base

- Controlled drainage of the rebate space can only be ensured if the sealing sections overlap in such a way that no moisture can get under the seals and foils.
- Run foils under the transom seal to act as a moisture barrier and glue to the steel structure. In accordance with DIN 18195 the seal should be run at least 150 mm above the water-guiding layer.
- Attach foil with moisture barrier in accordance with the requirements of DIN 18195.



Example 1:

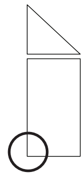
Mounting intermediate mullion to base plate



ZL-H_2.3_009.dwg

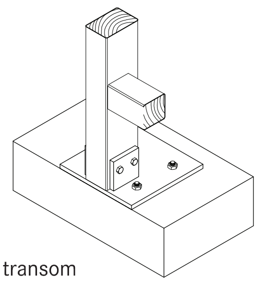
Drainage of the base area is achieved via the seal flap towards the outside. In this case the seal flap around the mullion at the base should not be released. For edge mullions, ensure there is a corresponding seal placed (continuous transom seal up the to the end point) and a constructive design of the drainage section.

Structural attachments



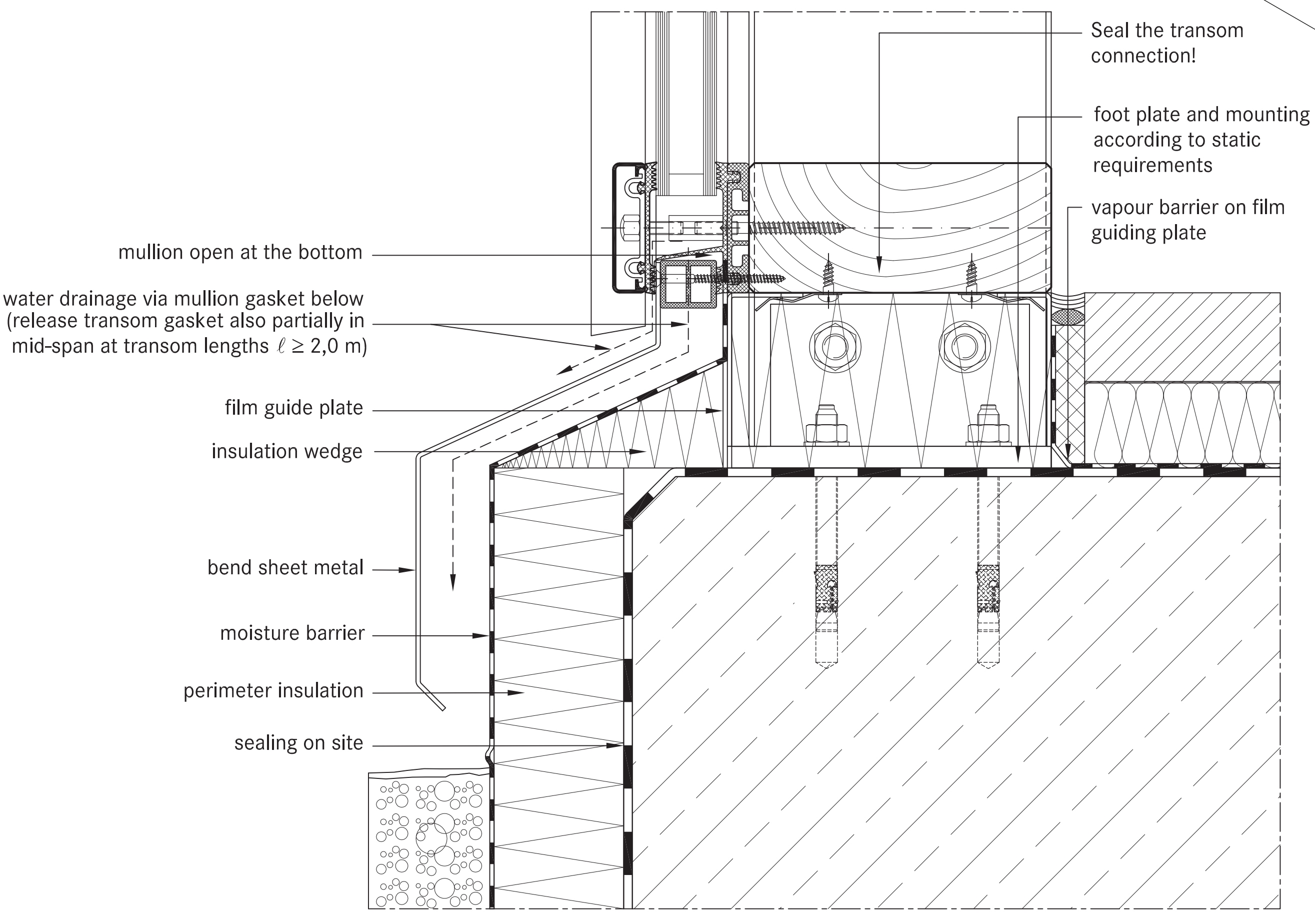
Facade base

- Rebate space ventilation is achieved via the open end of the vertical cover profiles.
- Ensure the connection is impermeable to vapour.
- Mullion mountings must be sufficiently statically dimensioned. Required centre and edge distances for anchoring with base plates and the building structure must be observed.



Example 2:

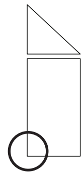
Mounting intermediate mullion to base plate



ZL-H_2.3_010.dwg

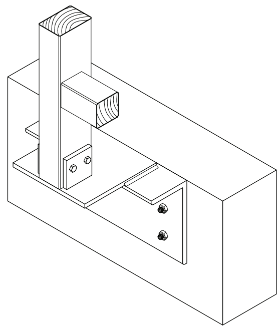
Where seal flaps are interrupted by joints, filler rods in the joint must also be cut.

Structural attachments



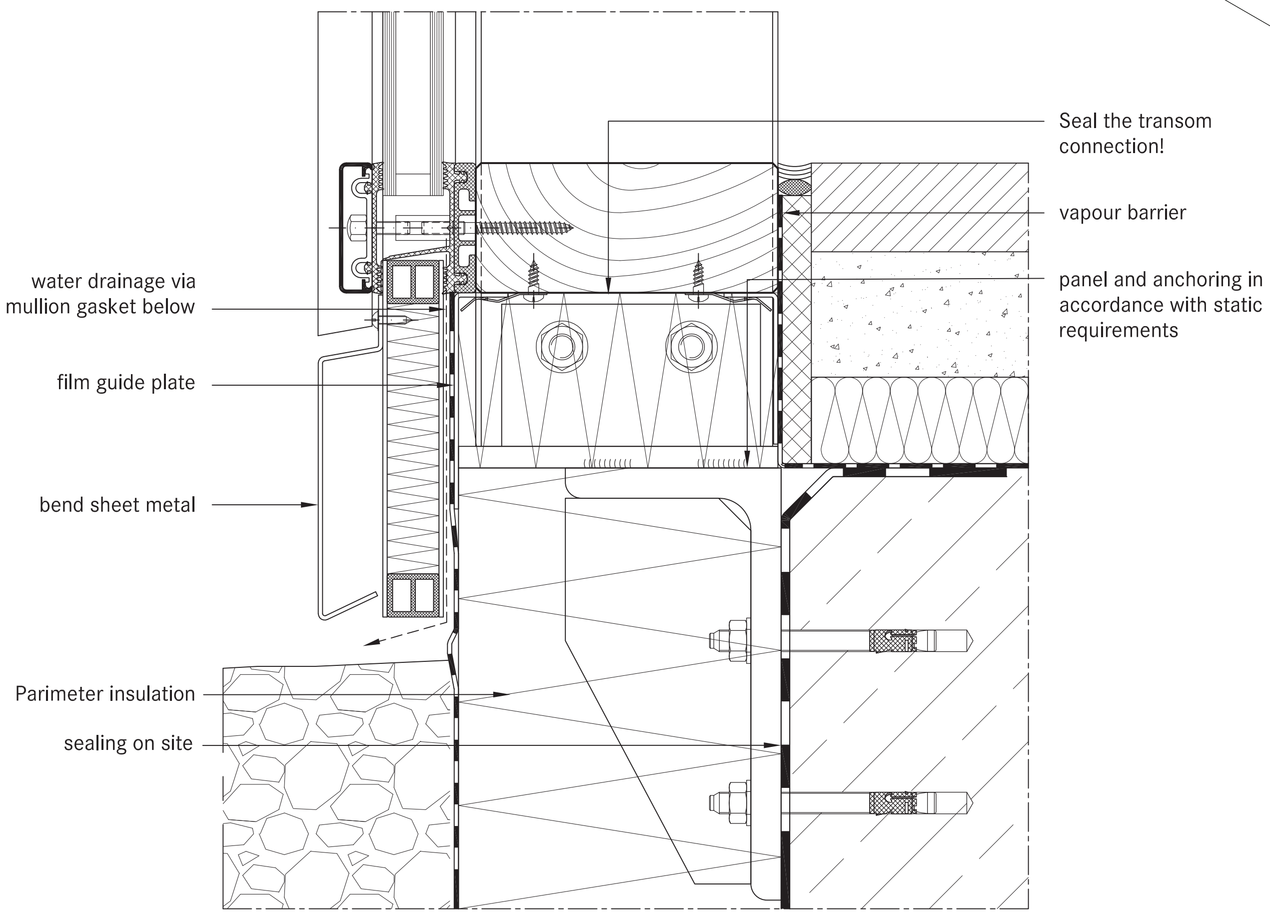
Facade base

- Heat insulation around the structural connection should be designed in such as way as to prevent cold bridges forming.
- Steel parts should also be provided with sufficient protection against corrosion even in concealed areas.
- Weather-protection sheets should be used depending on the requirements of the construction. Sufficient rear ventilation must be ensured.



Example 3:

Attaching intermediate mullions at base plates



ZL-H_2.3_011.dwg

Structural attachments

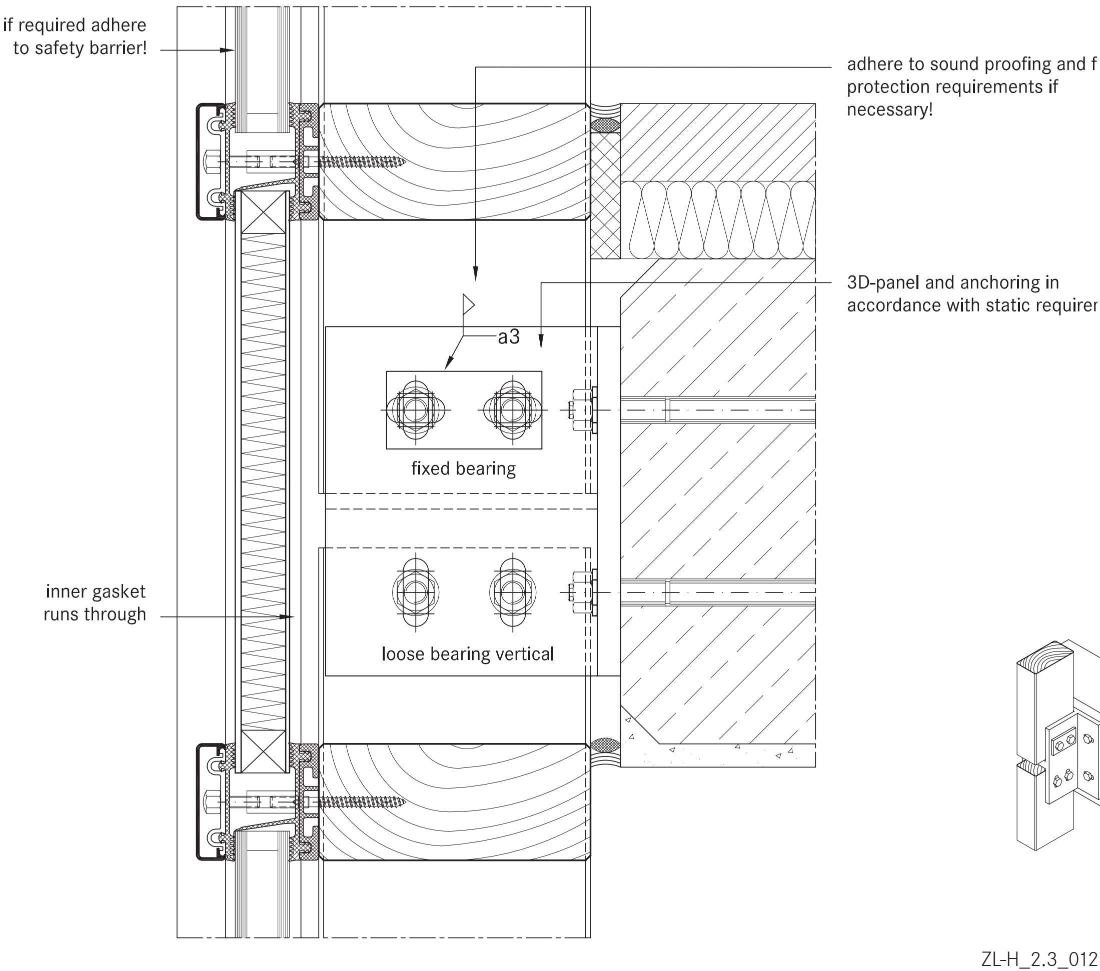
Connection before intermediate floors

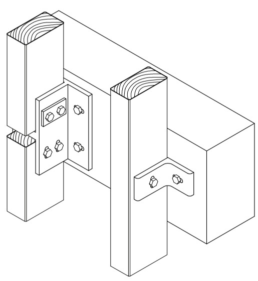
- Depending on requirements, mullions are designed as continuous multi-span transoms or separated at each floor.
- Reasons for separating mullions can include e.g. building settlement, fire protection, sound insulation, etc.
- If the separation joint is intended to absorb expansion, then as well as the required degree of freedom for mullions the ability for movement of integrated elements must also be ensured.
- The constructive design of the mullion joint and mounting should be chosen according to the statically calculated base system and determines the choice and arrangement of fixed and movable bearings, type of screw fittings, structural connection parts and attachment to the concrete floor.
- With continuous mullions and a corresponding mount the multi-span support principle is in effect. Sagging due to horizontal effects are lower. The required moment of inertia reduces for 2-span supports with the same span length compared to the 1-span support by a factor of 0.415. However, a tension and stability analysis should be carried out.

Example:

Mullions separated at each floor

In this example, distribution of horizontal and vertical loads is achieved at each floor through the existing floor structure.



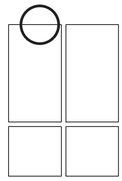


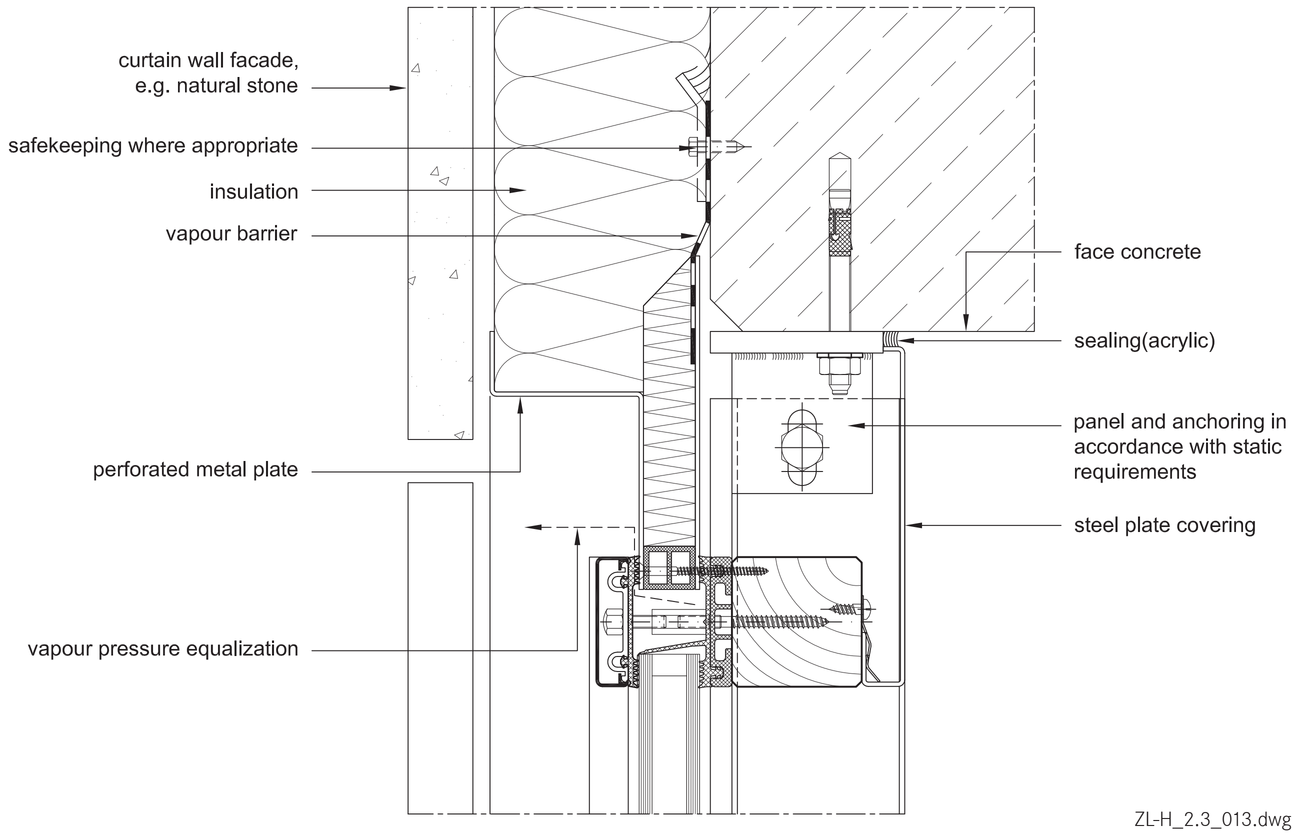
ZL-H_2.3_012.dwg

Structural attachments

Ceiling connection

- Structural connections should take account of any movement that may occur.
- As well as temperature induced expansion in the façade, all longitudinal expansions and movements of the affected components must be considered.
- Additional stresses from restraints must be avoided.





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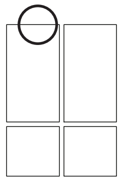
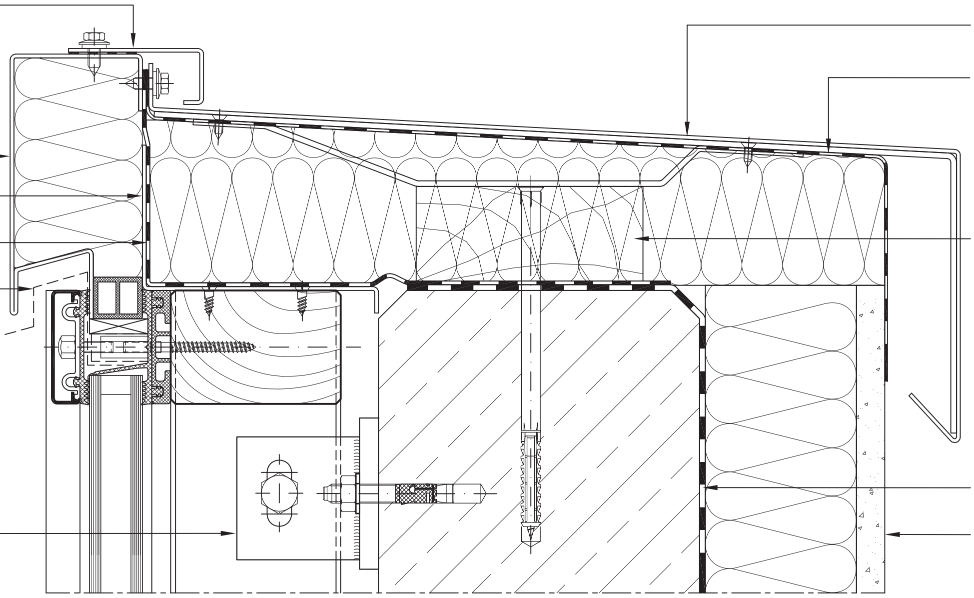
Structural attachments

2.3
4

Facade connection to parapets





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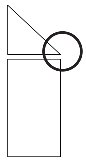
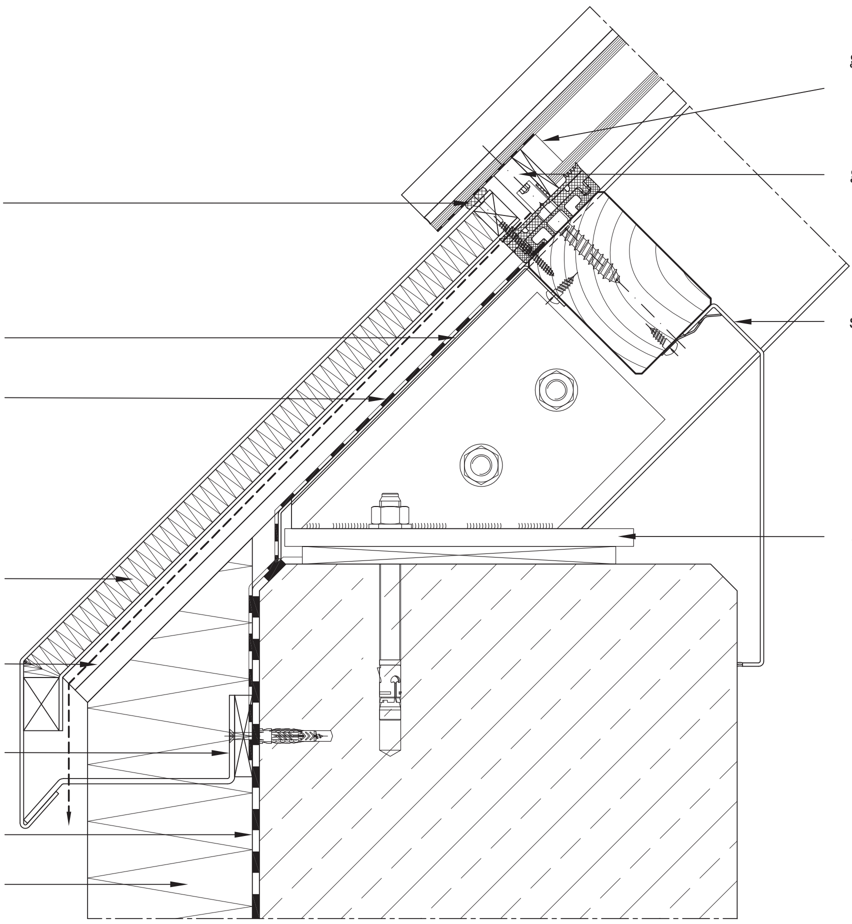
Structural attachments



Connecting to structural eaves

- This connection is suitable for glass roofs that are being installed as skylights in the structure. This may be gabled roofs, single pitch roofs, pyramids or arched roofs.

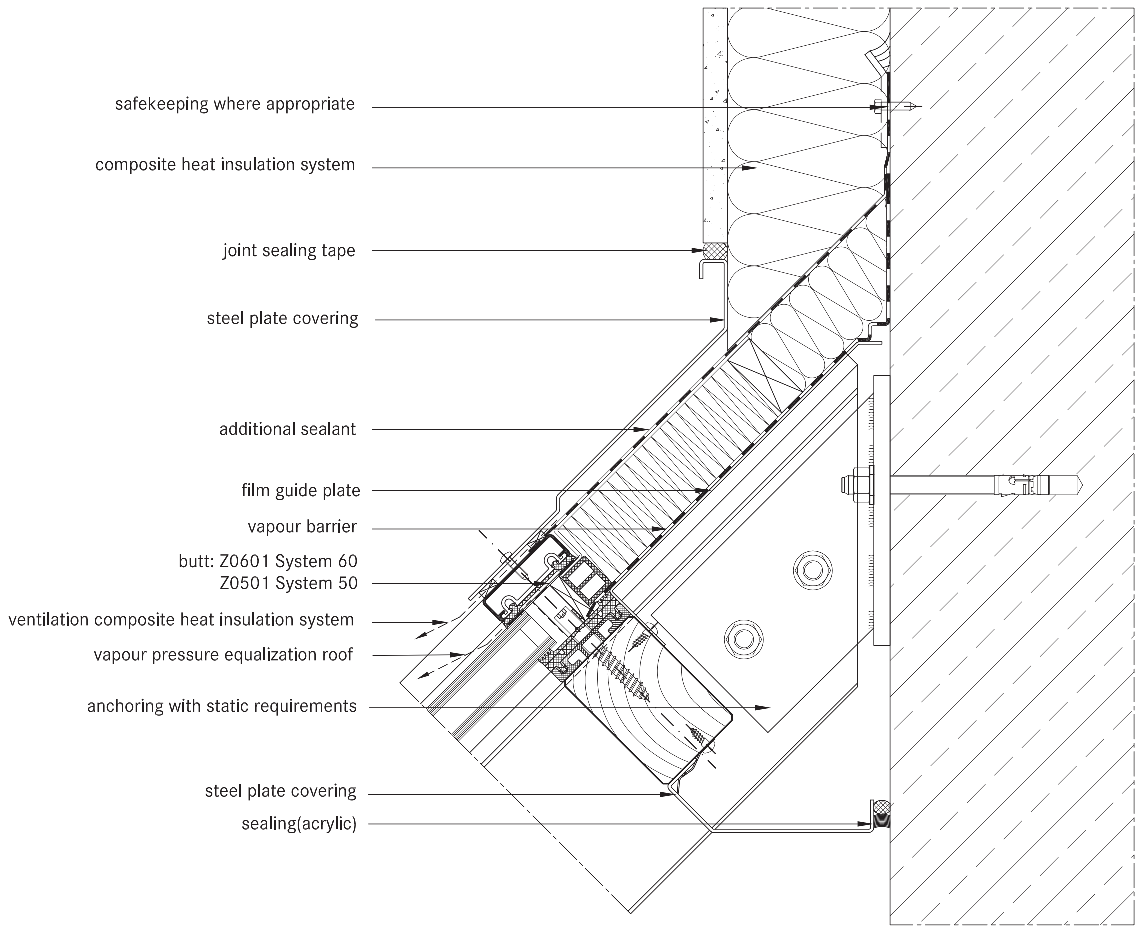


ZL-H_2.3_015.dwg

Structural attachments

Ridge connection to walls

- When making ridge connections to walls, permeability to moisture is particularly important. Warm air with a high level of moisture gets into cooler zones of the inner sealing section where the design is not sufficiently sealed and can cause structural damage from penetrating into the connecting structure.
- Joint seals made from butyl-clad stainless steel plates (Z 0501, Z 0601) must be installed on the outside of joint areas.

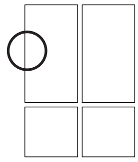


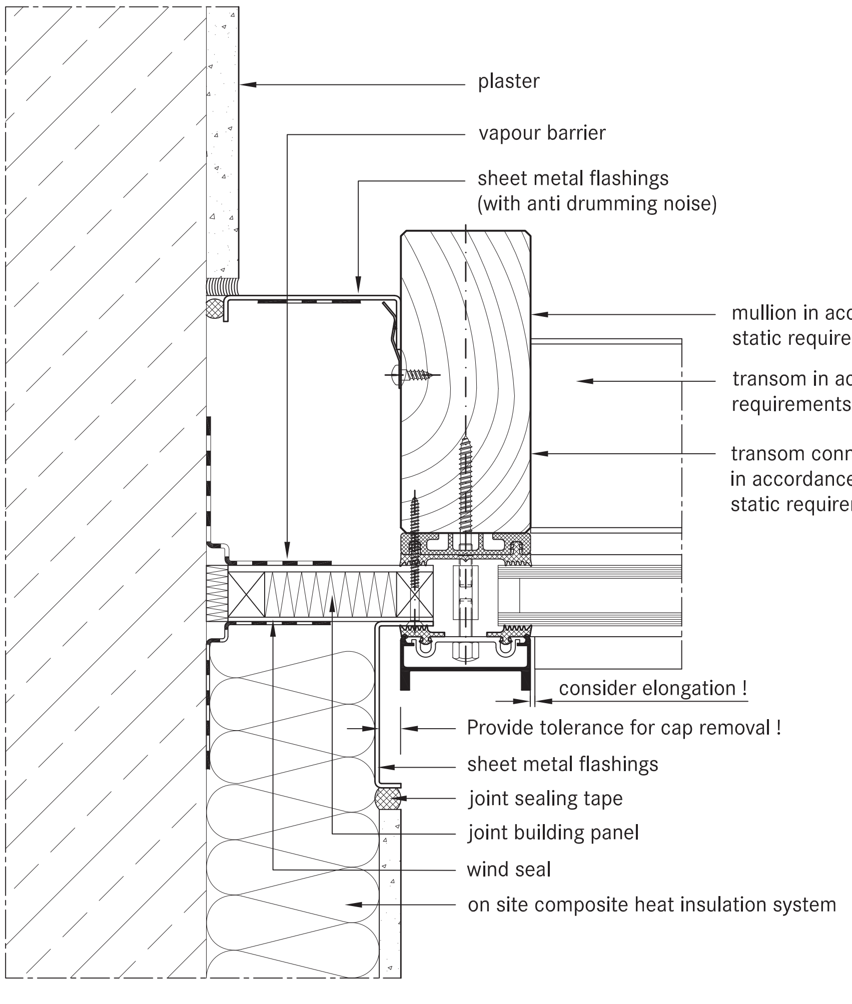
ZL-H_2.3_016.dwg

Structural attachments

2.3
4

Horizontal wall connection to heat insulation bonding system



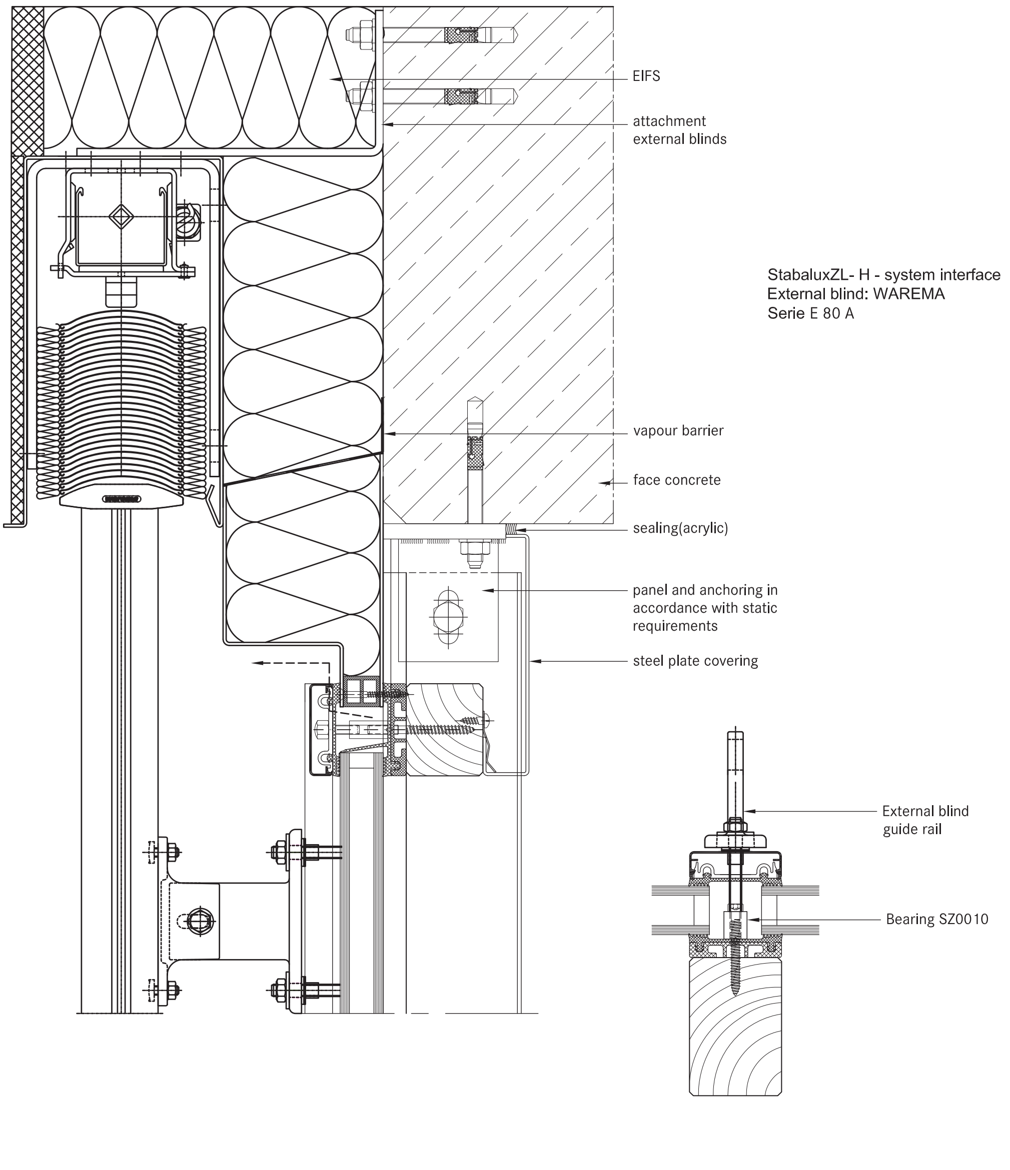


ZL-H_2.3_017.dwg

Structural attachments

2.3
4

Ceiling connection including WAREMA external blinds



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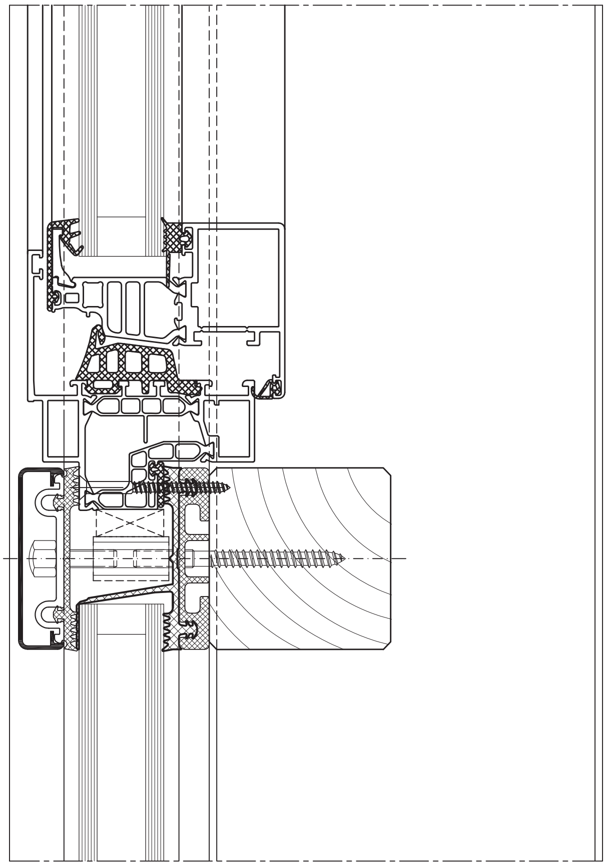
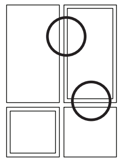
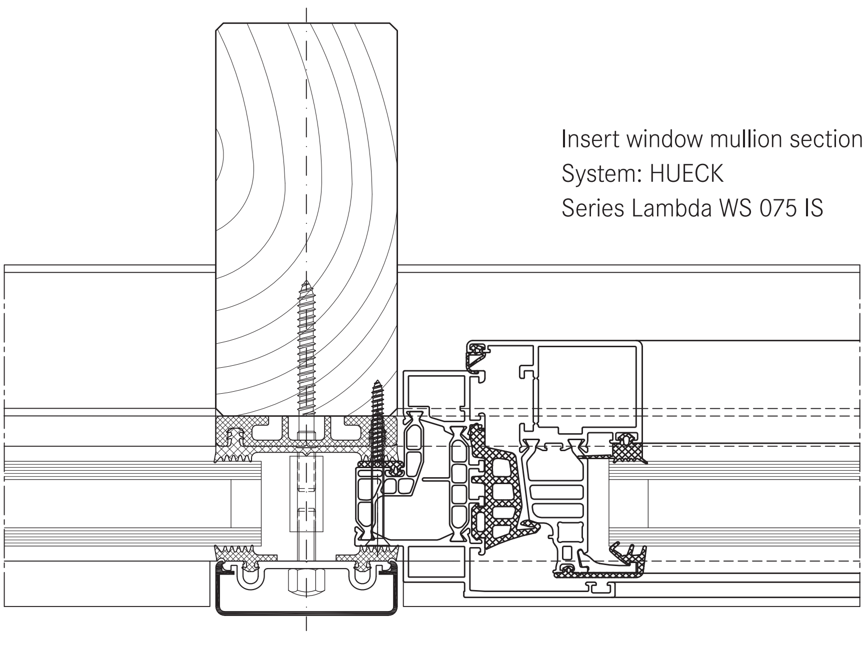
Installing windows and doors



Insert window transom section
System: HUECK
Series Lambda WS 075 IS



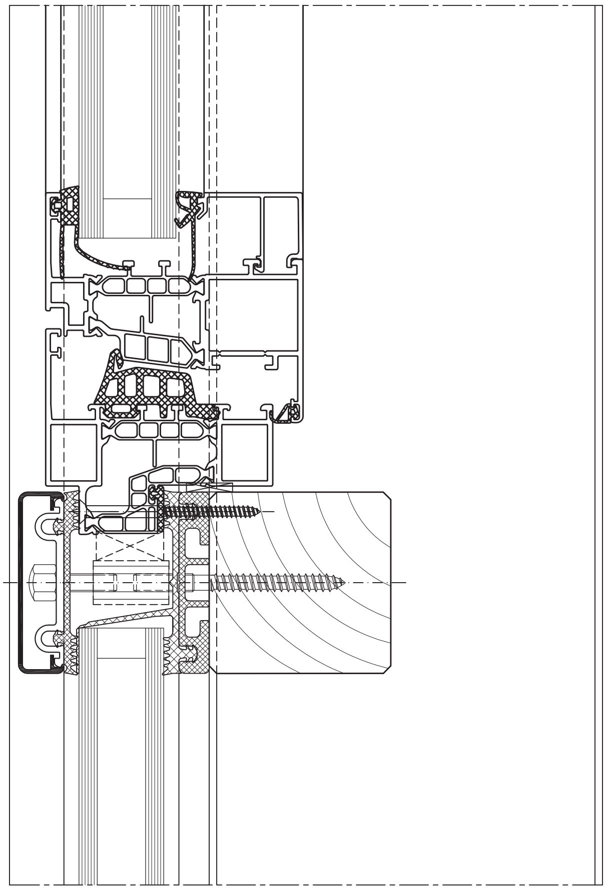
Mullion and transom facades and glass roofs from Stabalux are neutral with regards to the selection of insert elements. All commonly available window and door systems made from steel, aluminium, wood or plastic can be used. Frame profiles from the window and door manufacturer's should be selected to match the chosen glass thickness. If no profiles with a suitable insert rebate are available, mountings may be used as shown in the following examples. Like with glass elements, windows are set into the facade on glass supports, padded and then secured against slippage.



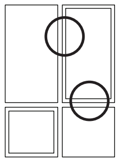
Insert window mullion section
System: HUECK
Series Lambda WS 075 IS

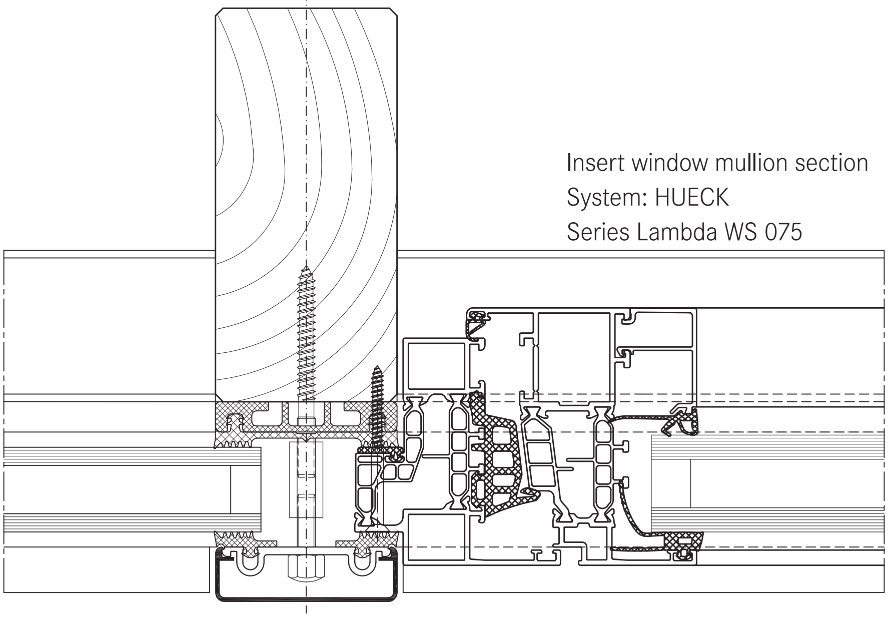
ZL-H_2.3_018.dwg

Installing windows and doors



Insert window transom section
System: HUECK
Series Lambda WS 075

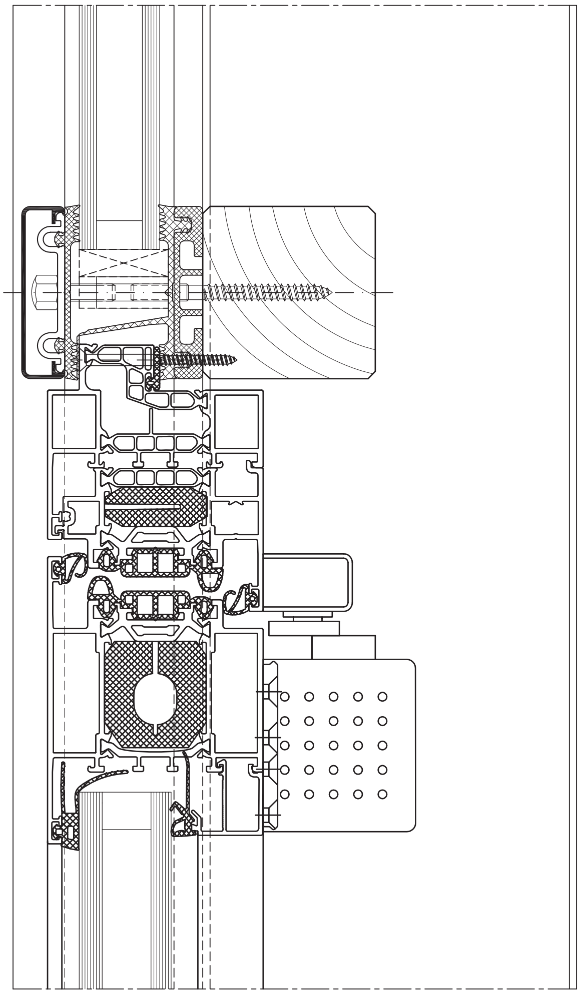




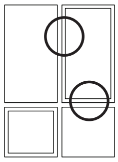
Insert window mullion section
System: HUECK
Series Lambda WS 075

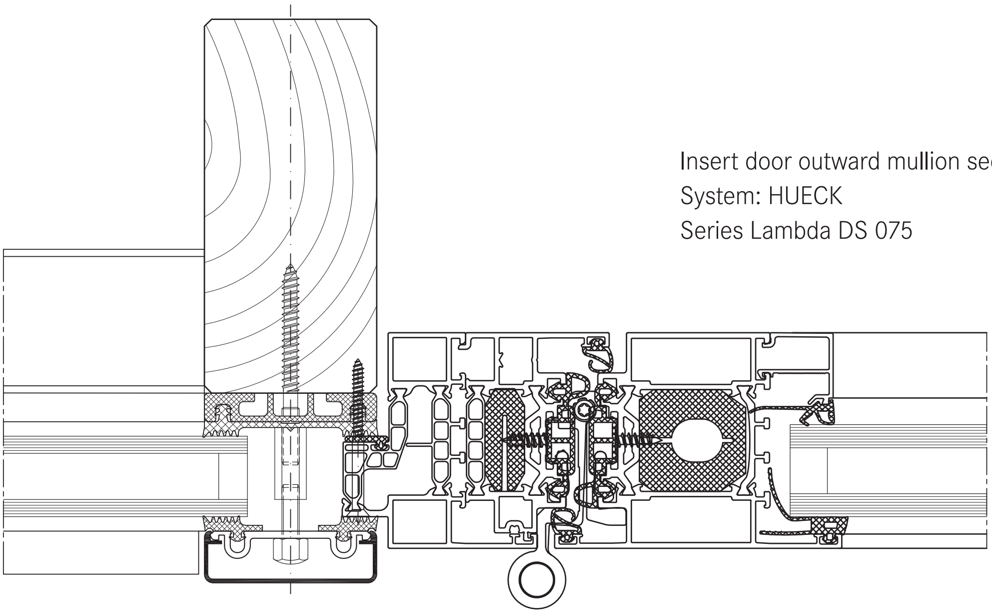
ZL-H_2.3_019.dwg

Installing windows and doors



Insert door outward transom section
System: HUECK
Series Lambda DS 075



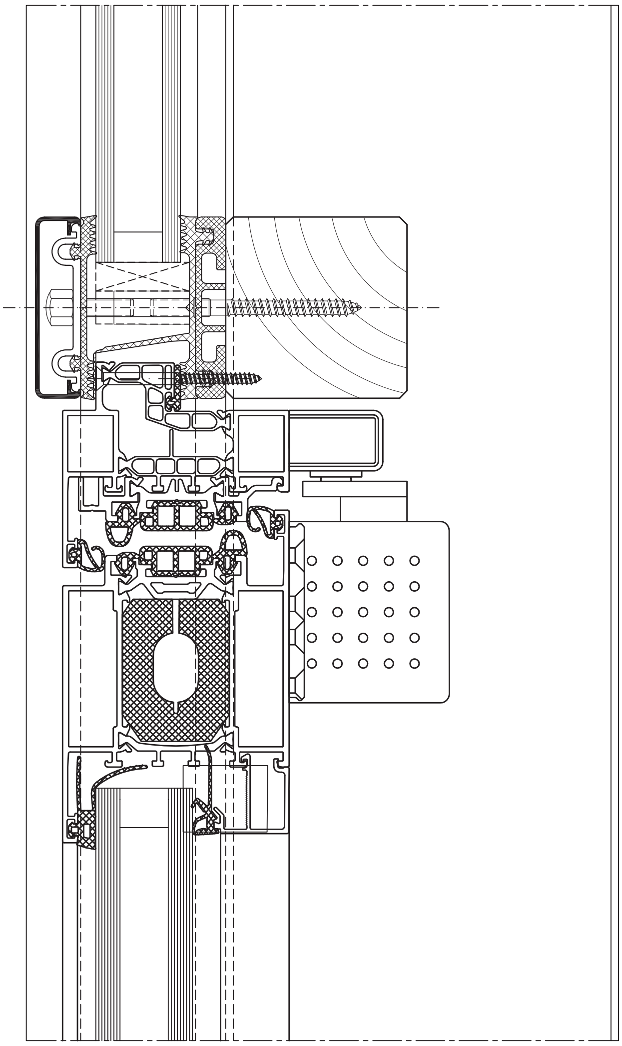


Insert door outward mullion section
System: HUECK
Series Lambda DS 075

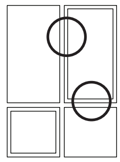
ZL-H_2.3_020.dwg

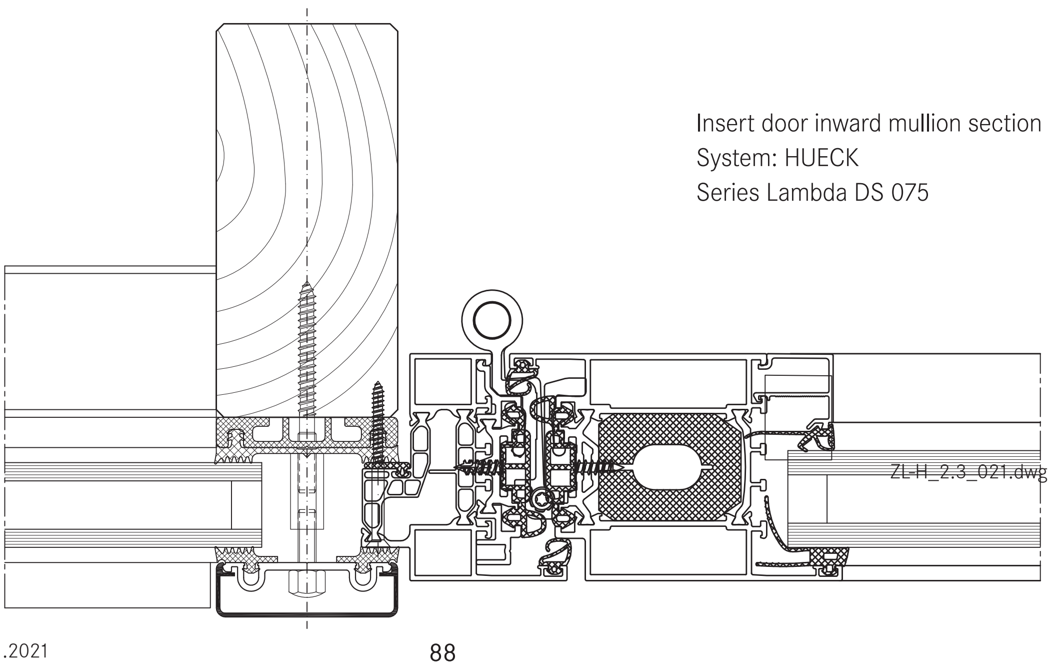
Installing windows and doors

2.3
5



Insert door inward transom section
System: HUECK
Series Lambda DS 075

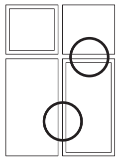


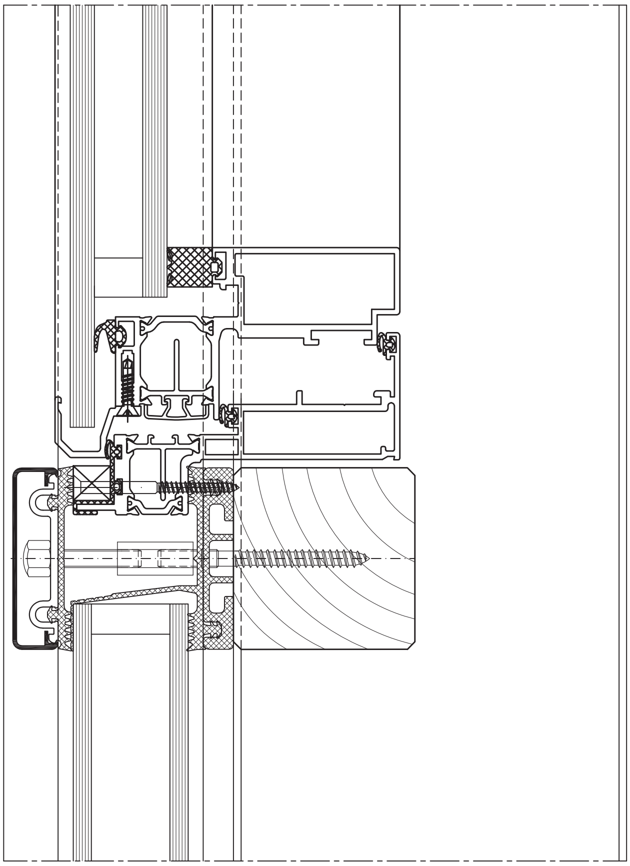


Insert door inward mullion section
System: HUECK
Series Lambda DS 075

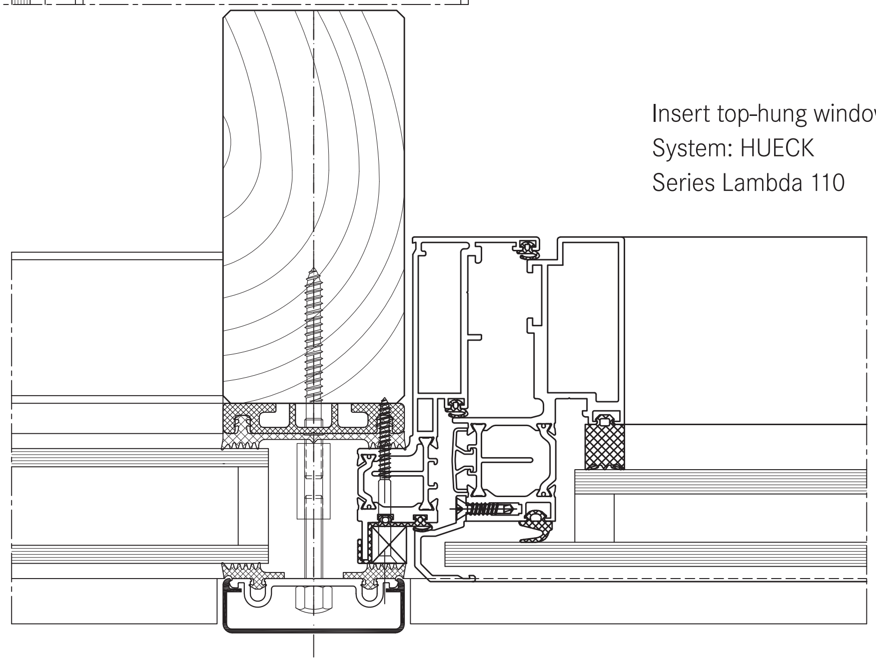
Installing windows and doors

2.3
5





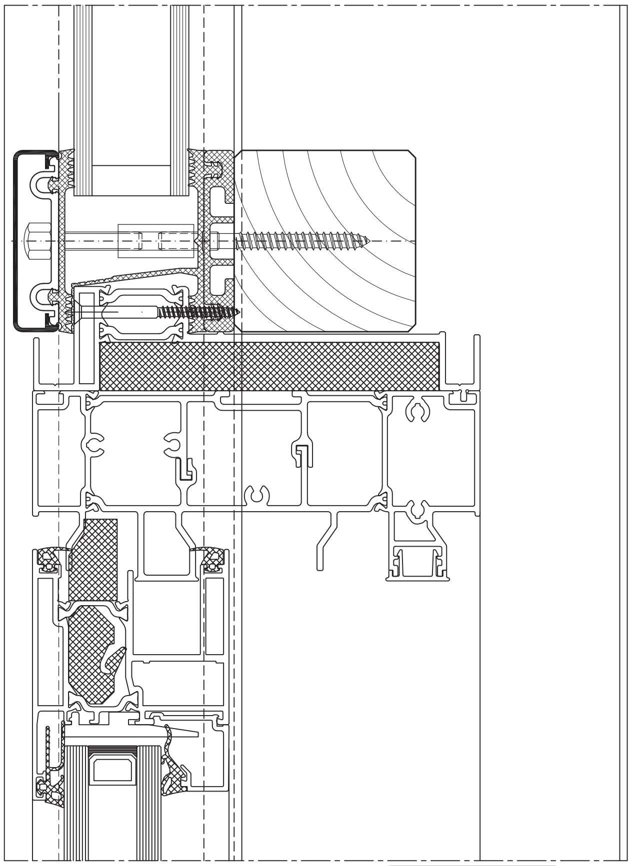
Insert top-hung window transom section
System: HUECK
Series Lambda 110



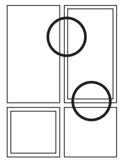
Insert top-hung window mullion section
System: HUECK
Series Lambda 110

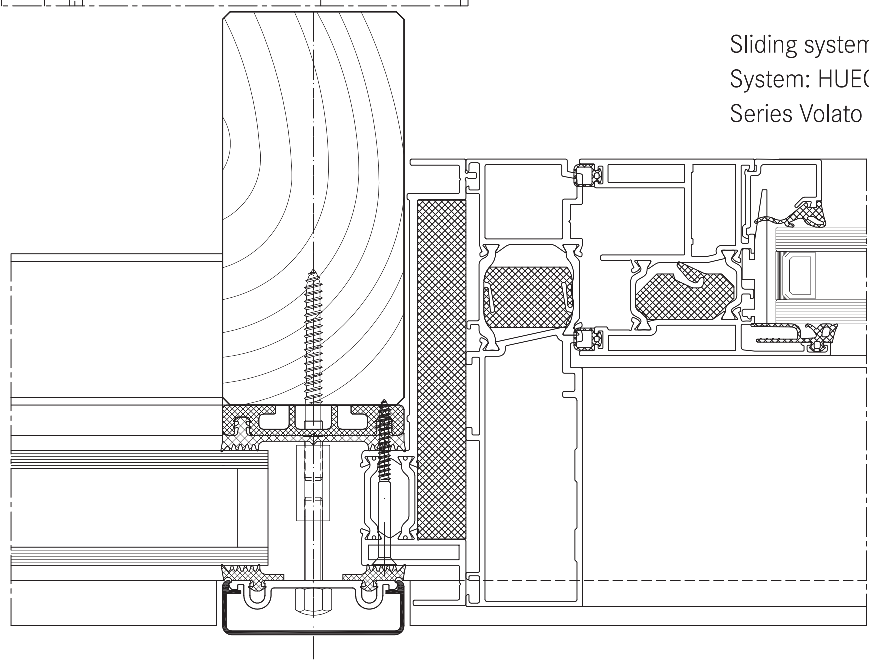
ZL-H_2.3_022.

Installing windows and doors



Sliding system transom section
System: HUECK
Series Volato M





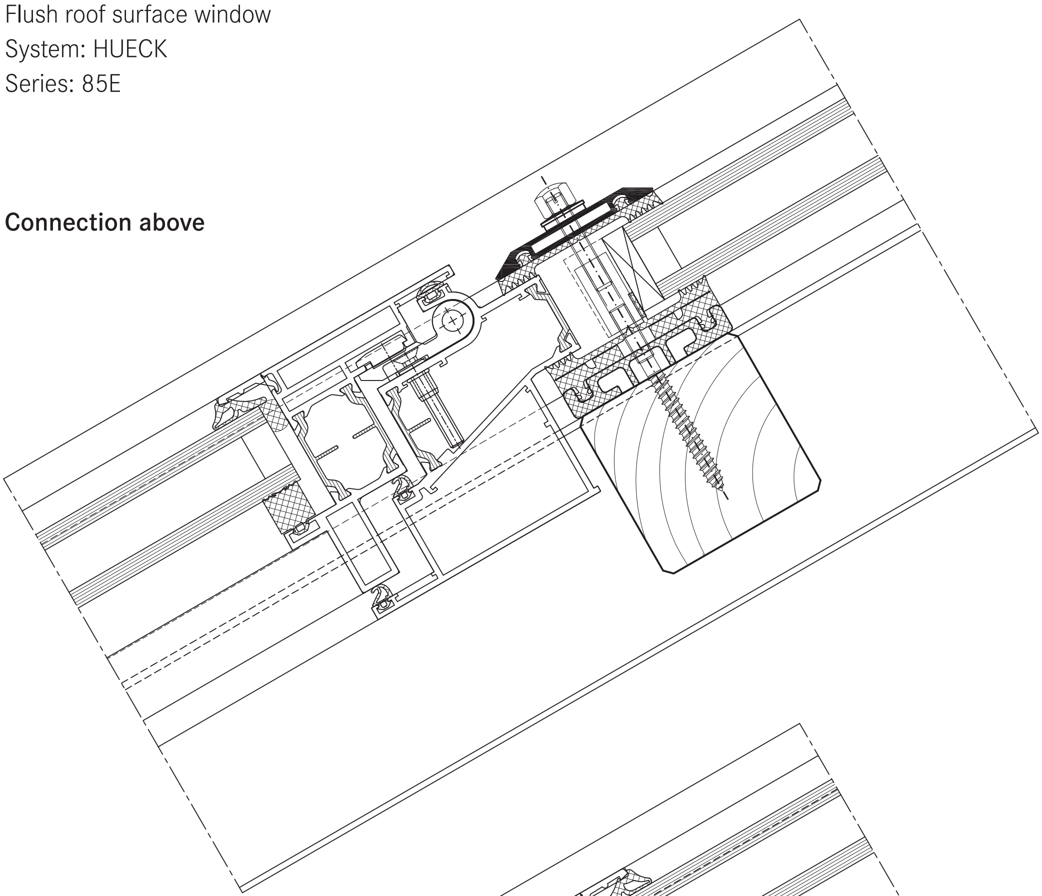
Sliding system mullion section
System: HUECK
Series Volato M

ZL-H_2.3_023.

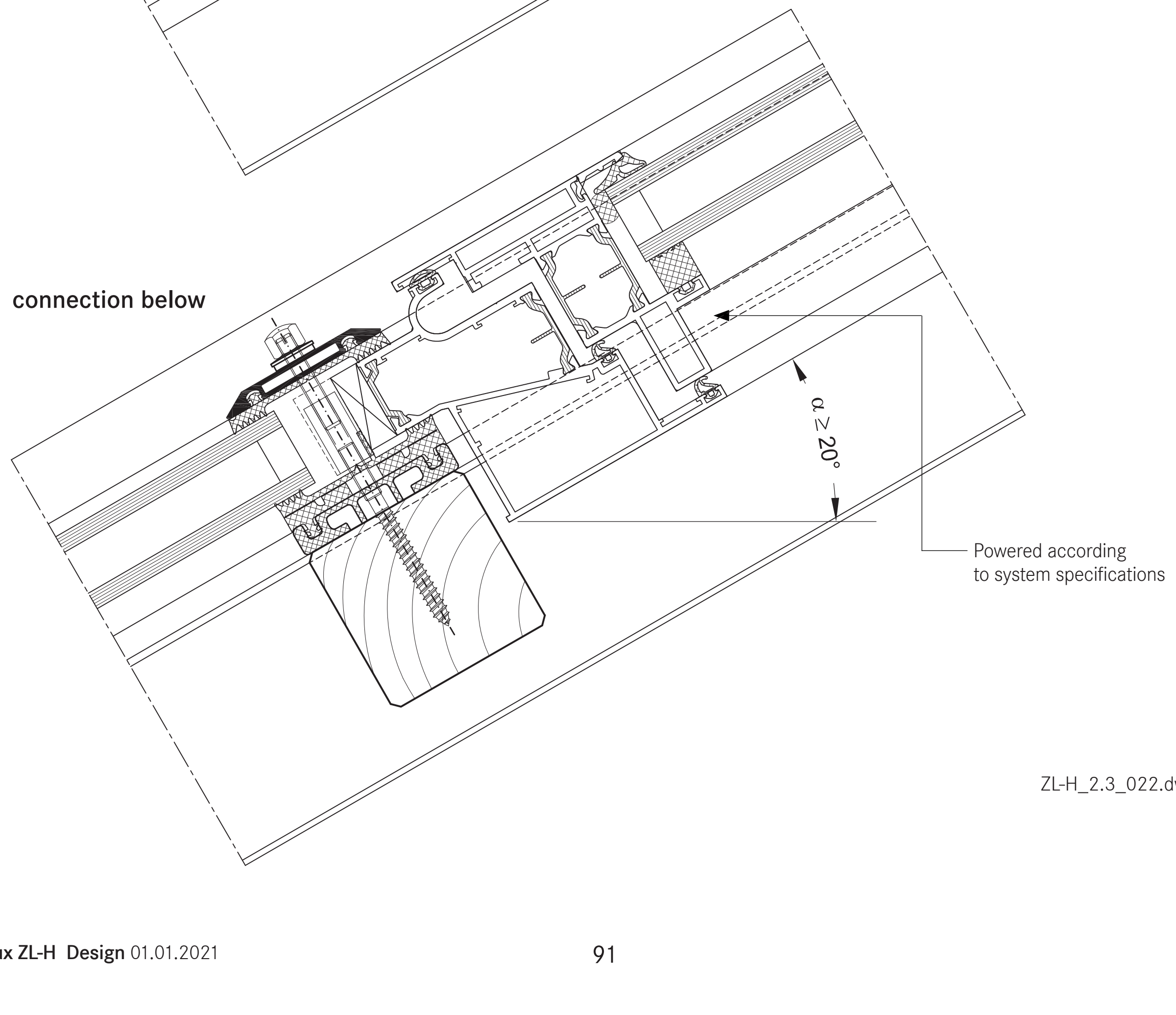
Installing windows and doors

Flush roof surface window
System: HUECK
Series: 85E

Connection above

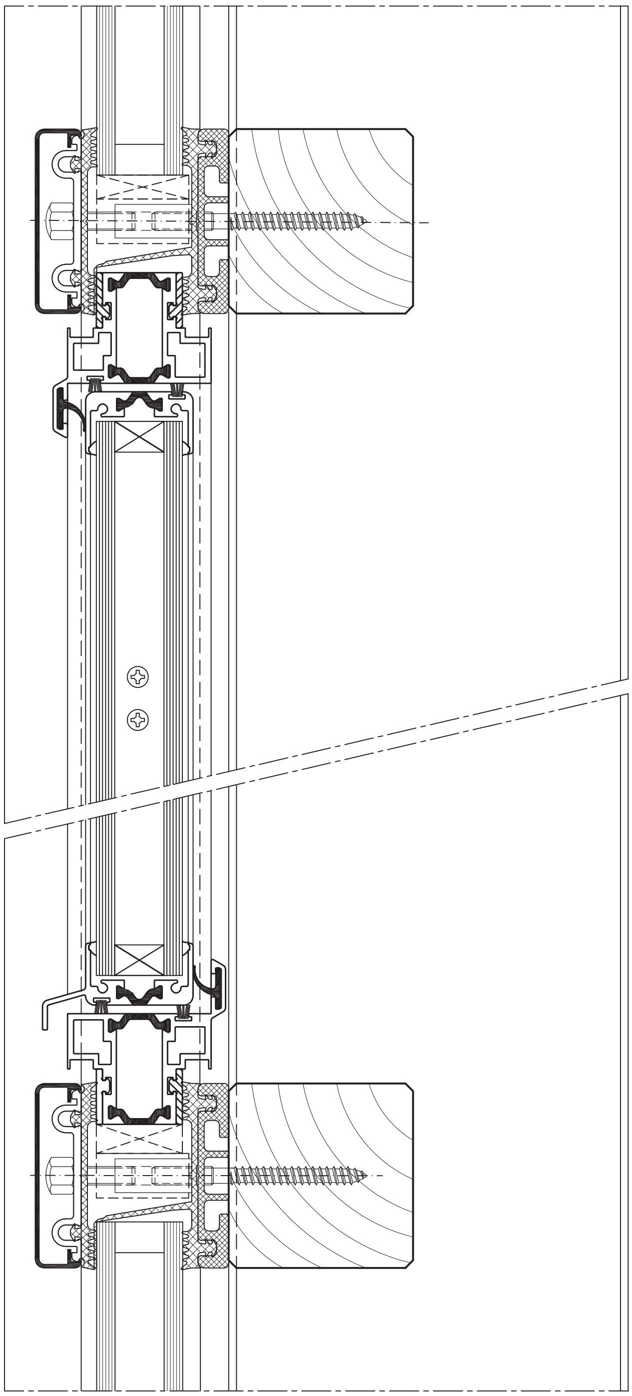


connection below

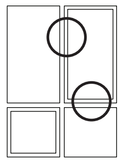


ZL-H_2.3_022.dwg

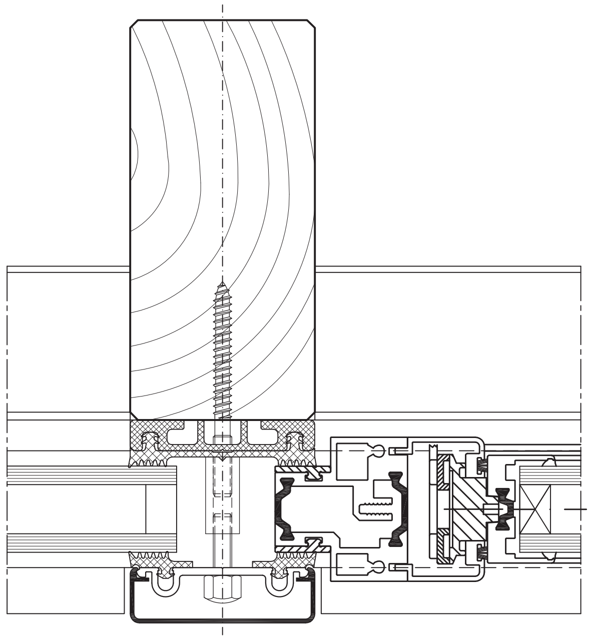
Installing windows and doors



Insert window - transom sections
System: Hahn
Series: Louvered windows S9-iVt-05

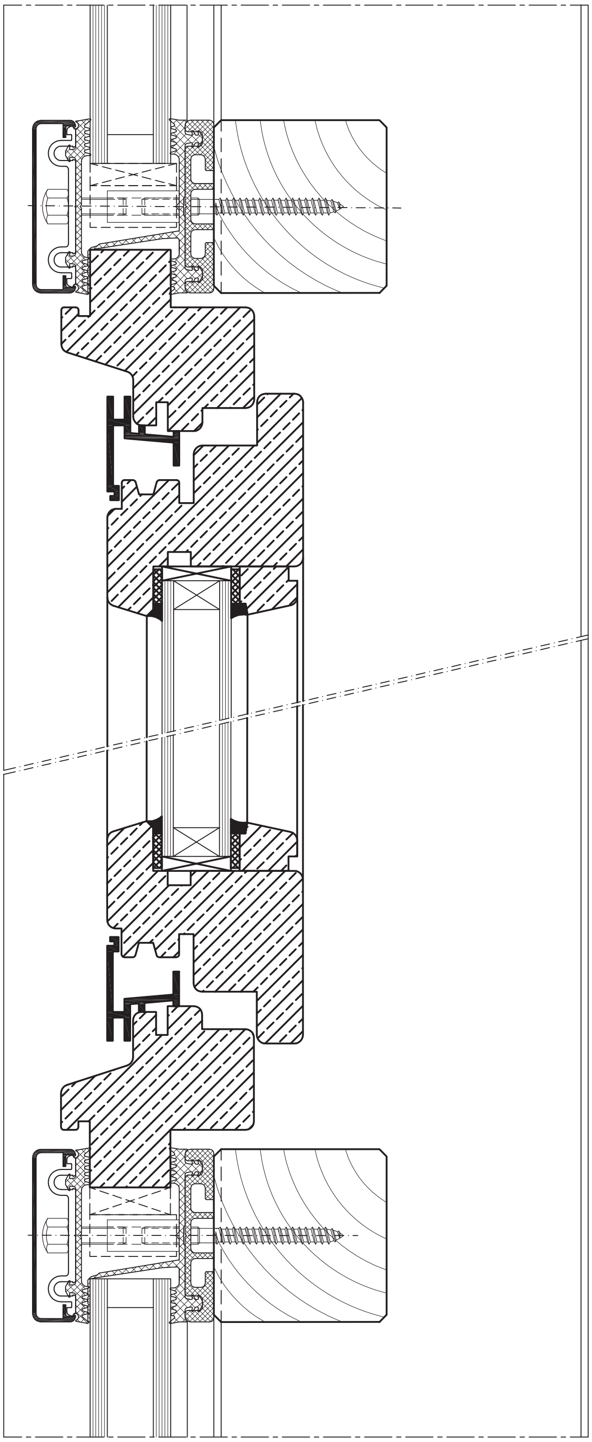


Insert window - mullion section
System: Hahn
Series: Louvered windows S9-iVt-05

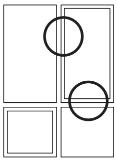


ZL-H_2.3_023.dwg

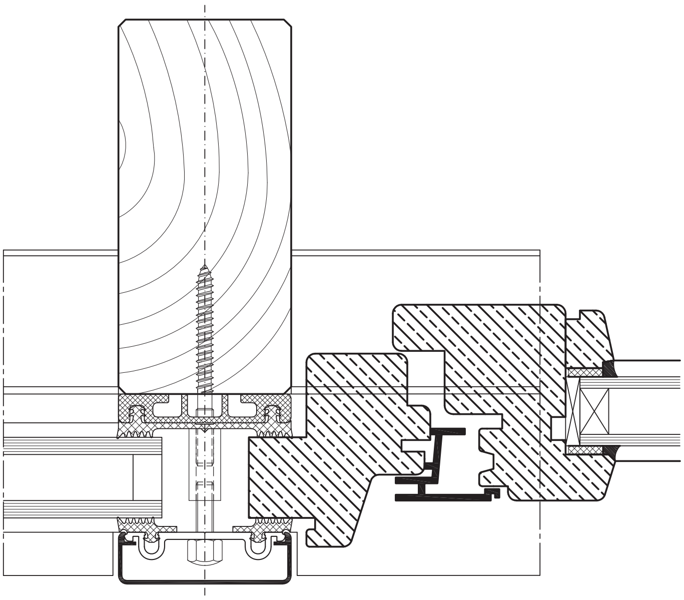
Installing windows and doors



Insert window - transom sections
wood windows



Insert window - mullion section
wood windows

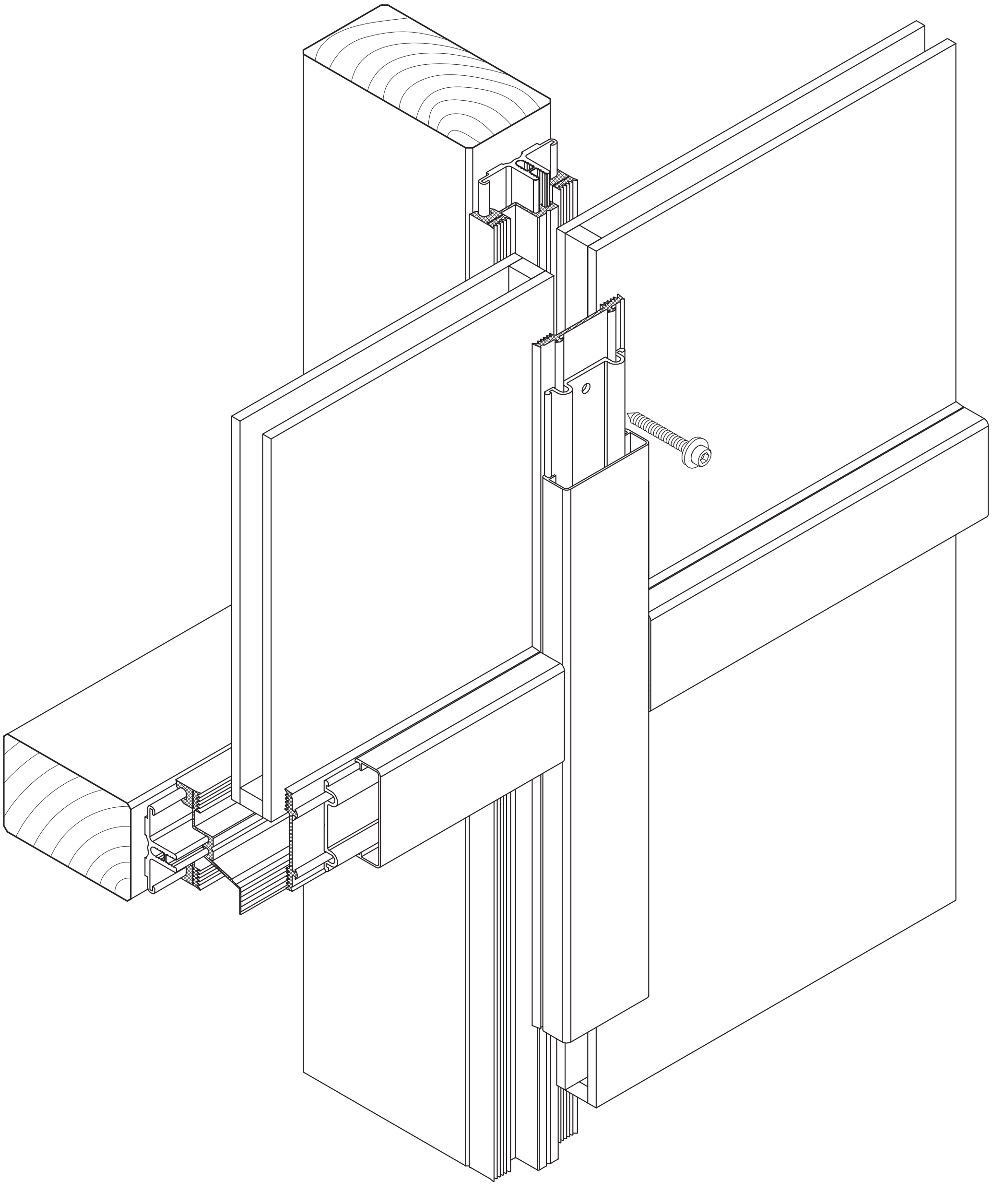


ZL-H_2.3_027.dwg

Stabalux AK-H

System properties

Timber facade system with add-on design



AK-H_3.1_001.dwg

System properties

System Stabalux AK-H Aluminium Add-On Channel AK 5010/ AK 6010

- The Stabalux System AK-H provides a complete range of products in 50 mm. 60 mm and 80 mm widths for vertical and inclined glazing.
- The single piece add-on channel is used the same way for both facades and roofs.
- The Stabalux add-on channel is suitable for custom glass structures with single or double glazing.
- The Stabalux add-on channel allows direct attachment to a timber supporting substructure.
- The substructure made from timber profiles can be freely chosen and offers good value options for designing facades and roof.
- Pre-assembly of support profiles and add-on channels in the workshop is possible. Timber structures can also be mounted independent of the add-on channel. The add-on channel is then fitted on site. On-site mounting of the System AK-H therefore makes it suitable for restoration of existing facades and roofs.
- The timber structure can be coated independently of the add-on channel and regardless of any later screw fittings.
- The screw connection between the add-on channel and substructure is achieved using system screws from the Stabalux range. Pre-drilling of timber profiles is generally not necessary. However, this should be considered in the case of high-quality timbers. Application of screw fittings should be controlled.
- The inner seals for mullions and transoms are different and are directly pressed into the add-on channel. This guarantees exact guidance in mullions and transoms
- Clamping strips and outer seals are screwed directly to the add-on channel. The advantages of screw channel technology become clear when implementing the clamp connection.
- Integrated glass supports with direct screw fittings in the add-on channel allow the use of glass with a thickness up to 60 mm.
- Attachment to the substructure, the clamp connection and glass supports are all regulated by general building control certification Z-14.4-767.
- The System AK-H allows good U_f values to be achieved. Installing slab insulation results in significant improvements to the thermal insulation properties.

Specifications

System widths	**50, 60, 80 mm**	
Air permeability EN 12152	AE	
Driving rain resistance EN 12154/ENV 13050	static dynamic	RE 1500 Pa 250 Pa/750 Pa
Resistance to wind EN 13116	permitted load increased load	2000 Pa 3000 Pa
Shock strength EN 14019	I5/E5	
Glass weight		≤ 1030 kg
Clamp connection		abZ Z-14.4-767
Burglary resistance DIN EN 1627	RC 2	
U_f value	U_f = 0.67 W/(m²K) Glass thickness 46 mm, slab insulation	

System properties

Certifications, authorisations, CE mark

(Section 9)

The tests we have carried out provide contractors and planners with certainty as well as the ability to use the test results and system passports. For example, they might use this information to issue the CE mark.

Permeability/Safety

- The Stabalux sealing geometry prevents moisture ingress.
- Condensation is guided away in a controlled manner.
- For vertical and roof glazing, Stabalux offers an overlapping 2-level sealing system.
- Three guide rails hold the seals in exactly the right position when using the single-piece Stabalux add-on channel and ensure even support for glass on all sides.
- Seal flaps increase the mount safety and impermeability of vertical glazing.
- A special sealing piece for transom seals makes overlaps more secure.
- Creation of the required drainage takes place at the construction site by pushing together the seals in the facade or slotting together the offset sealing sections.

Insulation (Section 9)

The System Stabalux AK-H has good thermal insulation values. A heat transfer coefficient of U_f for frames of up to 0.69 W/(m²K) are achieved with a glass thickness of 44 mm.
The use slab insulation has a positive effect on thermal insulation for the entire glass installation.

Noise insulation of the glass facade

(Section 9)

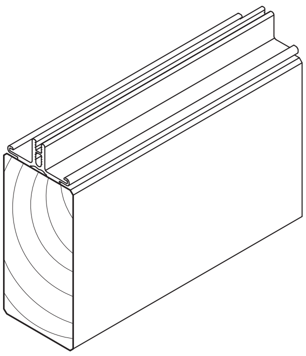
The noise insulating properties of a facade depend on a variety of factors, each of which affects the properties in a different way. The task of the planner is to expertly select the optimum design on a case-by-case basis. Different combinations of frame profiles, glazing systems and noise reducing glass have vastly different effects on noise insulation.

Burglar resistance (Section 9)

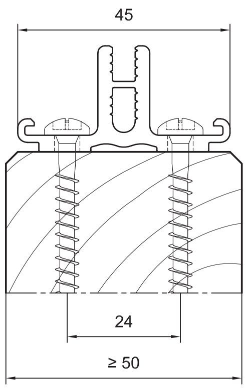
The Stabalux System AK-H has burglar resistant properties. The test was performed according to DIN EN 1627. Facades in resistance class RC2 can be mounted on the system widths 50 mm, 60 mm and 80 mm.
Class RC2 is classified as a moderate risk. It is recommended for use in residential, commercial and public buildings.
Very few constructive measures are needed to achieve the burglary-resistant properties; tested panels must also be installed.
The appearance of burglar-resistant facades using Stabalux System AK-H is the same as the normal construction. All benefits of using threaded tubes are preserved. The benefits of direct screw fittings in the central groove are preserved.

System properties

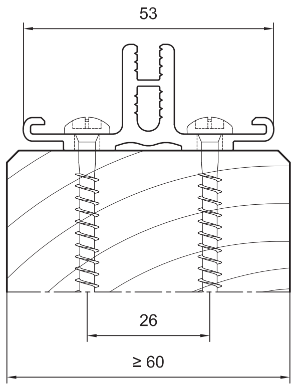
Timber profile with add-on channel AK 5010/ AK 6010



AK 5010



AK 6010



Overview

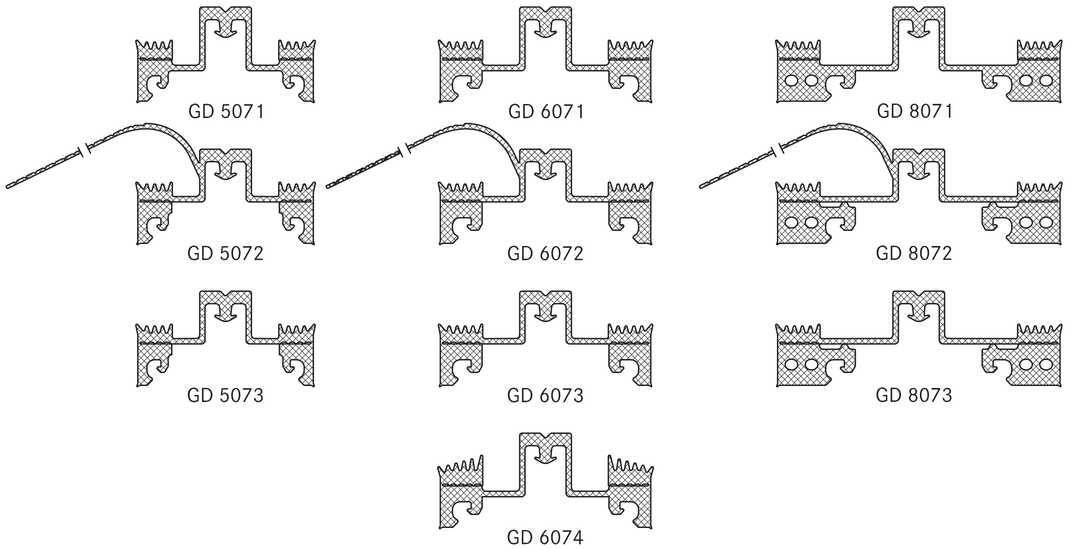
Material (Section 3.2.1)	AK 5010/ AK 6010	Aluminium EN 6360 T66	
	Wood types	min. softwood C24 (with a gross density of 350 kg/m^3) min. laminated timber GL24h (with a gross density of 380 kg/m^3)	
Pre-cut (Section 3.2.5)	AK length on mullion	$\ell_{AK} = \ell_{mullion}$	
	AK length on transoms	$\ell_{AK} = \ell_{transom}$ - (2 x 15 mm)	
	AK length on intermediate mullions	$\ell_{AK} = \ell_{intermediate\ mullion}$ - (2 x 15 mm)	
Attachments (Section 3.1.1)	to timber profile	**Z 0170**	
Attachment (Section 3.2.5)		First set of screw fittings placed in pairs, then every 200 mm **= approx. 6 screws/m**	
	Edge distance - mullion	≤ 100 mm	
	Edge distance - transoms	approx. 100 mm (be aware of T-joints and glass supports)	
Glass supports (Section 3.2.10)	GH 6071 for 20 - 60 mm glass thicknesses	Screw fittings for glass supports with add-on channel	**3 x Z 0247**
		Add-on channel strengthening around the glass support	**6 x Z 0170**
	GH 6072 for 20 - 60 mm glass thicknesses	Screw fittings for glass supports with add-on channel	**6 x Z 0247**
		Add-on channel strengthening around the glass support	**8 x Z 0170**
	GH 6073 for 8 - 18 mm glass thicknesses	Screw fittings for glass supports with add-on channel	**3 x Z 0193**
		Add-on channel strengthening around the glass support	**6 x Z 0170**
Inner seal System 60 mm (Section 3.1.2)	Facade + roof mullion	**GD 6071** (without radii) **GD 6074** (polygonal convex 3° - 15°)	
	Facade transoms	**GD 6072** (without radii)	
	Roof - transoms	**GD 6073 (without radii) also for facade single-glazing**	
	Sealing piece	**Z 0062 | 1 x per transom end**	
Inner seal System 80 mm (Section 3.1.2)	Facade + roof mullion	**GD 8071 (without radii)**	
	Facade transoms	**GD 8072 (without radii)**	
	Roof - transoms	**GD 8073 (without radii) also for facade single-glazing**	
	Sealing piece	**Z 0062 | 1 x per transom end**	

AK-H_3.1_002.dwg

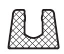
System properties

AK 5010/AK 6010 - Product Overview

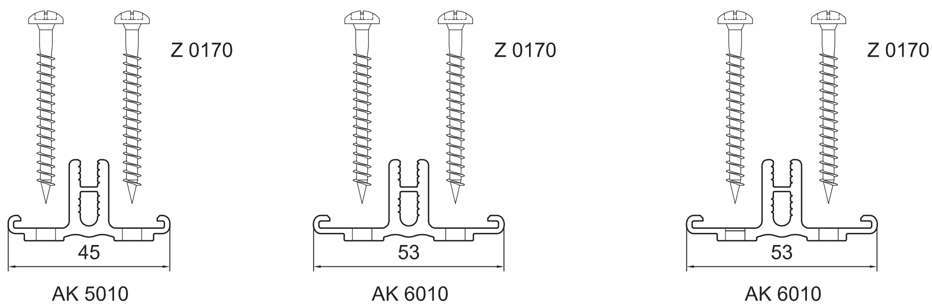
System width: 50 mm 60 mm 80 mm



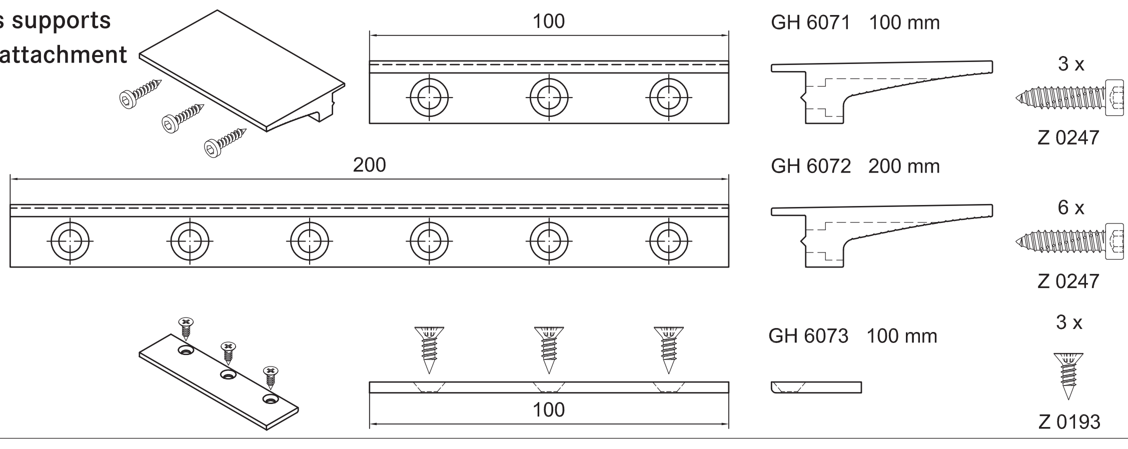
Inner seals
with sealing piece



add-on profiles
with attachment
on wood



Glass supports
with attachment

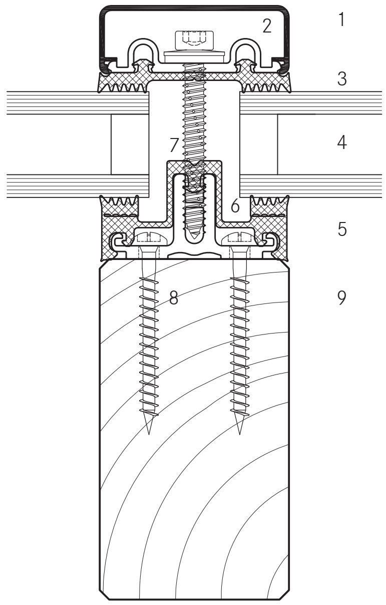


*) Available on request

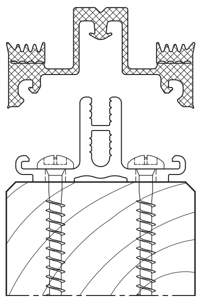
System cross sections and inner seals - facade

Inner seal 16.5 mm tall / 2 overlapping drainage levels

Vertical glazing mullion



Inner seal vertical glazing mullion
System width 50 mm



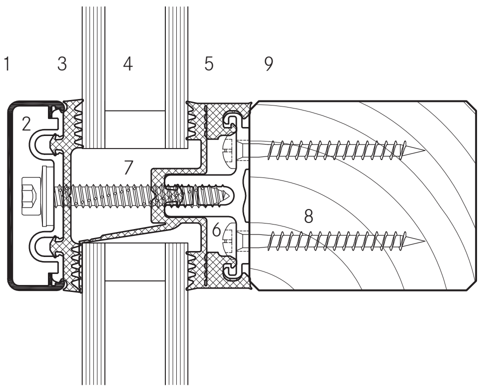
1	Cover profile
2	Pressure profile
3	Outer seal
4	Glass / fill element
5	Inner mullion seal
6	Add-on channel AK 6010
7	System screw fittings clamp connection
8	System screw fittings add-on channel AK 6010/timber profile
9	Timber profile

AK-H_3.1_003.dwg

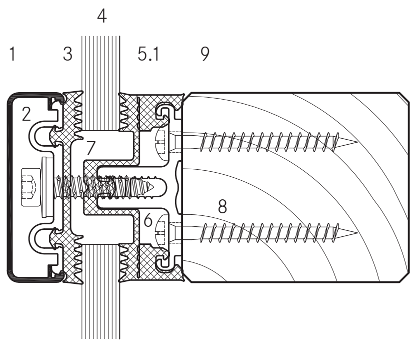
System cross sections and inner seals - facade

Inner seal 16.5 mm tall / 2 overlapping drainage levels

Vertical glazing transom double glazing

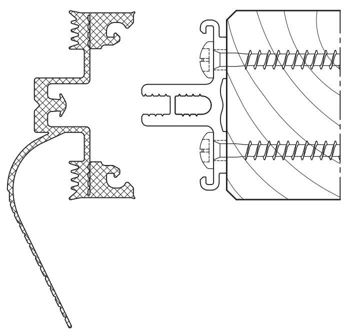


Vertical glazing transom single glazing



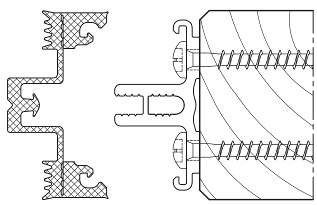
Inner seal vertical glazing transoms
System 50 mm double glazing

GD 5072



Inner seal vertical glazing transoms
System 50 mm single glazing

GD 5073



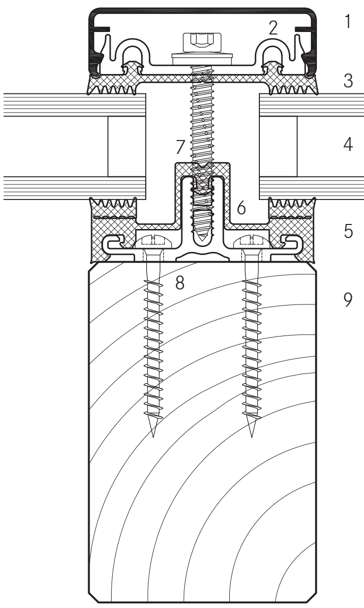
1 Cover profile
2 Pressure profile
3 Outer seal
4 Glass / fill element
5 Inner transom seal double glazing
5.1 Inner transom seal single glazing
6 Add-on channel
7 System screw fittings clamp connection
8 System screw fittings add-on channel/support profile
9 Timber profile

AK-H_3.1_003.dwg

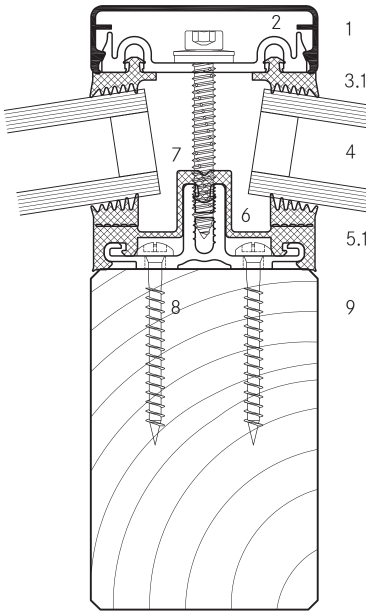
System cross sections and inner seals - facade

Inner seal 16.5 mm tall / 2 overlapping drainage levels

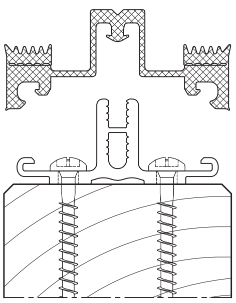
Vertical glazing mullion



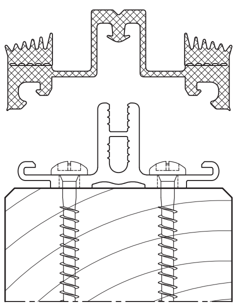
Polygonal glazing mullion- convex / 3° - 15°



Inner seal vertical glazing mullion
System width 60 mm



Inner seal polygonal glazing mullion
System width 60 mm



1 Cover profile
2 Pressure profile
3 Outer seal
4 Glass / fill element
5 Inner mullion seal
5.1 Inner mullion seal polygonal glazing
6 Add-on channel AK 6010
7 System screw fittings clamp connection
8 System screw fittings add-on channel AK 6010/timber profile
9 Timber profile

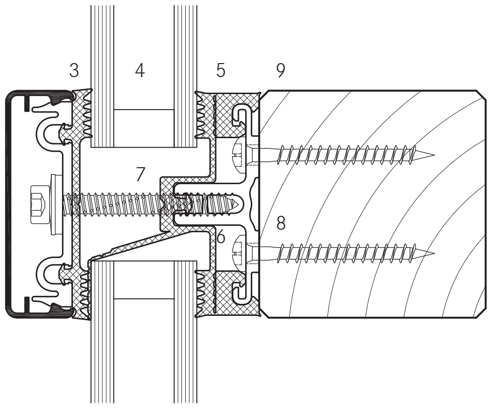
AK-H_3.1_003.dwg

System cross sections and inner seals - facade

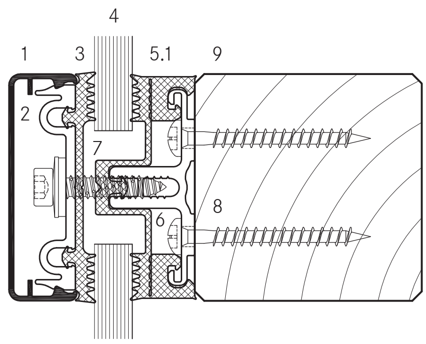
3.1
2

Inner seal 16.5 mm tall / 2 overlapping drainage levels

Vertical glazing transom double glazing

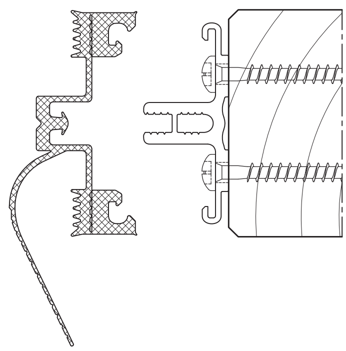


Vertical glazing transom single glazing



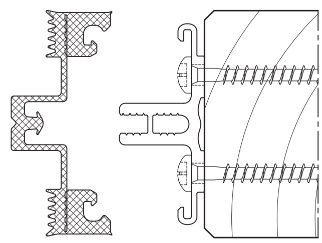
Inner seal vertical glazing transoms
System 60 mm single glazing

GD 6072



Inner seal vertical glazing transoms
System 60 mm single glazing

GD 6073



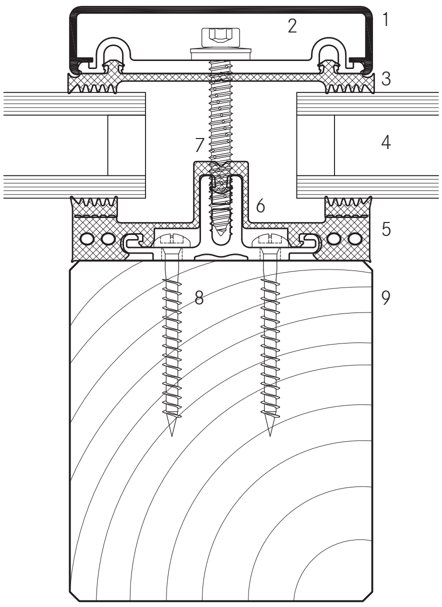
1 Cover profile
2 Pressure profile
3 Outer seal
4 Glass / fill element
5 Inner transom seal double glazing
5.1 Inner transom seal single glazing
6 Add-on channel AK6010
7 System screw fittings clamp connection
8 System screw fittings add-on channel/support profile
9 Timber profile

AK-H_3.1_003.dwg

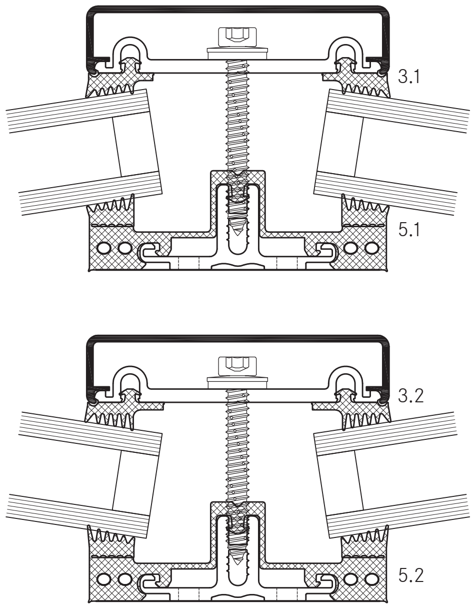
System cross sections and inner seals - facade

Inner seal 16.5 mm tall / 2 overlapping drainage levels

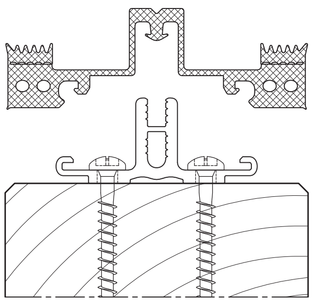
Vertical glazing mullion



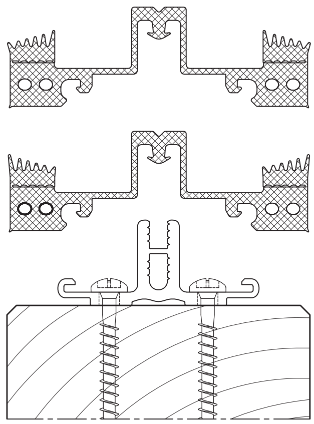
Polygonal glazing mullion- convex / 3° - 15°



Inner seal vertical glazing mullion
System width 80 mm



Inner seal polygonal glazing mullion
System width 80 mm



1 Cover profile
2 Pressure profile
3 Outer seal
3.1 Outer seal ploygonal glazing convex
3.2 Outer seal ploygonal glazing convav
4 Glass / fill element
5 Inner mullion seal
5.1 Inner mullion seal polygonal glazing convex
5.2 Inner mullion seal polygonal glazing convex
6 Add-on channel AK 6010
7 System screw fittings clamp connection
8 System screw fittings add-on channel AK 6010/timber profile
9 Timber profile

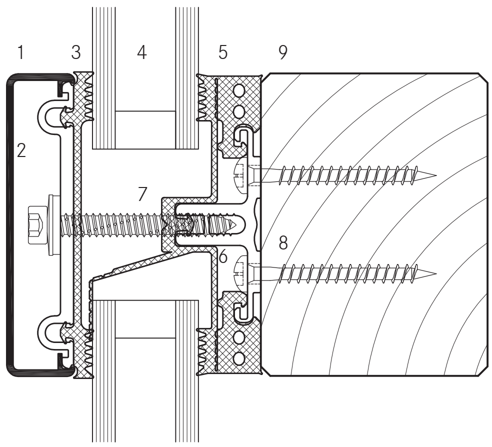
AK-H_3.1_003.dwg

*) Erhältlich auf Anfrage

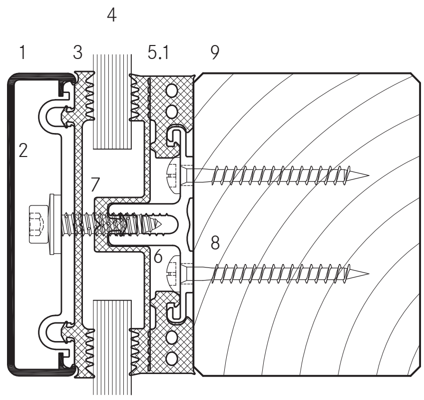
System cross sections and inner seals - facade

Inner seal 16.5 mm tall / 2 overlapping drainage levels

Vertical glazing transom double glazing

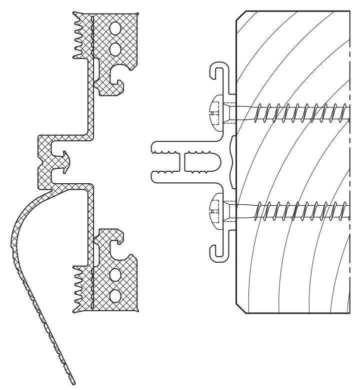


Vertical glazing transom single glazing



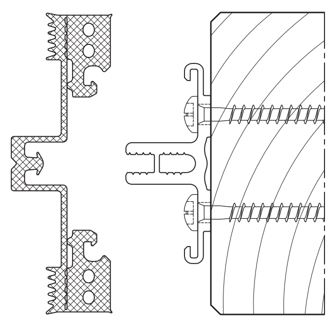
Inner seal vertical glazing transoms
System 80 mm single glazing

GD 8072



Inner seal vertical glazing transoms
System 80 mm single glazing

GD 8073



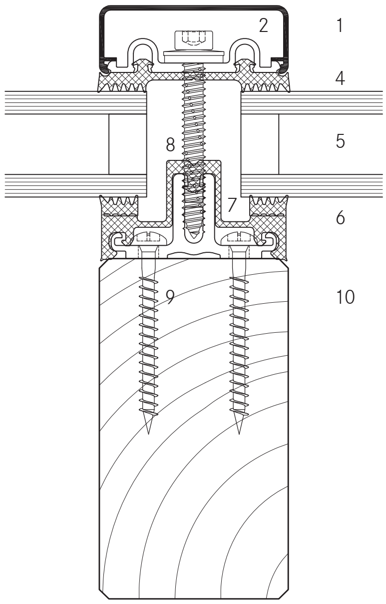
1 Cover profile
2 Pressure profile
3 Outer seal
4 Glass / fill element
5 Inner transom seal double glazing
5.1 Inner transom seal single glazing
6 Add-on channel AK6010
7 System screw fittings clamp connection
8 System screw fittings add-on channel/support profile
9 Timber profile

AK-H_3.1_003.dwg

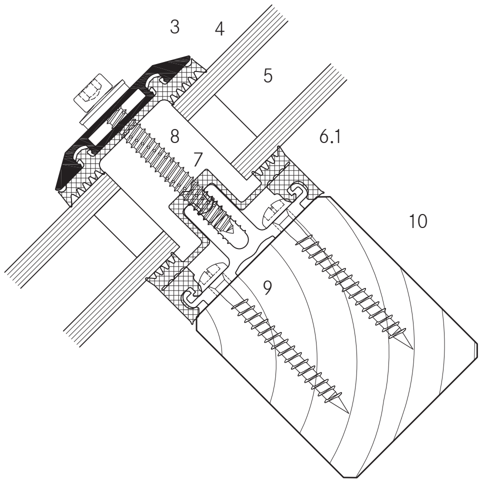
System cross sections and inner seals - roof

Inner seal 16.5 mm tall / 2 overlapping drainage levels

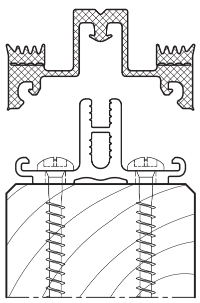
Inclined glazing rafter



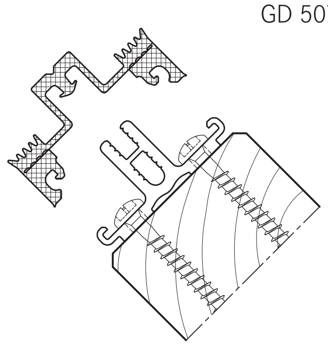
Inclined glazing transom



Inner seal inclined glazing rafter
System width 50 mm



Inner seal inclined glazing transom
System width 50 mm



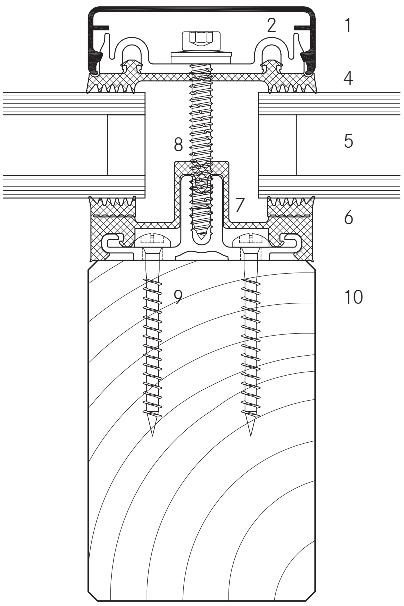
1	Cover profile
2	Pressure profile
3	Cover strip
4	Outer seal
5	Glass / fill element
6	Inner mullion seal
6.1	Inner transom seal for inclined glazing
7	Add-on channel AK 5010
8	System screw fittings clamp connection
9	System screw fittings add-on channel/timber profile
10	Timber profile

AK-H_3.1_003.dwg

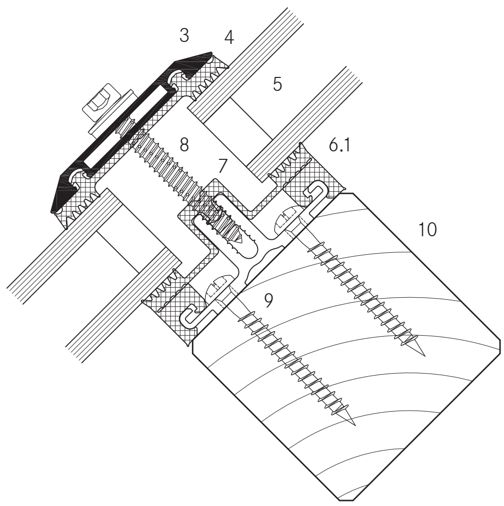
System cross sections and inner seals - roof

Inner seal 16.5 mm tall / 2 overlapping drainage levels

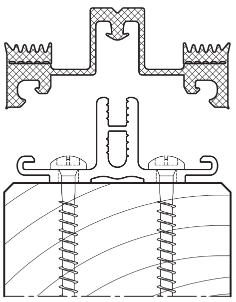
Inclined glazing rafter



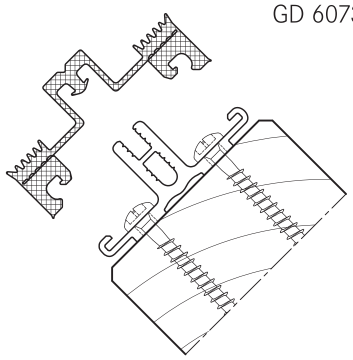
Inclined glazing transom



Inner seal inclined glazing rafter
System width 60 mm



Inner seal inclined glazing transom
System width 60 mm



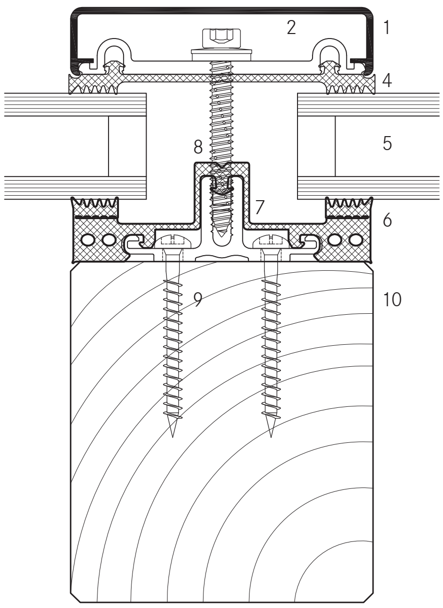
1 Cover profile
2 Pressure profile
3 Cover strip
4 Outer seal
5 Glass / fill element
6 Inner mullion seal
6.1 Inner transom seal for inclined glazing
7 Add-on channel AK 6010
8 System screw fittings clamp connection
9 System screw fittings add-on channel/timber profile
10 Timber profile

AK-H_3.1_003.dwg

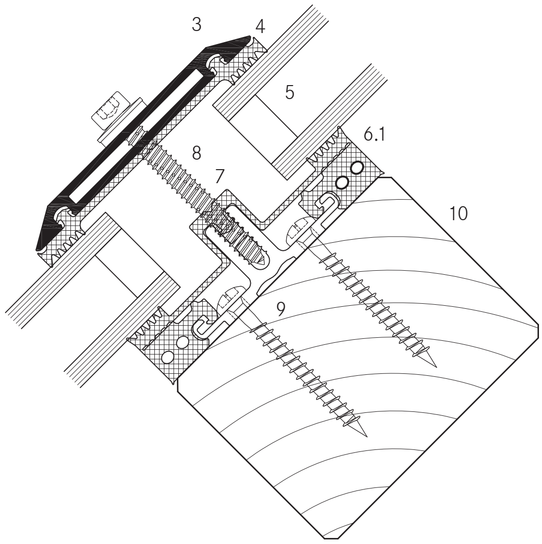
System cross sections and inner seals - roof

Inner seal 16.5 mm tall / 2 overlapping drainage levels

Inclined glazing rafter

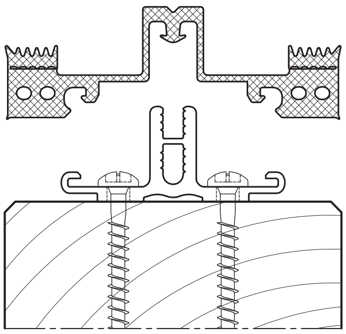


Inclined glazing transom



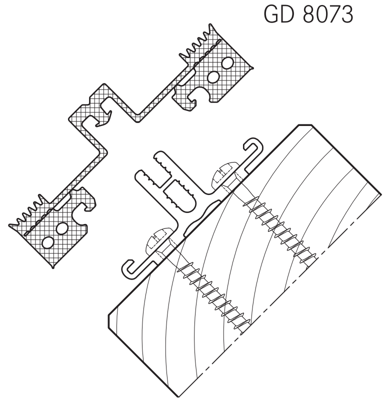
Inner seal inclined glazing rafter
System width 80 mm

GD 8071



Inner seal inclined glazing transom
System width 80 mm

GD 8073



1 Cover profile
2 Pressure profile
3 Cover strip
4 Outer seal
5 Glass / fill element
6 Inner mullion seal
6.1 Inner transom seal for inclined glazing
7 Add-on channel AK 6010
8 System screw fittings clamp connection
9 System screw fittings add-on channel/timber profile
10 Timber profile

AK-H_3.1_003.dwg

Cover strips and outer seals

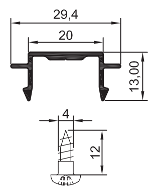
Wooden covering strips

Wooden cover strips can be easily mounted to mullions and transoms using aluminium top or lower bars. The pressure profile UL5003/UL6003/UL8003 acts as a clamping strip.
Assembly: apply the two-piece GD 1903 outer seal to the upper strip attach to the system using screws. Divide the OL 1903 into 80 mm long pieces and attached centrally using 3 screws to the wooden cover strip at 300 mm intervals and then clip to the upper strip.

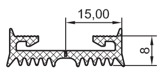
The wooden cover strip to be provided by the customerisasupplementtotheStabaluxSystemwareand,if necessary,mechanically due to the natural properties of wood weathering to secure. Guidelines for the use of exterior wood should be followed.

(Please see section 3.2.7 on assembling the outer seal)

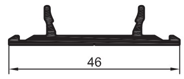
OL1903



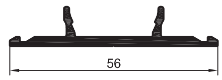
GD1903 (2-teilig)



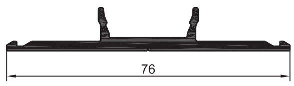
UL5003



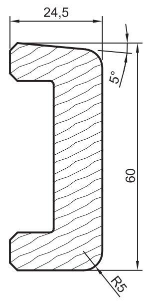
UL6003



UL8003



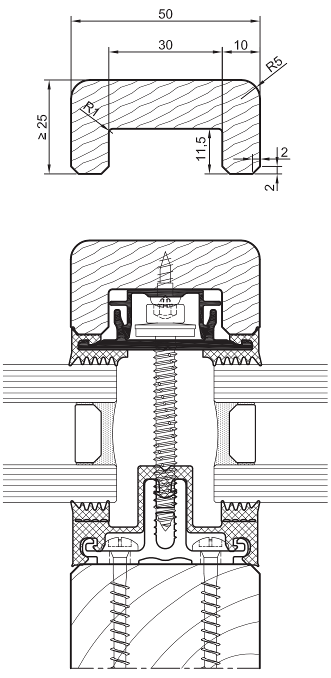
Transom



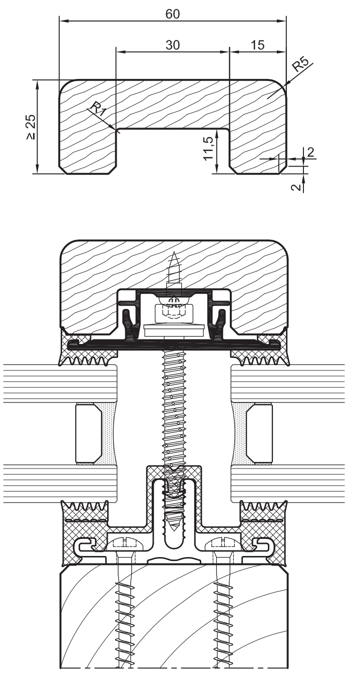
Set the wooden upper strip in the transom with an incline of 5°.

Example: System 60 mm

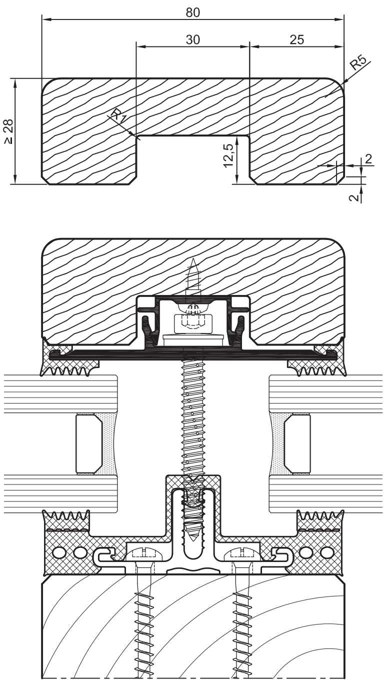
Mullion



System 50



System 60

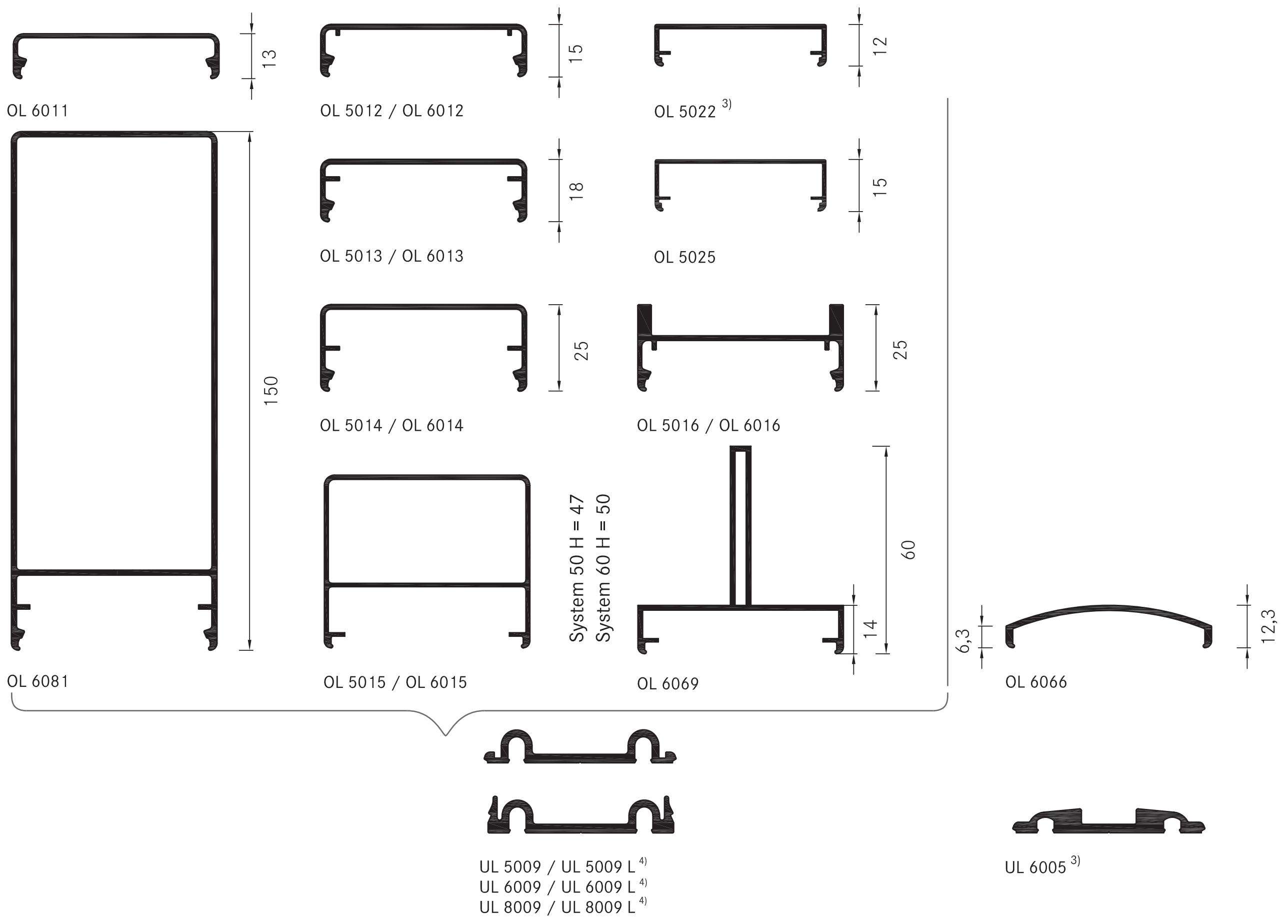


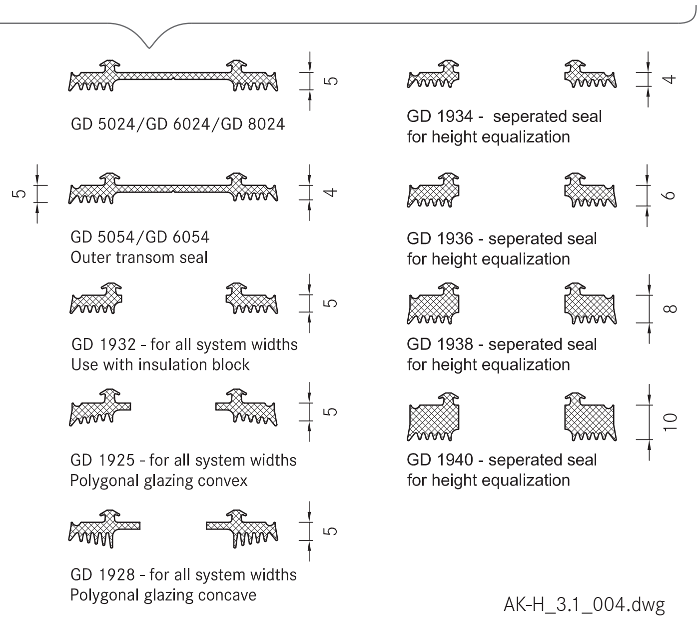
System 80

AK-H_3.1_005.dwg

Cover strips and outer seals

Aluminium - concealed screw fittings





1) Use screws without sealing washers.

2) Use of flat cover profile DL 5073/ DL 6073 in vertical facades only

3) System 80 mm upon request

4) The geometry of the clipping process is different for the 50, 60 and 80 mm widths

AK-H_3.1_004.dwg

Cover strips and outer seals

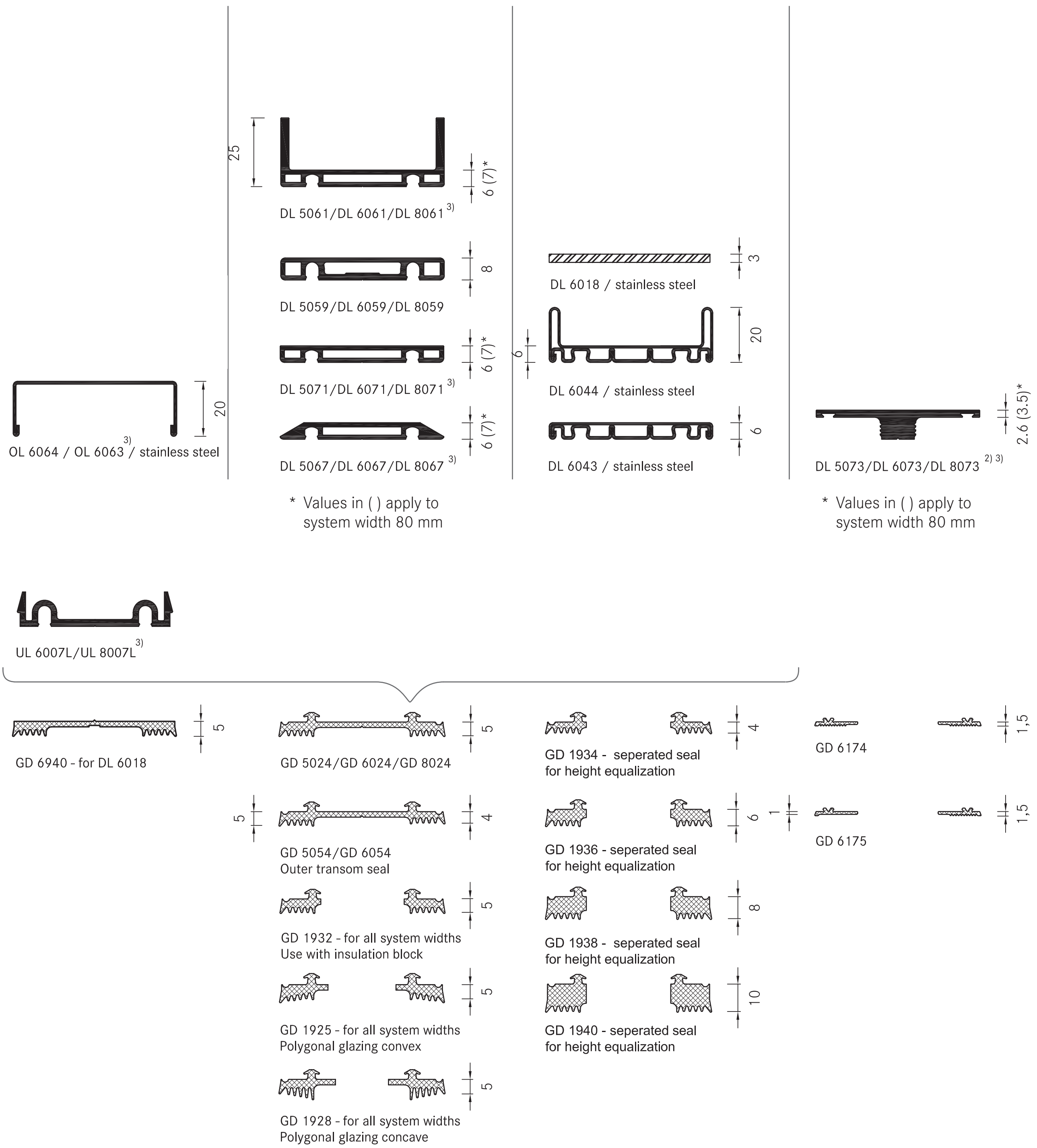
3.1
4

Stainless steel - concealed screw fittings

Aluminium- visible screw fittings

Stainless steel - visible screw fittings

Flat cover profile DL 6073



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Material information

Wood type and quality

The wooden load-bearing substructure is used for mounting the glazing and must meet all load and suitability requirements. The profile dimensions and choice of materials are key. The type of wood chosen depends on the client, architect and/or processor.
All wood materials are produced using wood types permitted by the current Eurocode 5 (DIN EN 1995-1) standard.
Alongside the mature solid wood sections and glued laminated timbers, facade construction is increasingly using materials made from laminated veneer. Due to its stability against deformations, we recommend using plywood sections. The following minimum requirements must be met for all wooden materials:

- Softwood, strength class C24
- Laminated timber, strength class GL24h

The use of comparable hardwoods is also permitted.

Wood type	Strength class	Elastic modulus $E_{0,mean}$ [kN/cm²]
Spruce, fir	C16	800
Pine, larch	C24	1100
Douglas Fir, Southern Pine	C30	1200
Western Hemlock	C35	1300
Yellow Cedar	C40	1400
Oak, Teak, Keruing	D30	1100
Beech	D35	1200
Beech, Azalea, Intsia	D40	1300
Angelique (Basralocus)	D40	1300
Azobé (Bongossi)	D60	1700
Laminated timber made using wood from class:		
C24	GL24h	1160
C30	GL28h	1260
C35	GL32h	1370
C40	GL36h	1470
Laminated veneer:		
Kerto Q		1000-1050
Kerto S		1380
Kerto T		1000
Multiplex sheets:		
(plywood)		900-1600

The woods and values mentioned here are examples for guidance only. Exact values for your choice should be determined with the supplier and applicable standards.

Working on the supporting structure

The use of the Stabalux aluminium add-on channel AK 5010/ AK 6010 allows work to be carried out on the mullion and transom structure in advance, including painting of the finished surface.
The supporting structure can also be mounted independent of the add-on channel. Pre-assembly of support profiles and add-on channels in the workshop is possible.

Protecting and coating the timber structure

The choice of timber protection and coating is the responsibility of the clients, architects and/or processor. This should be done professionally and to the latest standards.

The supporting structure can be treated and coated either in the workshop or on the construction site itself. A final coating may be applied before mounting the add-on channel.

Quality of add-on channel AK 5010/ AK 6010

The add-on channel is made from EN AW 6063 according to DIN EN 573-3, T66 according to DIN EN 755-2.

Aluminium profiles

The aluminium profiles we supply are generally made from EN AW 6060 and EN AW 6063 according to DIN EN 573-3, T66 according to DIN EN 755-2.

Coating the aluminium

Alongside anodic oxidation, with the corresponding pre-treatment, conventional coating methods such as air-drying multi-layer coating systems (wet coating) or thermosetting coatings (stove enamelling / powder-coating) can be used.
By using different mass distribution, longitudinal shadow formation is possible with cover profiles DL 5073/ DL 6073 and DL 8073. Resulting actions are to be taken with the agreement of the coater.

Material information

Longitudinal expansions in aluminium profiles exposed to temperature

When cutting the lower, upper and cover profiles from aluminium, allowance should be made for temperature-induced longitudinal expansion. The theoretical rod lengths ℓ should be shortened by $\Delta\ell = \alpha T \cdot \Delta T \cdot \ell$.

Example:

$\Delta\ell = 24 \cdot 10^{-6} \cdot 40 \cdot 1000 = 0.96 \approx$ **1 mm**

$\alpha^{T} \approx 24 \cdot 10^{-6}$ 1/K	Coefficient of thermal expansion for aluminium
ΔT = 40 K	Assumed temperature difference of aluminium dependent on the colour and amount of solar radiation
ℓ = 1000 mm	Rod length
$\Delta\ell \approx$ 1 mm	Longitudinal expansion

further examples:

$\Delta\ell = 24 \cdot 10^{-6} \cdot 60 \cdot 1000 = 1.44 \approx$ **1.5 mm**
$\Delta\ell = 24 \cdot 10^{-6} \cdot 100 \cdot 1000 = 2.4 \approx$ **2.5 mm**

A rod with a system length of ℓ = 1000 mm should be shortened by 1 mm for a temperature difference of ΔT = 40 °C. A rod of length ℓ = 3000 mm should be shortened by 3 mm.
For ΔT = 100 °C (often occurs in roof areas and south-facing facades), a rod of length ℓ = 1000 should be shortened by 2.5 mm.

Rod length ℓ (mm)	Temperature difference ΔT	Longitudinal expansion $\Delta\ell$ (mm)
1000	40°C	1
3000	40°C	3
1000	60°C	1.5
3000	60°C	4.5
1000	100°C	2.5
3000	100°C	7.5

Note:

We recommend shortening the pressure profile by ≈ 2.5 mm per ℓ = 1000 mm of length. When doing so, ensure to use the correct length of the outer seal.

When using cover profiles in roof area, it is recommended that holes for screwing on the cover profile are created with a diameter of d = 9 mm.

Stainless steel profile

Pressure profiles and bottom sections of cover profiles are made from 1.4301 stainless steel for visible screw fittings. The surface conforms to classification 2B according to DIN EN 10088-2.
Cover profiles using 1.4401 stainless steel. The surface has a ground finish (grain 220, DIN EN 10088-2). The upper parts of the cover profile are made from 1.4571 stainless steel with ground finish (grain 240, DIN EN 10088-2). To protect the surface, a film has been applied to one side, the sharp edge of which can be seen on narrow side.

Seal profiles

Stabalux seals are organic natural rubber materials based on EPDM and conform to the DIN 7863 standard, non-cellular elastomer sealing profiles for window and facade construction. Compatibility with contact media should tested by the processor, particularly when using plastic glazing and making structural connections with non-Stabalux products.

Other items

All system items are produced according to applicable standards.

Maintenance and care **(Section 9)**

The information sheets WP.01 – WP.05 from the Association of Window and Facade Producers (VFF) must be observed. The address can be found in the address section. Further information can be found in section 9.0 - Cleaning / Maintenance.

Profile design

System AK-H

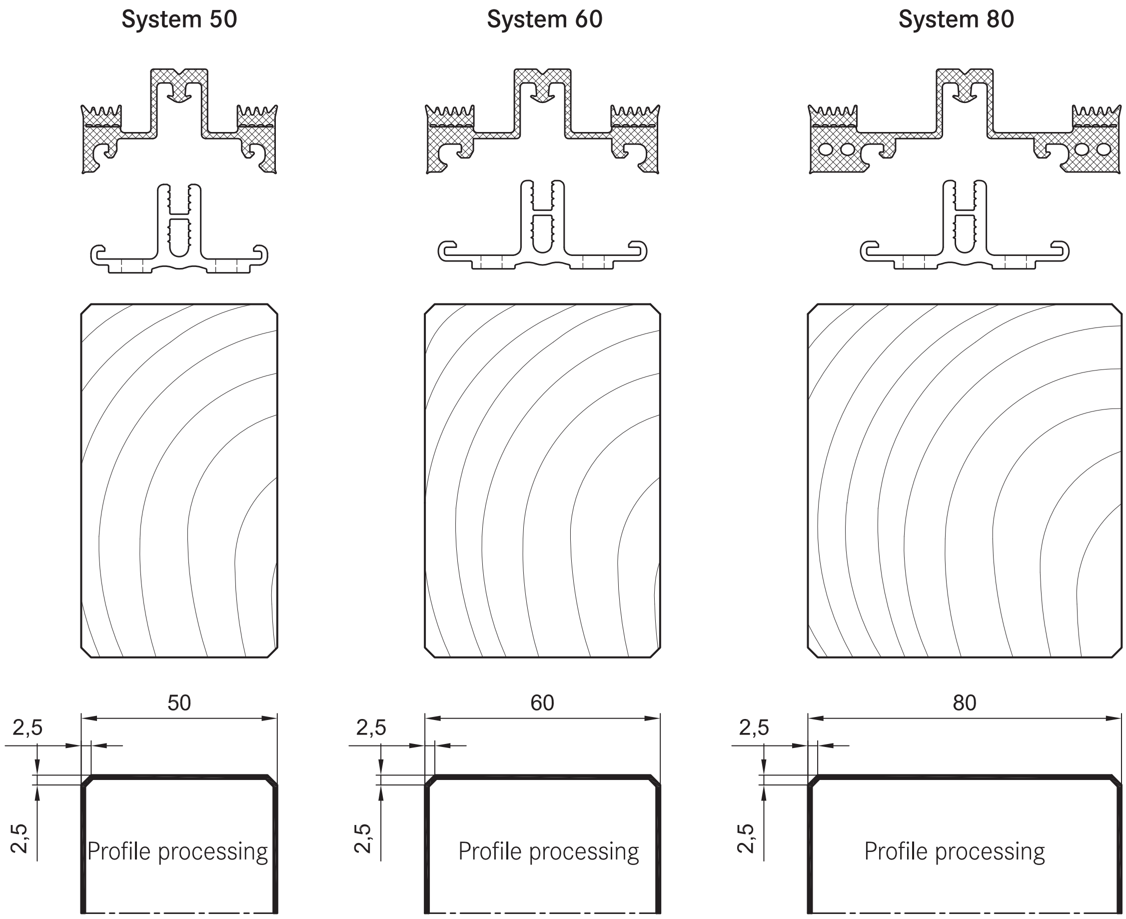
The type of wood chosen depends on the client, architect and/or processor and the following considerations:

- Softwood, strength class C24
- Softwood glued laminated timber, strength class GL24h

The use of comparable hardwoods is also permitted. The profile design is just an example. The add-on channel can also be mounted onto existing profiles.

Note:

Worked edges must be free of shavings and imperfections.



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Mullion-transom joint

Principle

- Attachment of the transoms to the mullions must match the static base system of the mullion-transom design selected.
- Load bearing capacity and suitability are to be statically demonstrated on site. In doing so, the design and technical processing experiences of the processor can be considered.
- Designs are to be chosen that can be considered regular joints for the intended purpose and meet the standards of the Eurocode 5 (DIN EN 1995) or are covered by general building approvals.
- The solutions presented by us are purely examples. A range of designs are possible depending on the shape of the wood and different jointing options.

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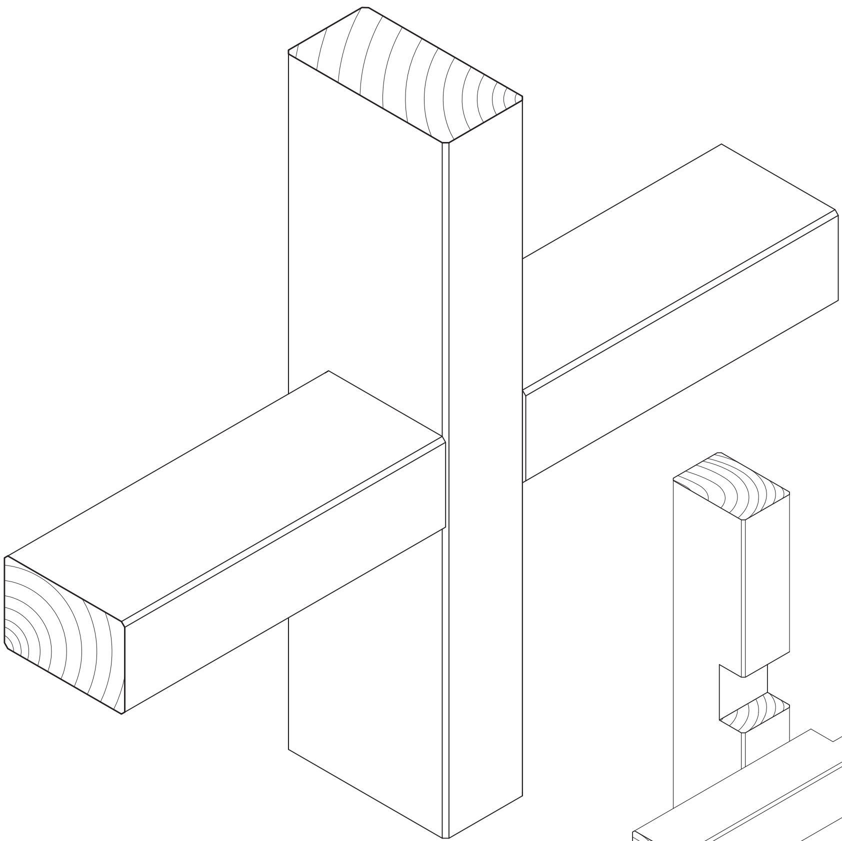
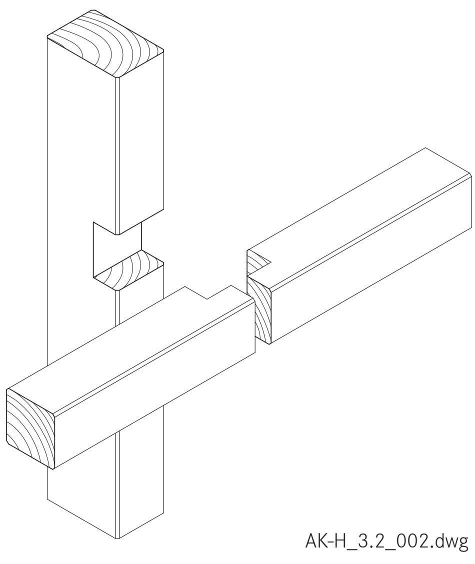


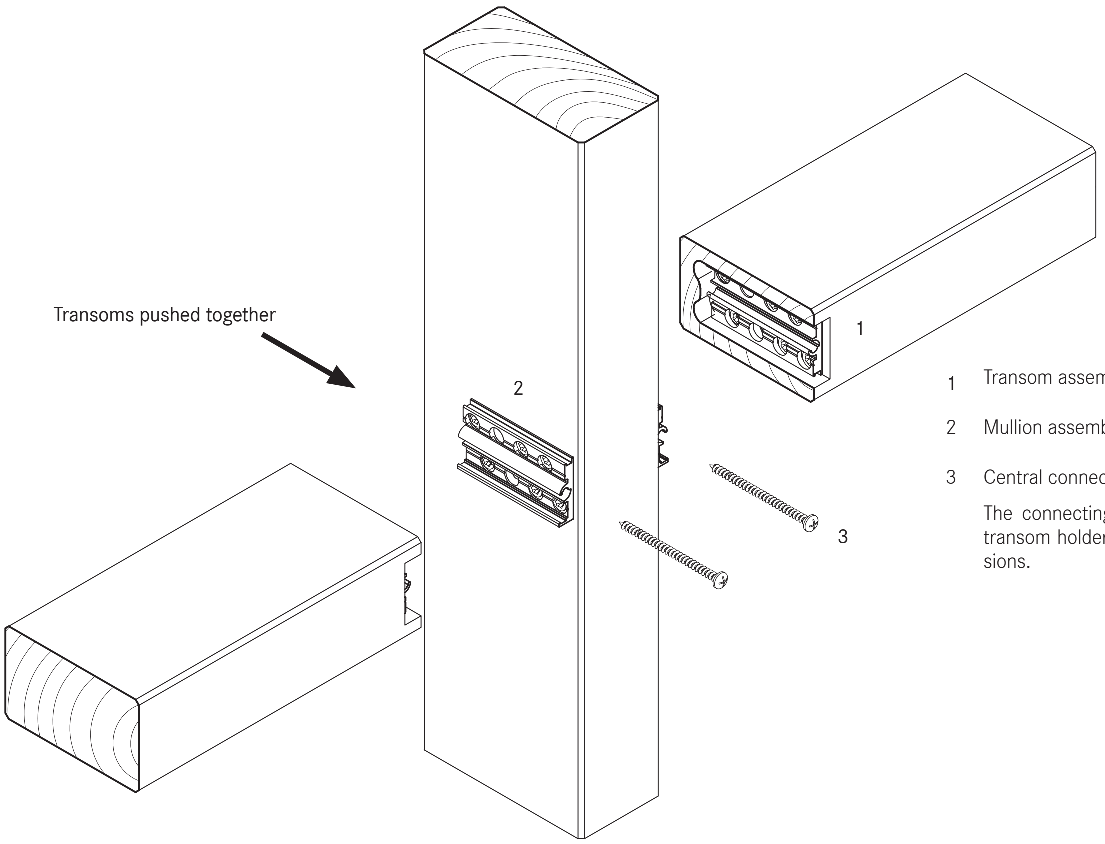


AK-H_3.2_002.dwg

Mullion-transom joint

RHT transom connector for wood systems

- The RHT links wooden mullion and transom constructions with a visible width of 50–80 mm.
- The two identical connector parts are mounted to mullions and transoms and linked with one another by pushing together the transoms.
- A connecting screw locks the connection in all three dimensions.
- The clamping foot on the transom inner seal must be disengaged in the area of the mullion-transom joint.
- When attaching the clamping strips to the system, take care to place the screws outside of the mullion-transom connection in order to avoid a collision with the RHT connector screw fittings.
- The central wooden groove in the transom should begin approx. 80 mm before the end of the transom.
- The glass support should be mounted approx. 100 mm from the end of the transom to prevent any collision between the RHT screws in the transom.



1 Transom assembly

2 Mullion assembly

3 Central connecting bolt

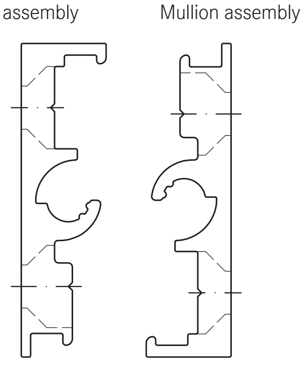
The connecting bolt tensions the transom holder in all three dimensions.

AK-H_3.2_003.dwg

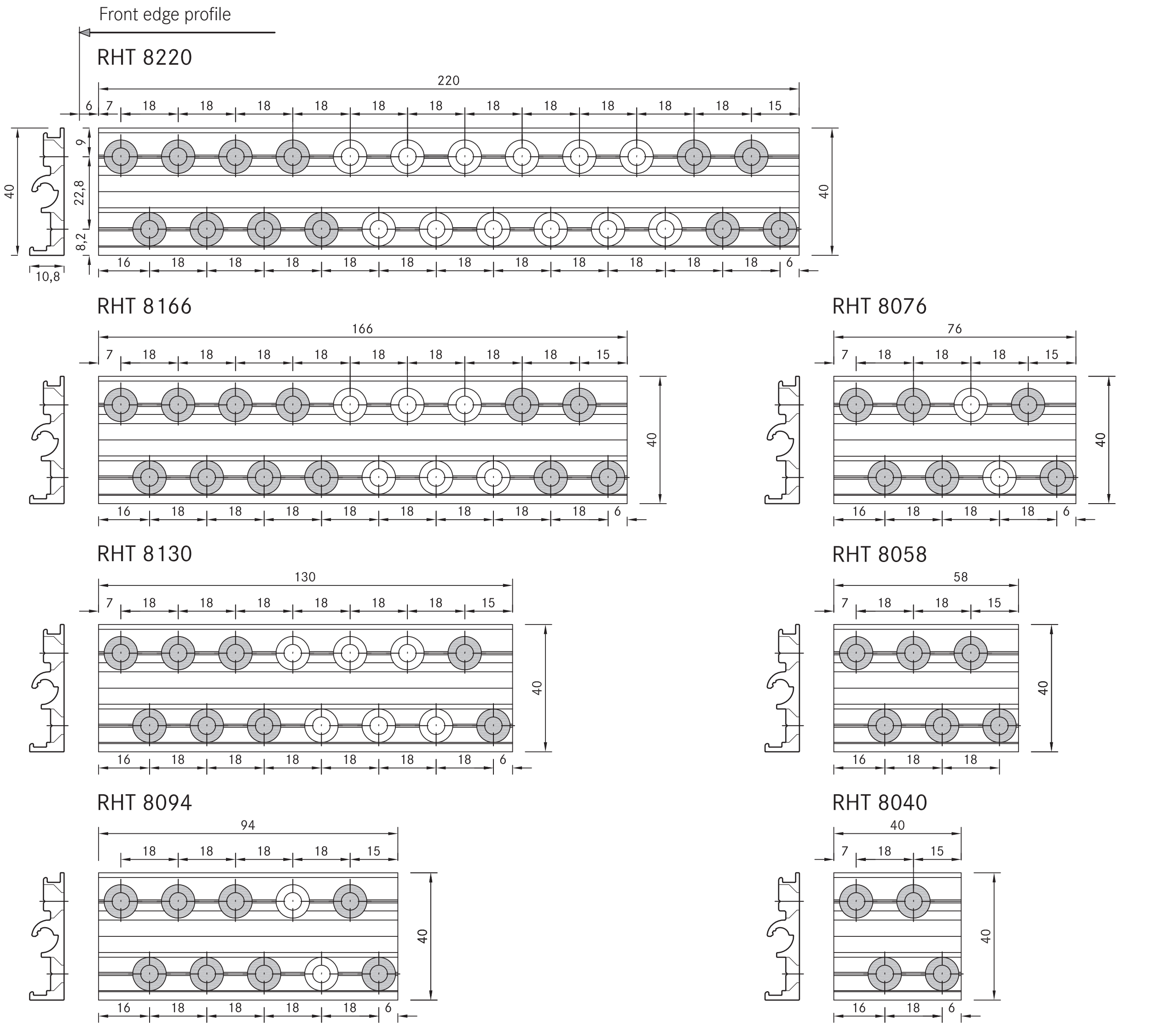
Mullion-transom joint

RHT for wood systems - types

- The range comprises 7 RHT types with different lengths and therefore different load-bearing capacities.
- The screw group comprising a larger number of screws (shown in the diagram) is positioned toward the front edge of the mullion and transom (glass side).



Connector types
Standard screw fittings



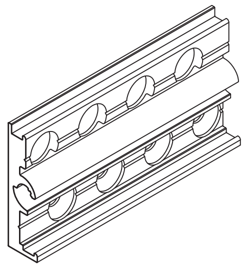
AK-H_3.2_003.dwg

Mullion-transom joint

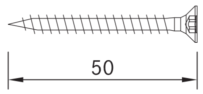
Assembly on the mullion

- The front edge of the connector lies 6 mm behind the front edge of the mullion.
- Z 0126 screws in length 5/50 are always used for attaching to horizontal timbers (mullions).
- When using hard woods or when working near the edge of the wood, a hole of 3 mm diameter should be pre-drilled.
- The number of screws varies for standard screw fittings, depending on the connector type. (Refer to the previous page)
- A combination of screws can be used and calculated case-by-case.

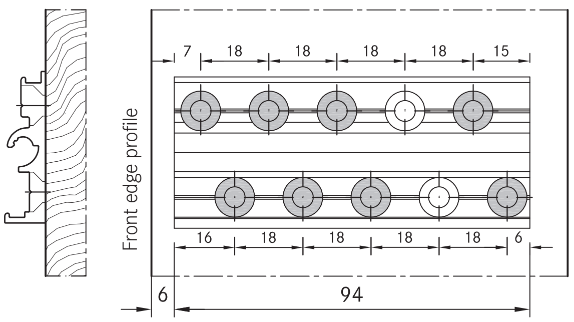
Mullion assembly



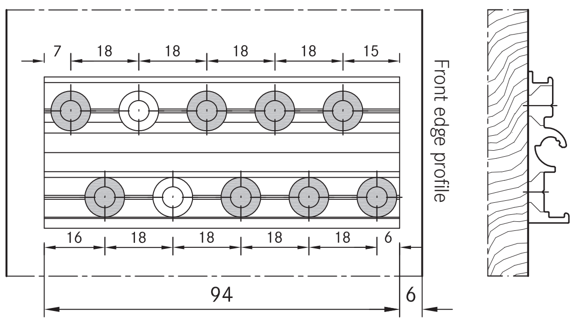
Screw fittings mullion Z 0126



Left mullion with connector e.g. RHT 8094



Right mullion with connector e.g. RHT 8094



AK-H_3.2_003.dwg

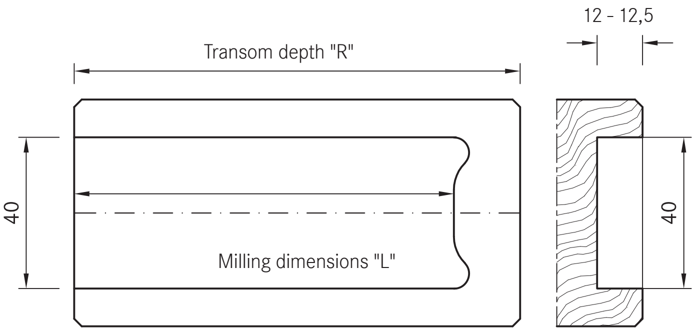
Mullion-transom joint

3.2
3

Assembly on the transom

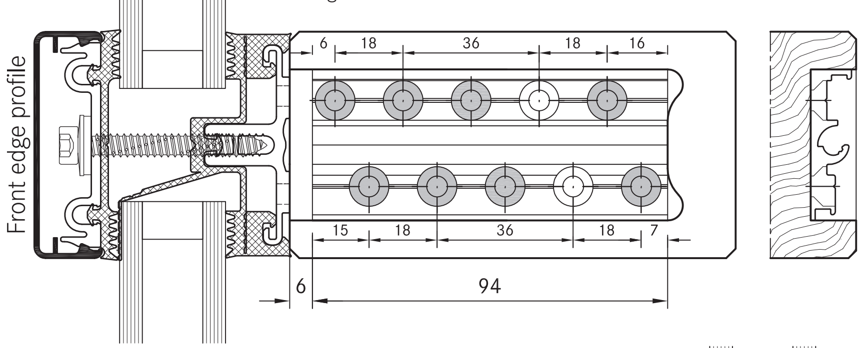
- A recess with 12-12.5 mm depth is milled into the (front of the) transom.
- The milling dimensions are:
  With x length x depth
  40 x (RHT length + 6) x 12-12.5 (mm)
- The milling can be carried out using a standard hand router.
- The front edge of the connector lies 6 mm behind the front edge of the transom.
- Z 0127 screws in length 5/80 are always used for attaching to longitudinal timbers (transoms).
- When using hard woods or when working near the edge of the wood, a hole of 3 mm diameter should be pre-drilled.
- The number of screws varies for standard screw fittings, depending on the connector type. (Refer to the previous page)
- A combination of screws can be used and calculated case-by-case.

Connector type	Transom depth R (mm)	Milling dimensions L (mm)
RHT 8040	55-73	46
RHT 8058	74-91	64
RHT 8076	92-109	82
RHT 8094	110-145	100
RHT 8130	146-181	136
RHT 8166	182-235	172
RHT 8220	236-300	226

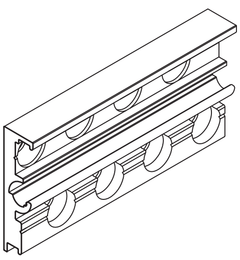


Front-side transom groove, depth 12-12.5 mm

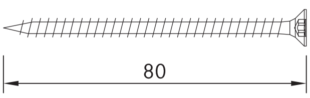
Transom with connector, right front side
e.g. RHT 8094



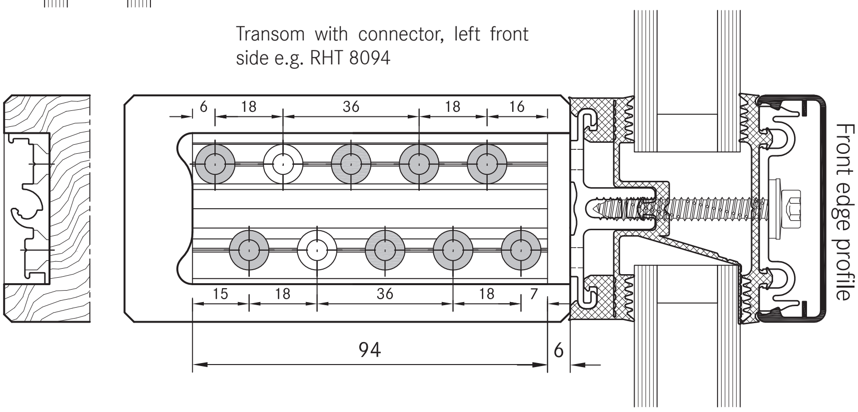
Transom assembly



Screw fitting, transom Z 0127



Transom with connector, left front side e.g. RHT 8094



AK-H_3.2_003.dwg

Mullion-transom joint

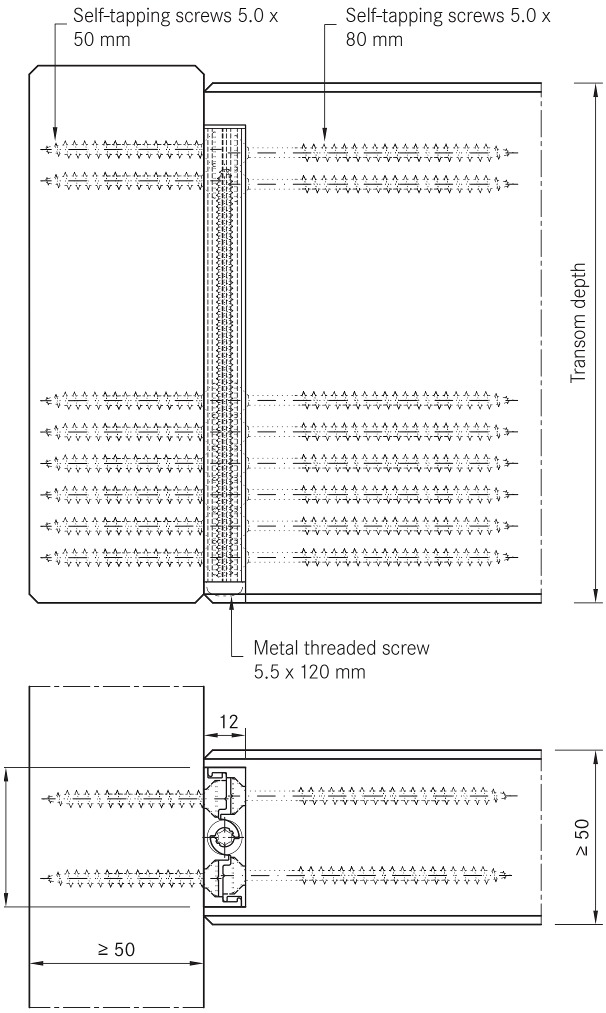
Constructing the timber joint

- The transom is pushed in from the inside to the outside.
- Screwing in the greased connecting screw allows the locked mullion-transom joint to be released in all three dimensions if necessary. This tightens the transom evenly to the mullion along the entire depth.

Linked connectors

- If the transom depth is over 300 mm, 2 connectors can be used along the entire length to improve tensioning of the mullion-transom joint.
- The connector type RHT 8220 is always used on the front edge of the profile. Another connector can be fitted on the RHT 8220 as required.
- A peg is inserted and positioned correctly by the into the connecting screw in order to improve tensioning of the second connector.
- The maximum load-bearing capacity of the RHT 8220 applies in regard to resilience.
- By request, a connector longer than 220mm can be produced. The maximum load-bearing capacity of the RHT 8220 is also valid here.

Example: RHT 8130 top and side views



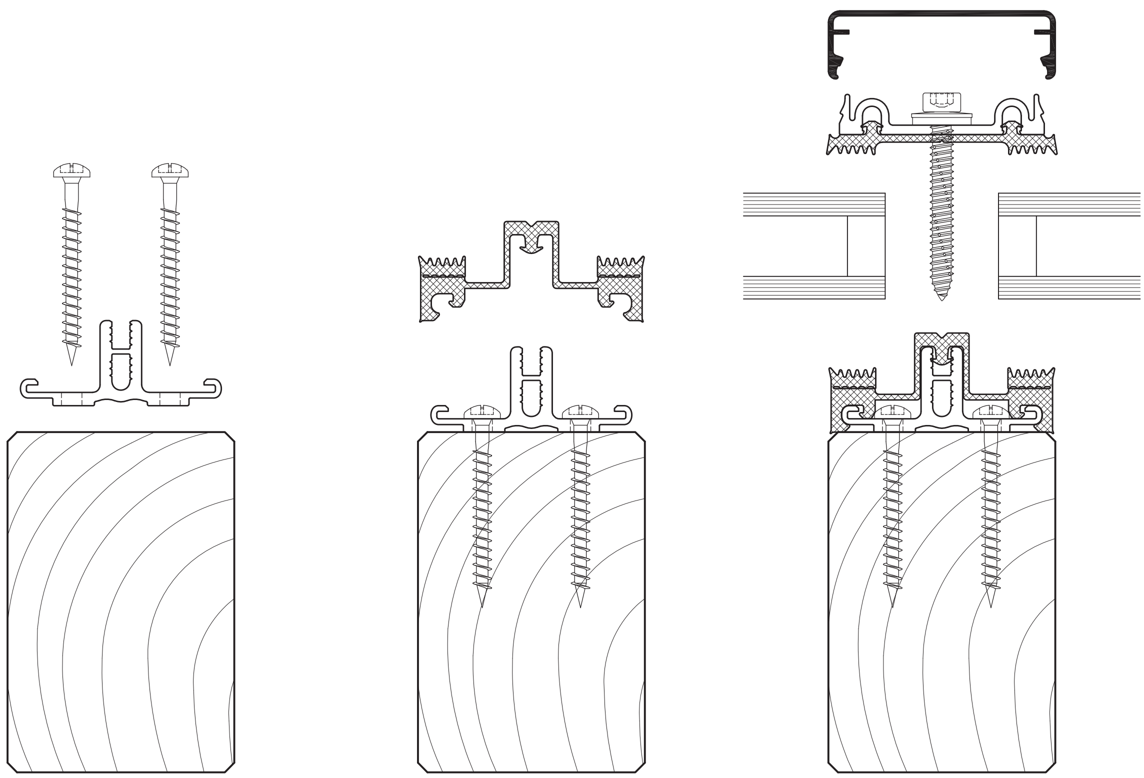
AK-H_3.2_003.dwg

Assembly order

Add-on channel AK 5010/ AK 6010

The Stabalux add-on channel is directly attached to supporting timber substructure. The add-on channel is placed centrally on mullions and transoms and screwed in an alternating pattern on the left and right.
A pair of screws is always placed at the ends of the add-on channel. As well as complete on-site assembly of the components, pre-assembly of supporting profiles and add-on channels in the workshop is possible.

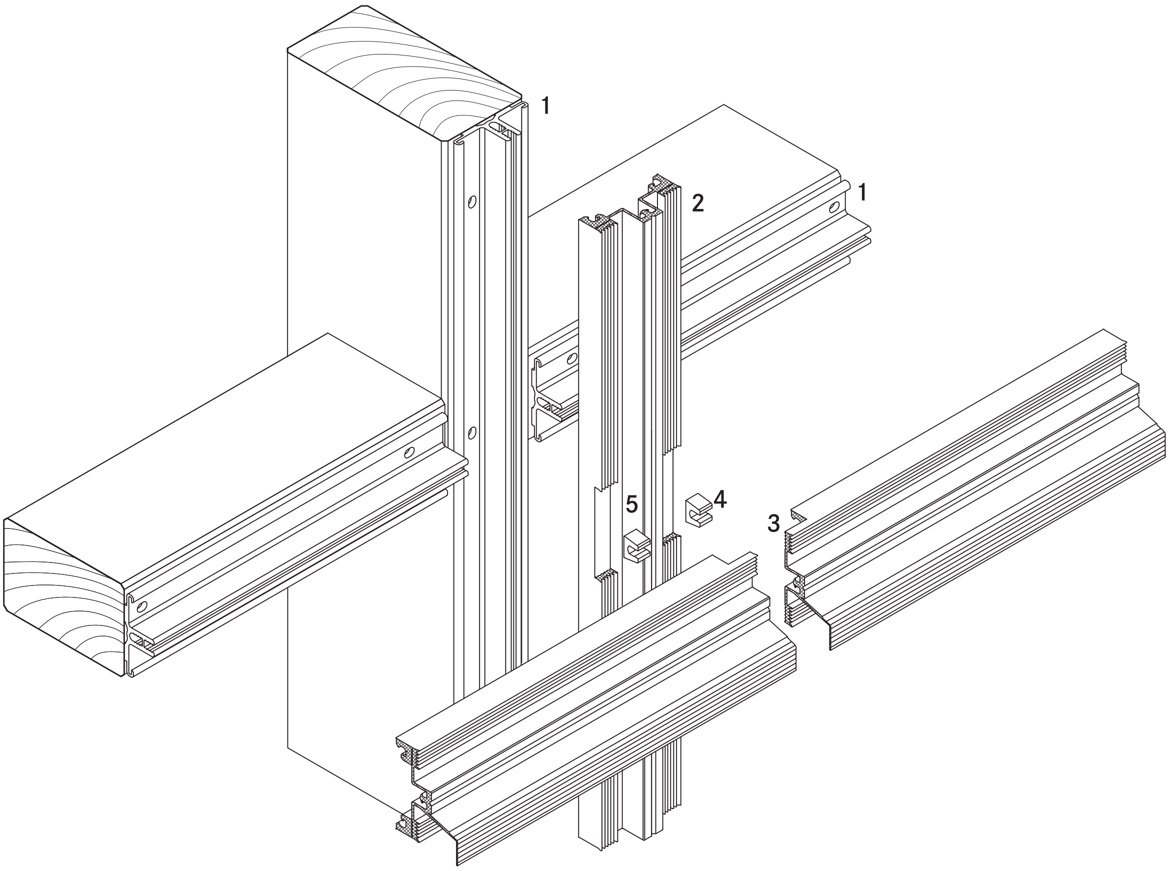
Mullion section



AK-H_3.2_004.dwg

Assembly order

1. Attachment of the add-on channel AK 5010/ AK 6010 to mullions and transoms
2. Attach the inner mullion seal (e.g. GD 6071) with a recess area around the transom.
3. Attach the inner transom seal (e.g. GD 6072) with a recess area around the mullion.
4. Lay and fix the sealing pieces Z 0062 using Stabalux connecting paste Z 0094 in the ends of the transom seal.
5. Seals the overlap joints on mullions and transom seals using Stabalux connecting paste Z 0094.



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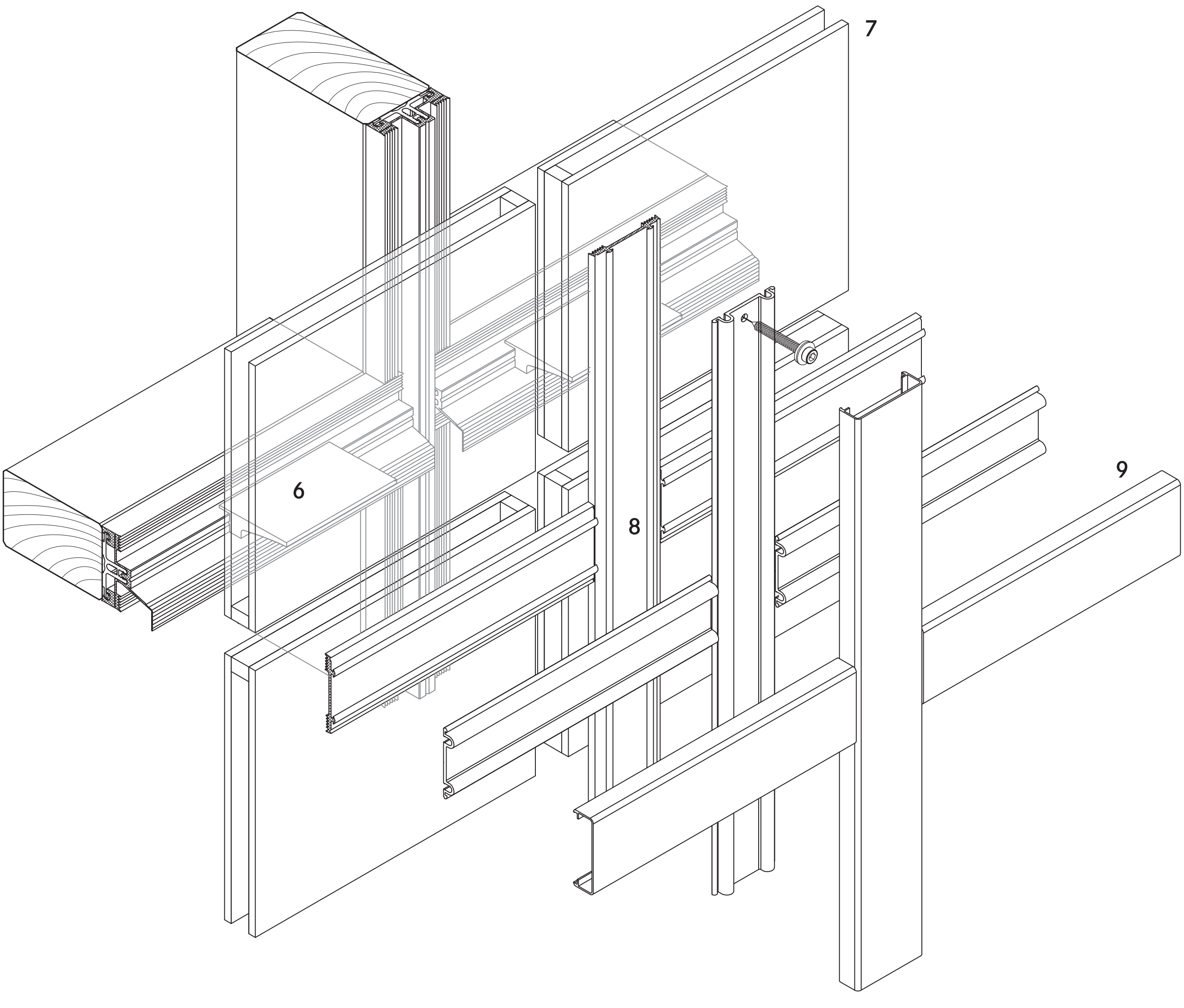
Assembly order

6. Screw on the glass support (e.g. GH 6071).
7. Attaching the filling elements.
8. Assemble the outer sealing section together with the clamping strips.
9. Clip on the upper strip with concealed screw fittings.



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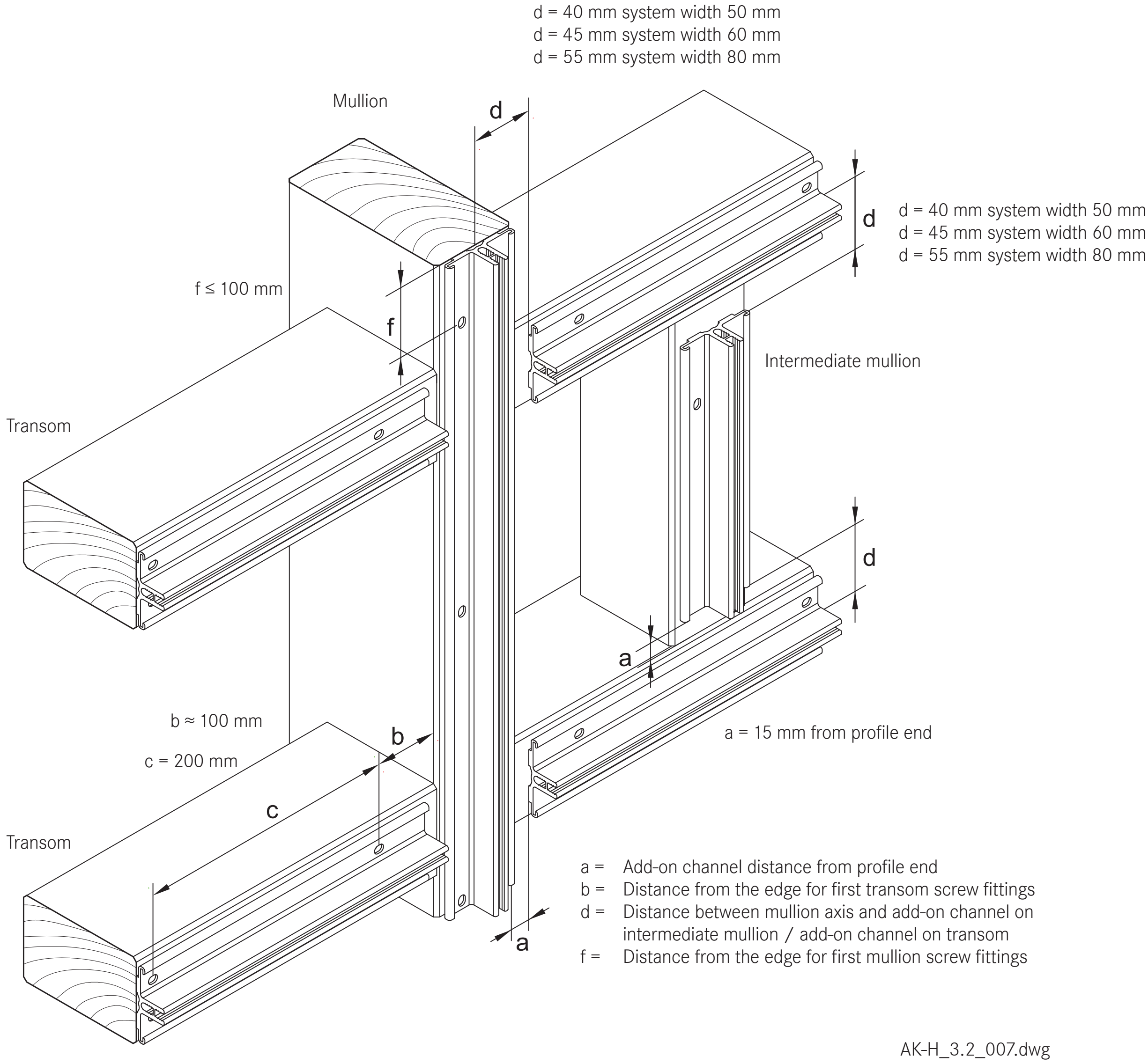
Assembly order for add-on channel

Cutting the add-on channel - mullions

- The length of the add-on channel AK on mullions is generally the same length as the mullion.
- When cutting, be aware of edge distance "f".
- The add-on channel is placed centrally on mullions and runs continuously along it.
- For the length of add-on channels AK on intermediate mullions, be aware of dimension “d“.
- Regardless of the system width, we therefore recommend a distance from the intermediate mullion profile end of a = 15 mm.

Cutting the add-on channel - transoms

- The add-on channel is placed centrally on transoms and it interrupted by the mullions.
- When cutting, be aware of edge distance "b".
- Cutting the add-on channel is done in such a way that between the mullion axis and the channel, the distance "d" is maintained on the transom.
- Regardless of the system width, we therefore recommend a distance from the transom profile end of a = 15 mm.



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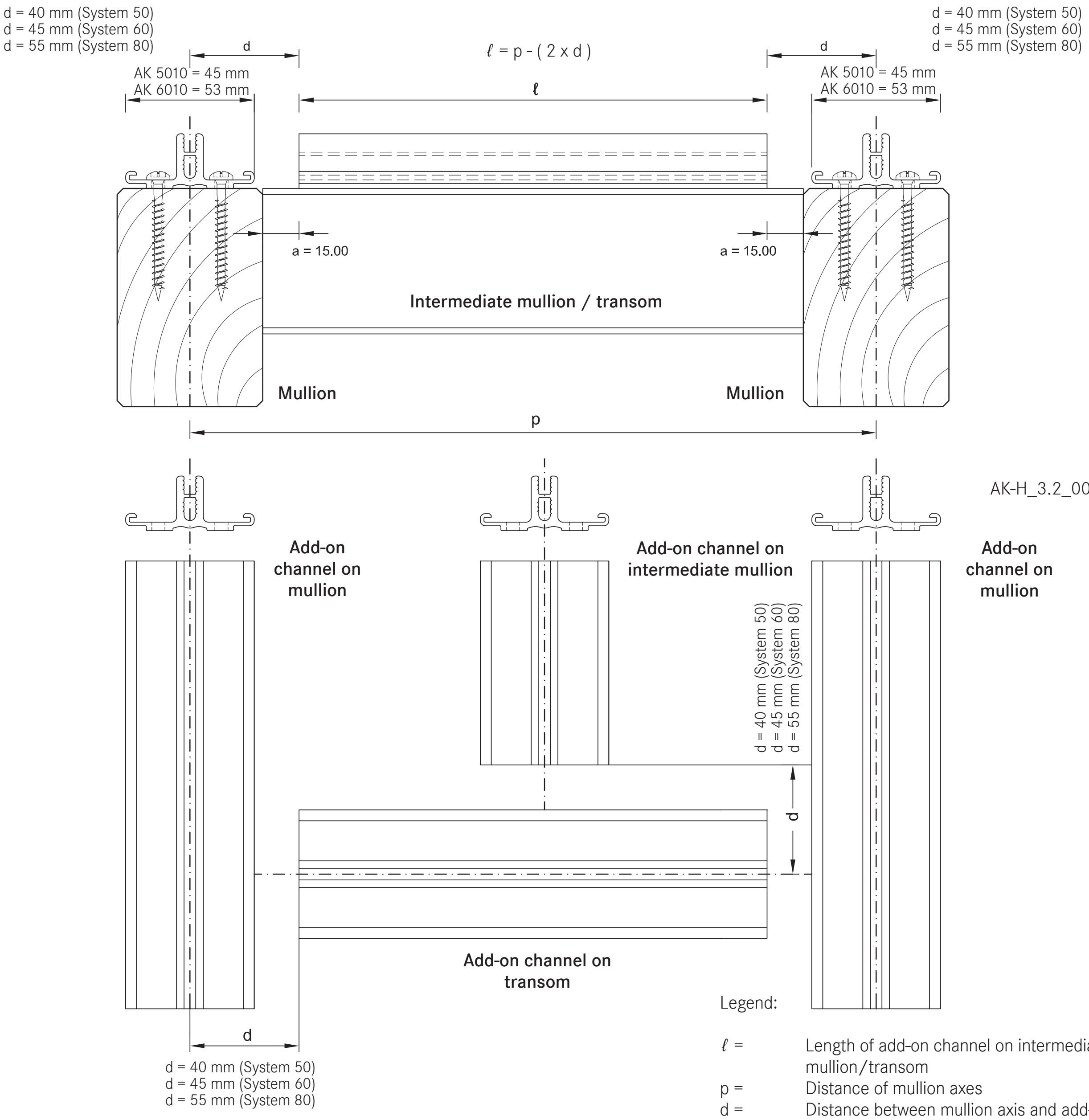
Assembly order for add-on channel

Cutting the mullions:

The length of the add-on channel on mullions is generally the same length as the mullion: $\ell_{AK} = \ell_{mullion}$

Cutting intermediate mullions and transoms:

	System width	Distance „d“	Calculate the length ℓ of the AK Intermediate mullions and transoms
AK 5010	50	40 mm	p - (2 x 40) = p - 80 mm
AK 6010	60	45 mm	p - (2 x 45) = p - 90 mm
	80	55 mm	p - (2 x 55) = p - 110 mm



Legend:

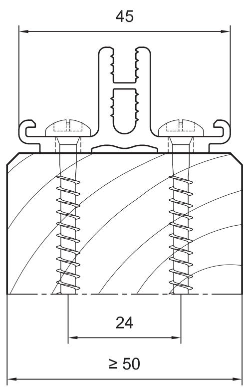
ℓ =	Length of add-on channel on intermediate mullion/transom
p =	Distance of mullion axes
d =	Distance between mullion axis and add-on channel on intermediate mullion / transom
a =	Distance from profile end

Assembly order for add-on channel

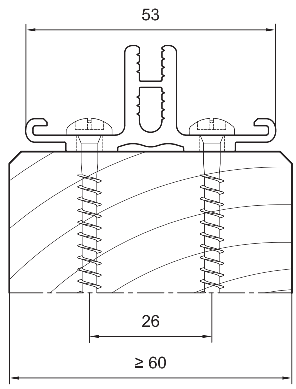
Attachment of add-on channel AK 5010/ AK 6010

- The add-on channel is pre-drilled with 5.4 x 7.2 mm slots at 200 mm intervals with an edge distance of 50 mm. These serve for screwing it to the supporting structure.
- The screw connection between the add-on channel and substructure is achieved using system screws from the Stabalux range.
- Screw fittings are generally placed every 200 mm (c = 200 mm). If needed, they may also be placed in pairs every 200 mm (c = 200 mm).
- A pair of screws is always placed at the ends of the add-on channel.
- The Stabalux system screws are directly screwed into the timber. Pre-drilling of timber profiles is generally not necessary. However, this should be considered in the case of high-quality timbers. Application of screw fittings should be controlled.
- The load bearing capacity of the screw fittings is regulated by general building approval Z-14.4-767 and should be demonstrated for each particular case.

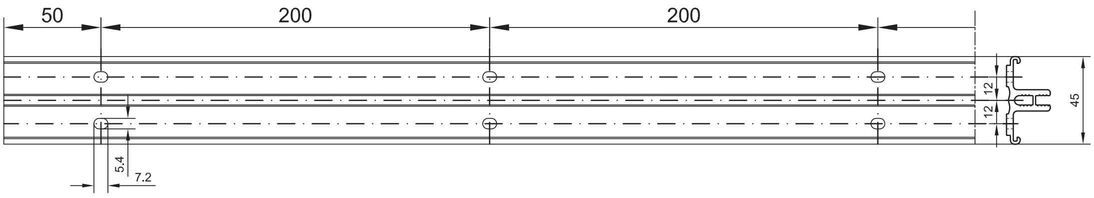
AK 5010



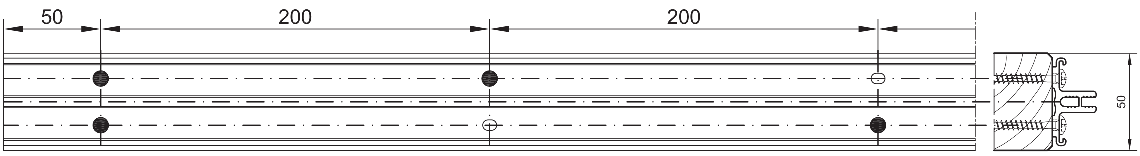
AK 6010



AK 5010 hole pattern



AK 5010 attachment to mullions and transoms: first attachments placed in pairs, then every 200 mm



AK 6010 hole pattern

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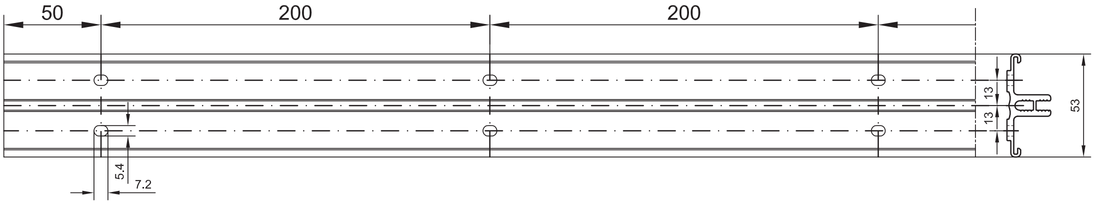
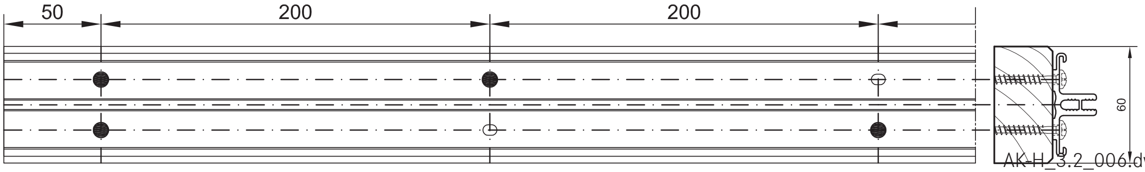


AK 6010 attachment to mullions and transoms: first attachments placed in pairs, then every 200 mm



AK-H_3.2_006.dwg

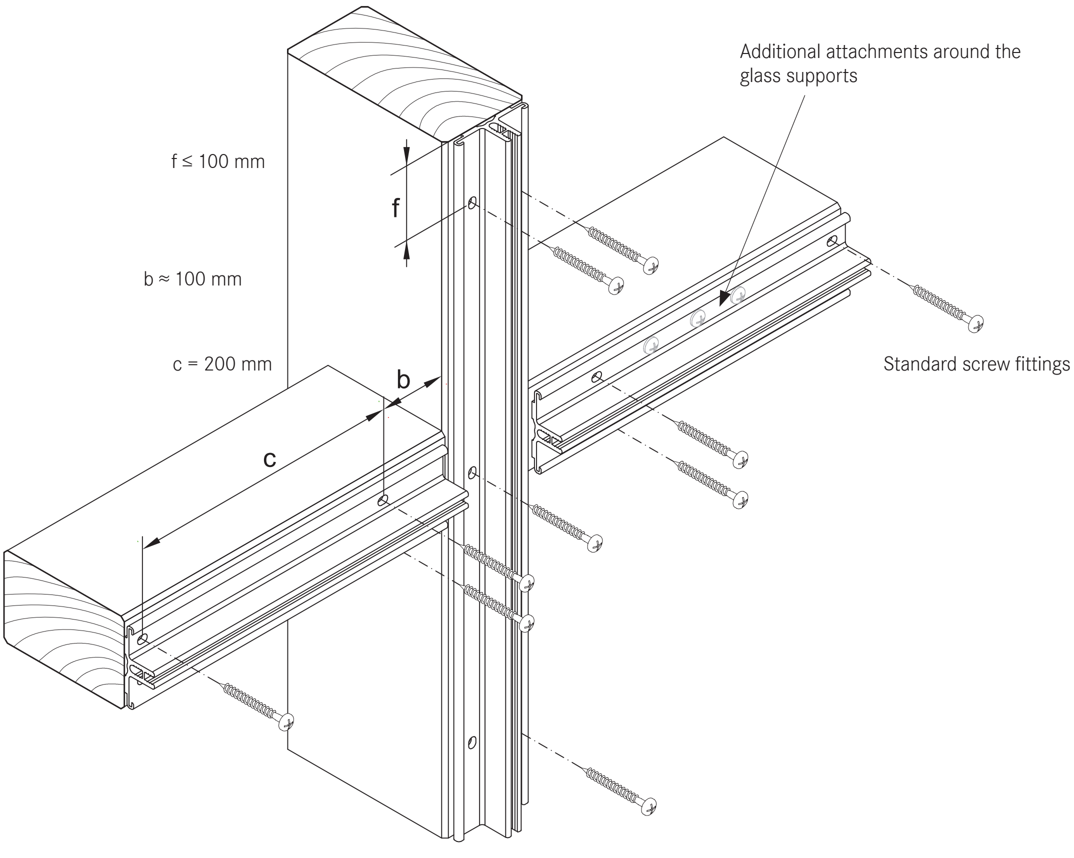
Assembly order for add-on channel

Mullion

- The add-on channel is first positioned centrally on the mullion and screwed on both left and right sides.
- Add-on channels on mullions run continuously along the mullion.
- The length of the add-on channel is generally the same length as the mullion.
- For intermediate mullions, the length of the add-on channel is dependent on the width of the substructure and the chosen system width for the glazing system.
- The edge distance of screw fittings on the mullion should not exceed 100 mm (f ≤ 100 mm).
- The distance between screw fittings is 200 mm and is usually implemented in an offset manner (c = 200 mm)

Transoms

- The add-on channel is then positioned centrally on the transoms and screwed on both left and right sides.
- The add-on channel on transoms is interrupted by the mullions.
- Cut the add-on channel as described.
- The first screw fittings on the transom are placed approx. 100 mm measured from the profile end (b ≈ 100 mm). However, always ensure that there is no collision with the mullion and transom joint and the glass support assembly.
- Around the glass supports, the channel is reinforced using additional attachments. Reinforcement varies depending on the type of glass support. (See section on glass supports).



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Tips for laying seals

Sealing system principle, general information about glazing seals

The Stabalux sealing system consists of the outer and inner sealing sections.

- The outer sealing section has the primary function of preventing the ingress of moisture. At the same time, the sealing section provides a flexible support for the glass panes.
- The inner sealing section acts to protect the inner space, water guiding section and elastic glass supports from moisture and steam.

Seals should be fitted on the construction site, but may also be pre-cut to the required length in the factory placed into the add-on channel and/or clamping strips following the mounting instructions for seals. Always ensure that seals are not bearing any loads once installed and are firmly pressed onto joints. All joints should be sealed as the per the following descriptions.

Pressure equalisation and controlled drainage

Pressure equalisation is generally achieved via openings at the base, head and ridge points. Should additional ventilation be required in the area of the transom (e.g. where panes are only supported on 2 sides or where transom length is ℓ 2 m), then this ventilation should be created by placing holes into the cover profile and/or using notches on the lower sealing lips of the outer seal.

The pressure equalisation openings also serve to drain away moisture. The inner sealing section is formed in such a way that when the joints are properly sealed, any moisture that occurs and does not dissipate via the rebate ventilation will drain away downwards. In the AK-H system, higher sealing sections overlap lower ones. This principle must be consistently implemented down to the lowest point of the glazing so that the water-guiding level of the structure carries moisture to the outside. Film is placed beneath the add-on channels and seals accordingly. It must be ensured that the film will last for a long time (see also design details).

Inner sealing section

- To avoid condensation build-up between the timber and seal, any knotholes and grooves in the timber must be repaired on the sealed surface.
- The structure of the inner sealing section differs in the AK-H system for vertical facades and roof glazing.

Inner seals for vertical glazing

- Seals with two drainage sections and a 16.5 mm height to safely guide away any moisture or condensation to the outside. These seals are created by overlapping the seal joints in which the higher sealing section of the transom goes underneath the lower level of the mullion.
- The use of intermediate mullions in the system creates an exception. In verticals facades, the intermediate mullion seals are pushed up again the transom seals. We recommend forming a drain with the connecting paste at the lower joint.
- The seal flap protects the vulnerable area of the edge bonding in the rebate in double glazing and ensures that moisture is drained away via the vertical mullions.
- 8 to 18 mm single glazing use transom seals without seal flaps. Transom seal GD 6073 should be in addition and can also be used in for transoms in inclined glazing. The installation of 5 mm thick glass panes is still possible, but adjustments must be made and geometrically checked.

Inner seals for glazed roofs

- A special seal geometry for glazed roofs also allows for two-level stepped drainage. The 16.5 mm high seals are laid with overlapping joints.
- The use of intermediate mullions in the system creates an exception. The intermediate mullion seals can only be pushed up flush against the transom seals. Due to the seal geometry (transom seal without seal flap), the add-on channel and roof structure (e.g. influence on roof incline) should be evaluated in each case. Generally, intermediate mullions should be avoided in glazed roofs.

Tips for laying seals

Some basic information for sealing and sticking down Stabalux seals

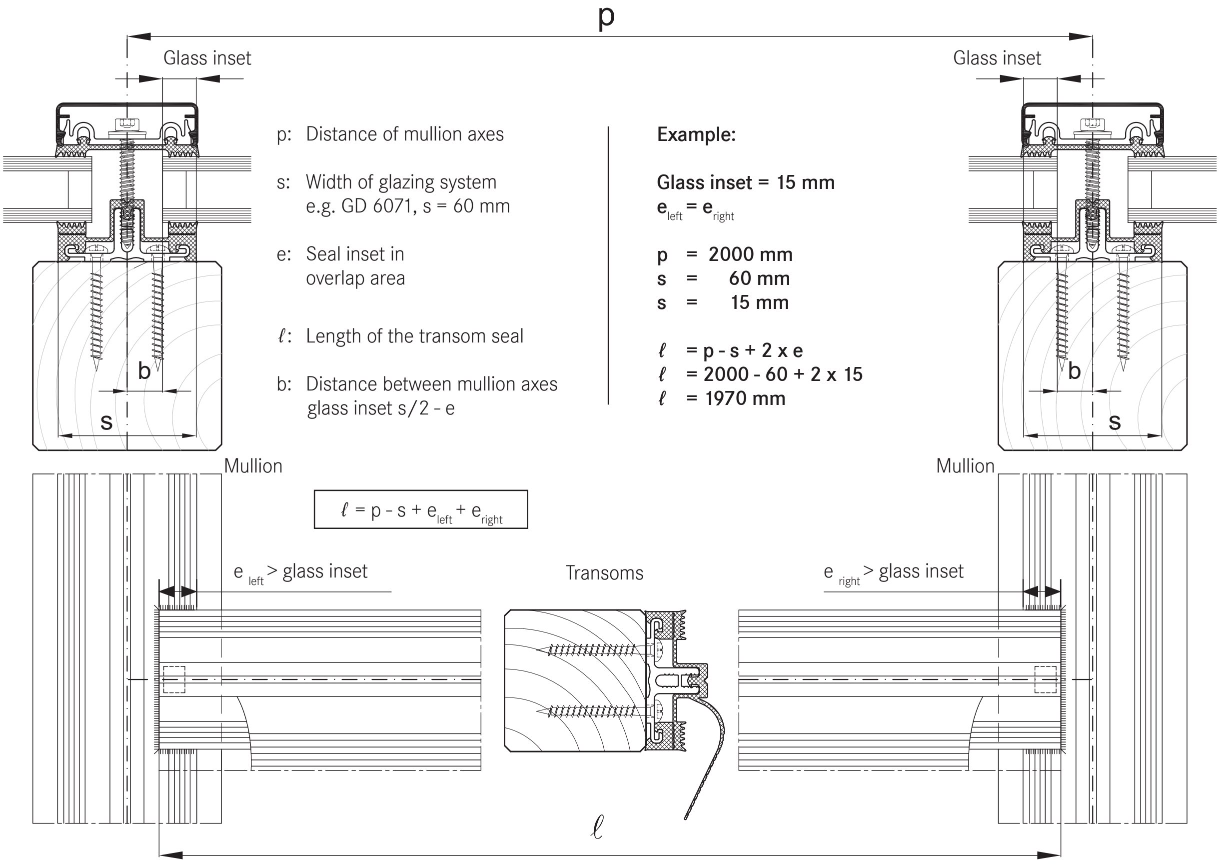
- To avoid condensation build-up between the timber and seal, any knotholes and grooves in the timber must be repaired on the sealed surface.
- All joints and seal penetrations must be waterproofed with the exception of the Stabalux screw fittings.
- Gasket joints in the inner sealing section should always be sealed using Stabalux sealant, regardless of whether they are butt joints or overlapping. We recommend Stabalux connecting paste Z 0094. Follow the directions provided by the manufacturer).
- For difficult to seal places we recommend first using Sicomet Z 0055 fixing glue.
- Before gluing, ensure all surfaces are free from moisture and dirt.
- Weather conditions such as snow and rain prevent an effective seal.
- Temperatures below +5 °C are not suitable for fixing seals.
- The hardened connecting paste should not prevent level support of glass.

Pre-cut

- The length of the mullion seal is generally the same length as the add-on channel attached to the mullion.
- The length of the transom seals matches the distance between the mullion seals plus an allowance for glass inset on each side. Ensure that the seal flap always covers the fill element's inset distance.
- When cutting to size, always ensure that seals are not bearing any loads when installed.

Simplified formula

System width	Calculate the length ℓ of the transom seal
50 mm	p - 2 x b = p - 2 x 13 mm = **p - 26 mm**
60 mm	p - 2 x b = p - 2 x 15 mm = **p - 30 mm**
80 mm	p - 2 x b = p - 2 x 20 mm = **p - 40 mm**



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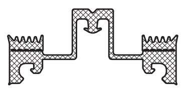
Facade seals

Assembly of inner seal for vertical roof glazing - mullions

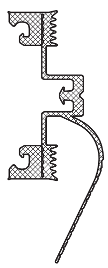
- In the first step, the mullion seals are attached.
- The vertical seals for the mullions (2nd drainage section) are laid continuously.
- The length of the mullion seal is generally the same length as the add-on channel attached to the mullion.
- Notch out the mullion seals at the height of the transom in order to allow them to interlock with the transom seal. The 16.5 mm high seals can be divided across their height to allow a simple overlap at critical transom joints.
- As an exception, the intermediate mullion seals are pushed up against the transom seals. Therefore the intermediate mullion seals are attached after laying the transom seals. The seal flap of the upper transom runs continuously in the upper part of the joint.

Inner seal mullions

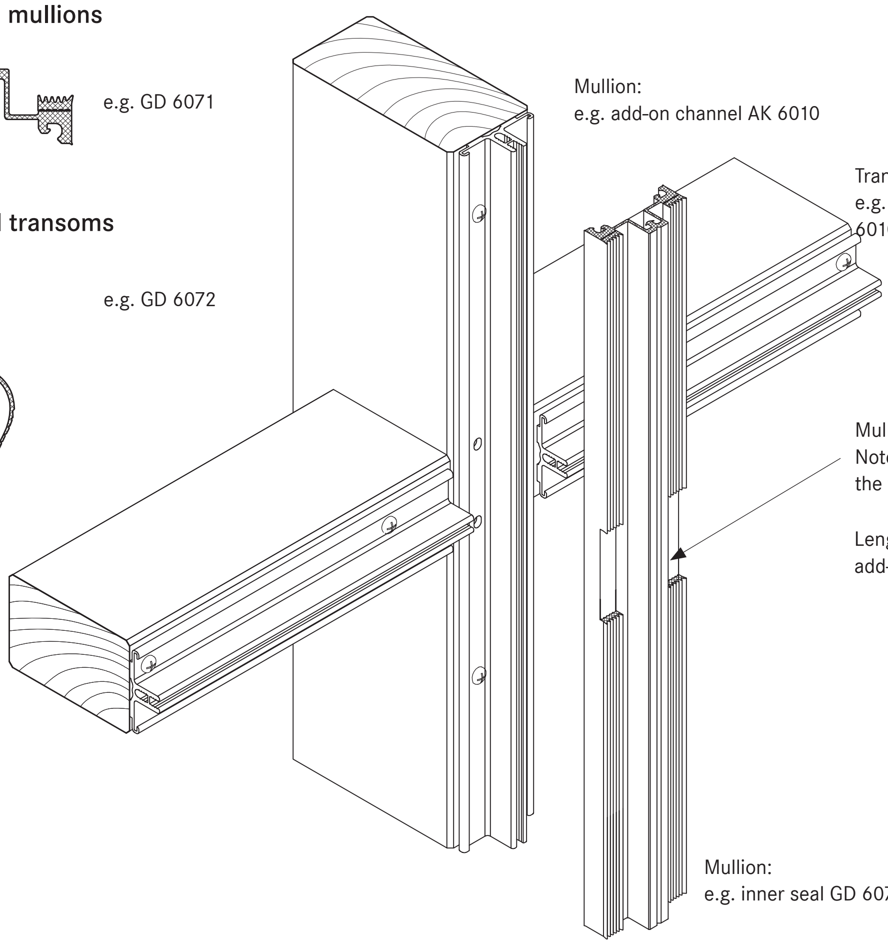


e.g. GD 6071

Inner seal transoms



e.g. GD 6072



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Facade seals

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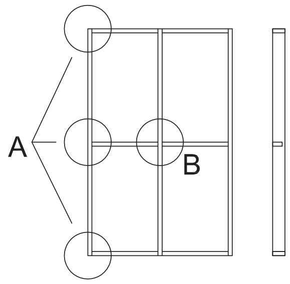
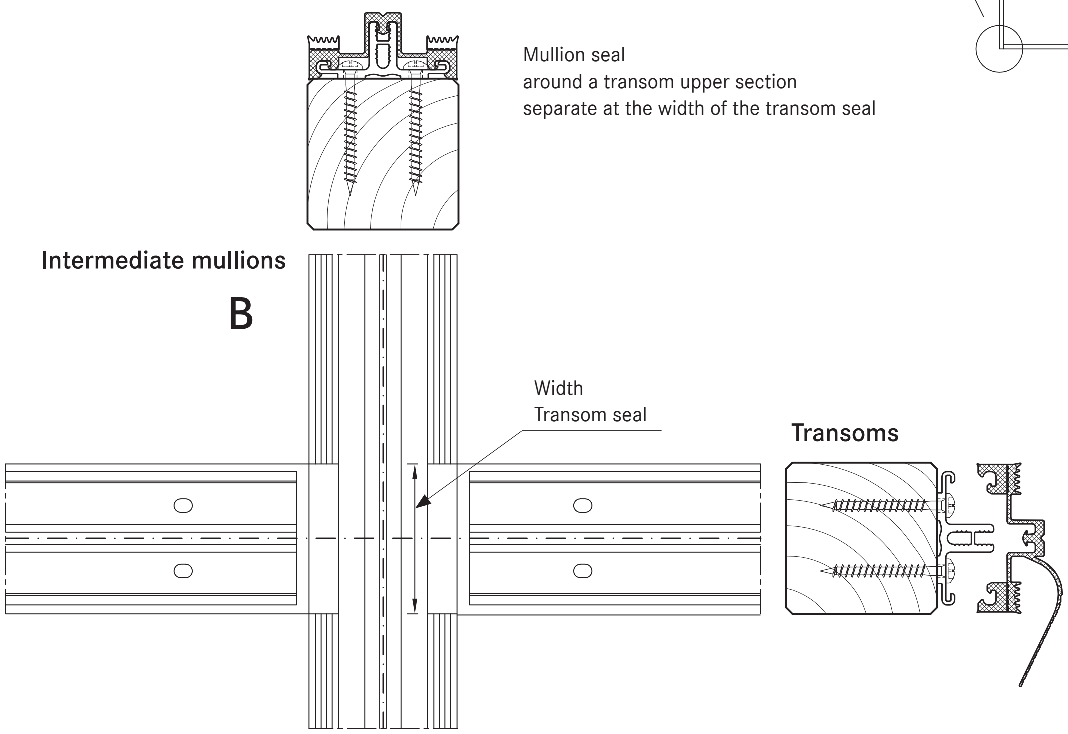
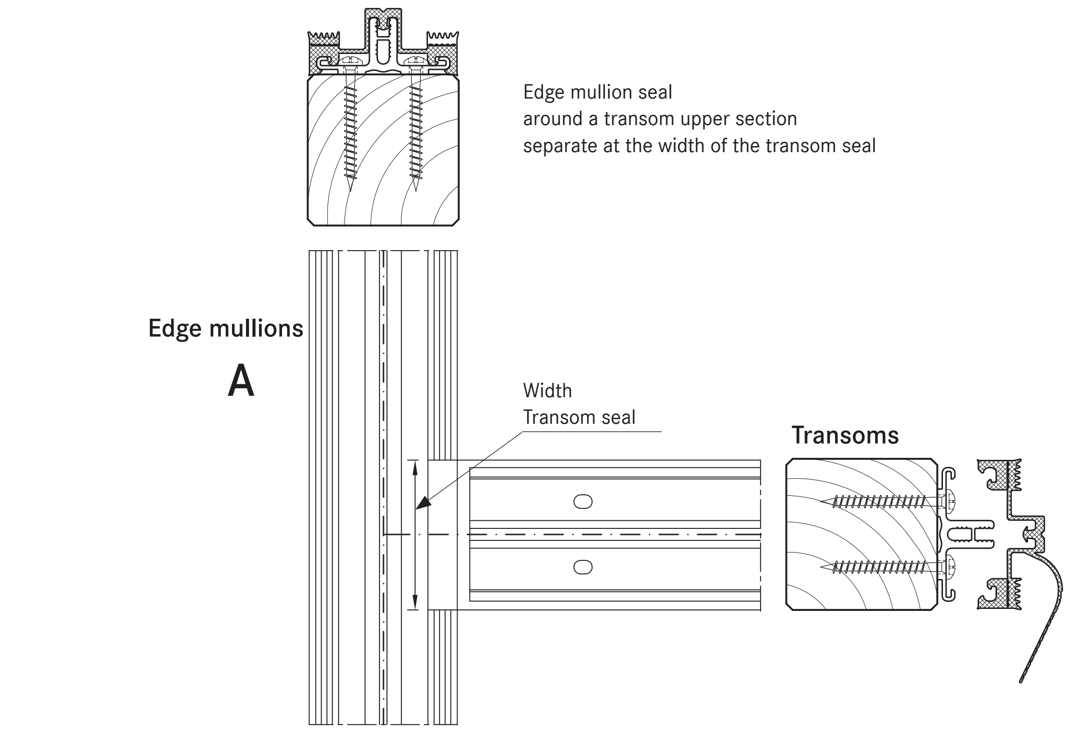
Assembly of inner seal for vertical roof glazing - mullions







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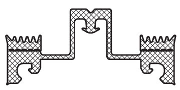
Facade seals

Assembly of inner seal for vertical roof glazing - mullions/transoms

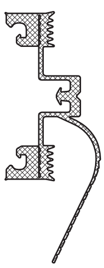
- In the second step, the transom seals are overlapped into the mullion seals. In the overlap area, the lower part of the 16.5 mm tall separable transom seal should also be removed.
- The length of the transom seal - see pre-cut part.
- Along a transom, seals must be laid continuously.
- In order to ensure good drainage of the transom, before gluing the overlap joint, the Z 0062 sealing pieces should be inserted at the ends of the transom seal according to the following diagram and fixed with Stabalux Z 0094 connecting paste. The gasket joint should then be generously sealed. Ensure unobstructed ventilation and drainage of the rebate area.
- Moisture and condensation is guided away via the seal flap of the transom seal (1st drainage section) to the main mullion.
- The protruding length of the seal flap should be removed at the perforation once glazing is completed.
- When installing single glazing up to 18 mm thick, seals without a seal flap are used on transoms (see section on “Inner seals for vertical glazing” and information about glass support GH 6073).

Inner seal mullions

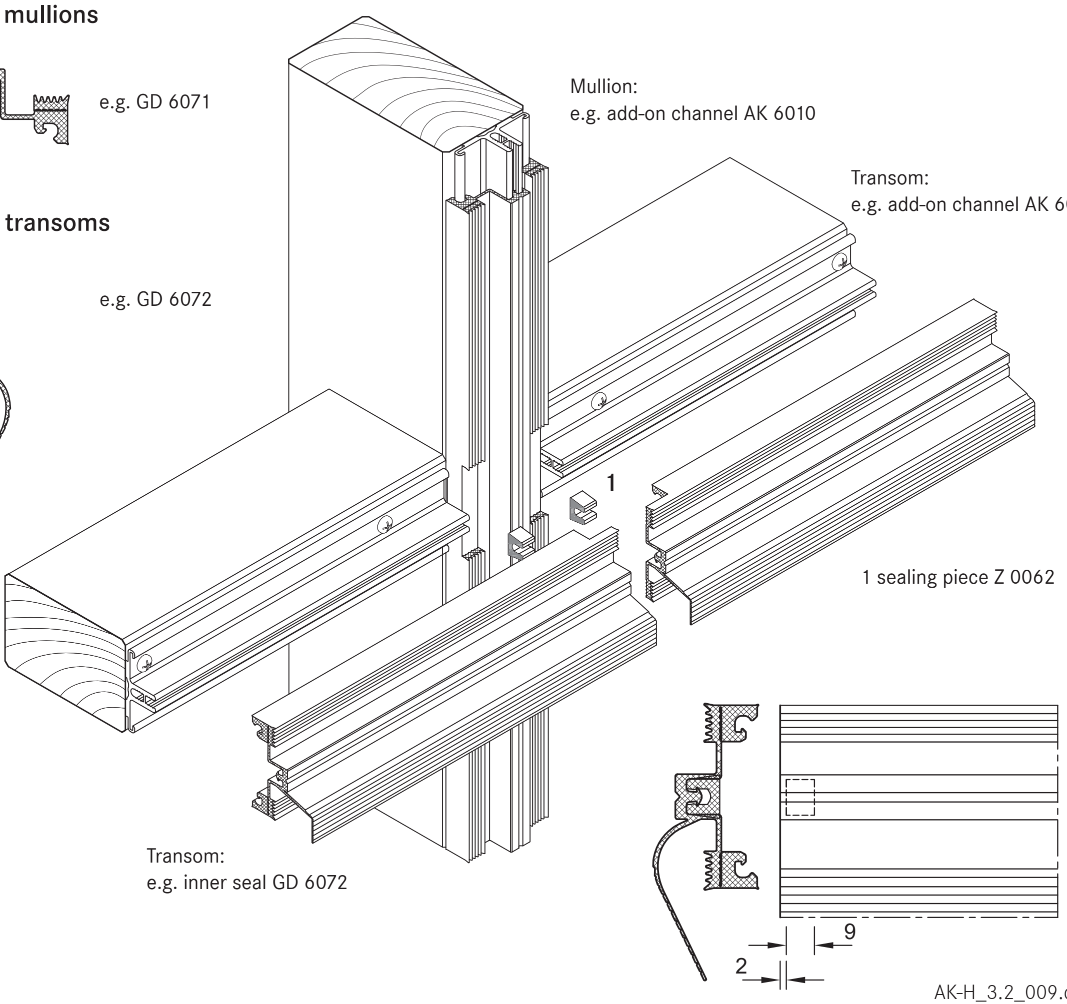


e.g. GD 6071

Inner seal transoms



e.g. GD 6072



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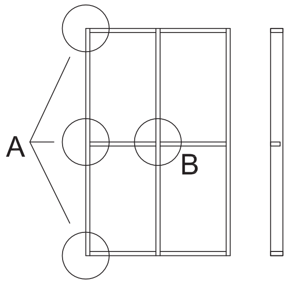
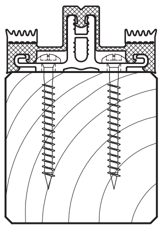
Facade seals



Assembly of inner seal for vertical roof glazing - mullions/transoms

Completed glued joints Intermediate mullion and end mullion



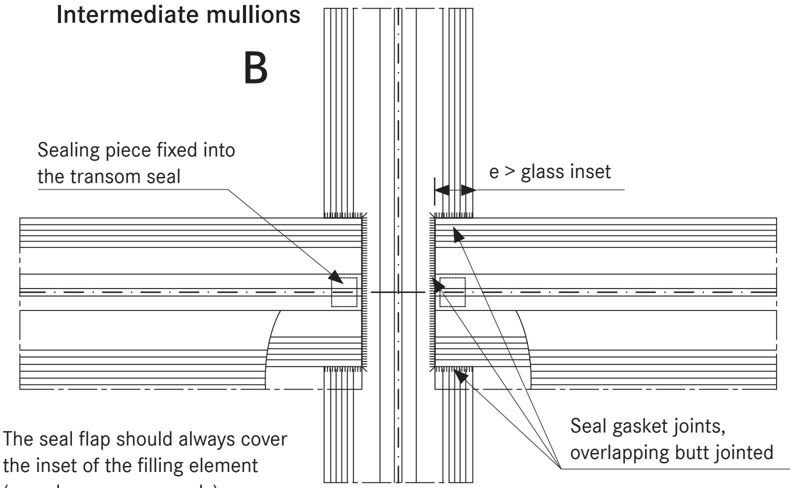
Mullion seal
around a transom upper section
separate at the width of the transom seal

Intermediate mullions

B

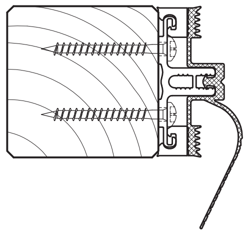
Sealing piece fixed into the transom seal

e > glass inset



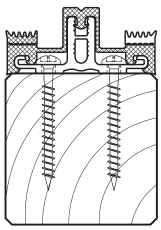
Transoms

Transom seal
separate lower section at length of the overlap “e”



The seal flap should always cover the inset of the filling element (e.g. glass panes, panels)

Seal gasket joints, overlapping butt jointed



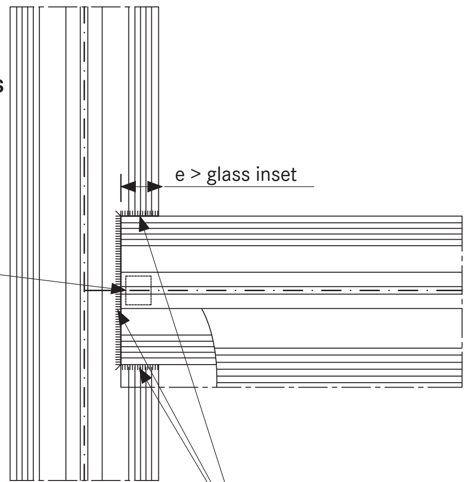
Edge mullion seal
around a transom upper section
separate at the width of the transom seal

Edge mullions

A

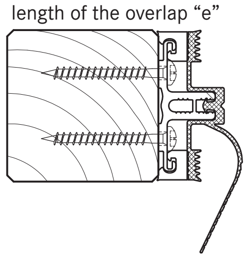
e > glass inset

Sealing piece fixed into the transom seal



Transoms

Transom seal
separate lower section at length of the overlap “e”



Seal gasket joints, overlapping butt jointed

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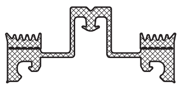
Facade seals

Assembly of inner seal for vertical roof glazing - intermediate mullions

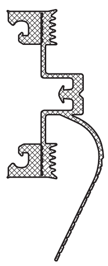
- The intermediate mullion seals are pushed up against the transom seals. Therefore the intermediate mullion seals are attached after laying the transom seals. The seal flap of the upper transom runs continuously in the upper part of the joint.
- A either end of the intermediate mullion seal, Z 0062 sealing pieces are inserted and fixed in place with connecting paste Z 0094. The gasket joints are then generously sealed.
- On the lower connection to the transom seal we recommend forming a drain with the connecting paste in the intermediate mullion rebate.
- For intermediate mullions we recommend using inner seal e.g. GD 6073

Inner seal mullions

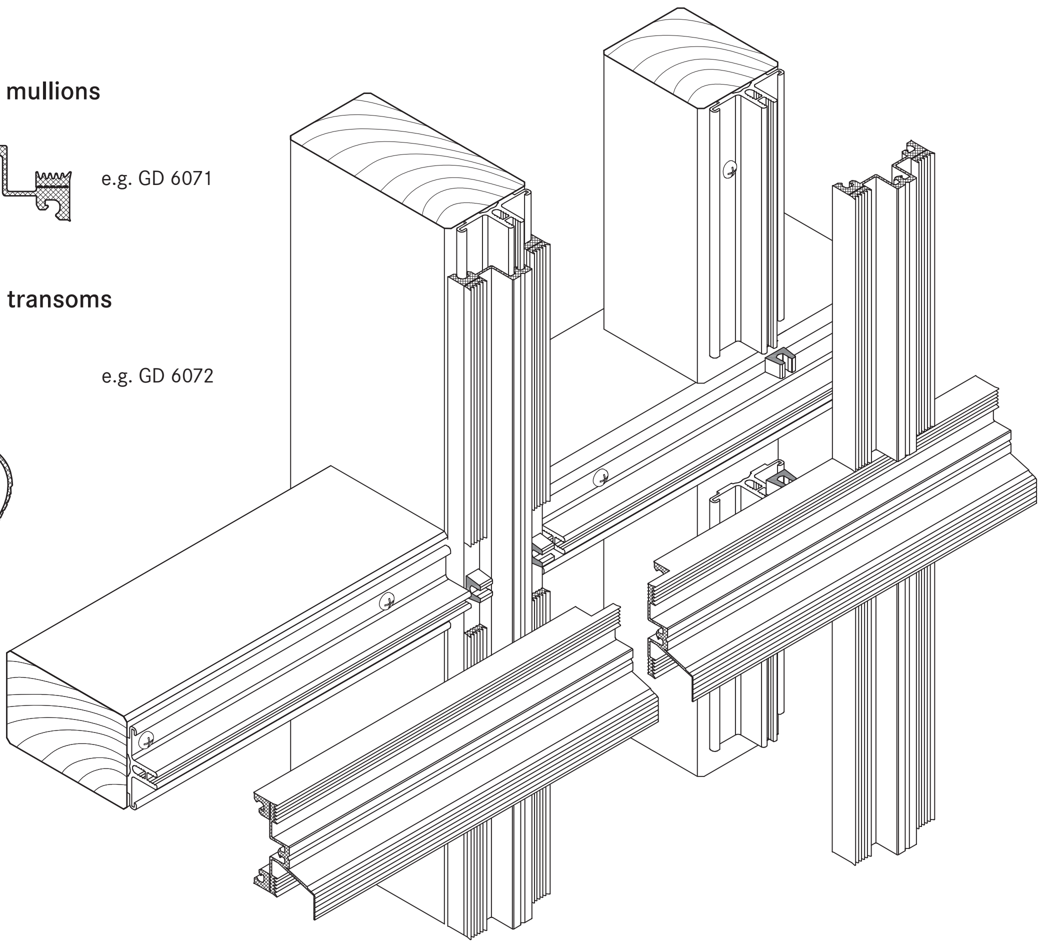


e.g. GD 6071

Inner seal transoms



e.g. GD 6072



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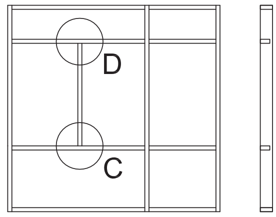
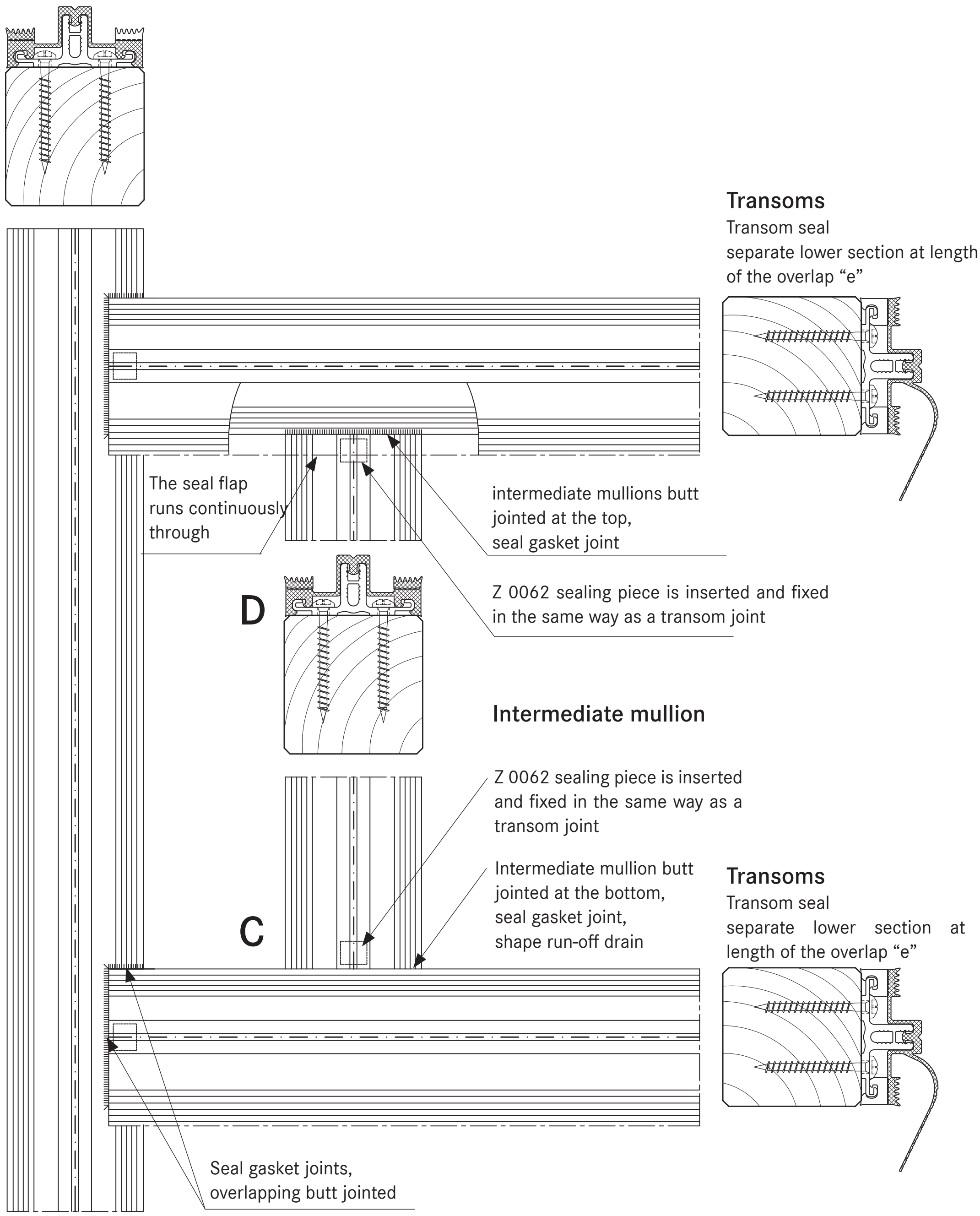
Facade seals

Assembly of inner seal for vertical roof glazing - intermediate mullions



Completed glued joints intermediate mullion / transom



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Facade seals

3.2
7

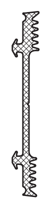
Assembly of the outer seal for vertical glazing

- As well as gently clamping the glass in place, the outer sealing system has the primary task of protecting the rebate against moisture ingress.
- The outer level must be completely sealed except for the necessary openings for pressure equalisation and condensation dissipation.
- The outer mullion seals are laid continuously and the transom seals are joined.
- Sealant joints are to be laid flat with a slight excess in dimensions. Exact specifications depends on the situation in which the system is used.
- Tightly fitted sealant joints can be implemented without fixing the outer seal of the mullion-transom joint in vertical facades.
- The flag for the inner transom joint in combination with the outer seal creates additional safety. Ensure correct and level placement of the seal flap.
- The seal flap should be separate at its perforations to match the thickness of the glass in order that this is clamped down and concealed under the outer seal.
- Different heights of sealing lips on the outer transom seal bridge the height difference created by the seal flap in the outer sealing section.
- Separated seals with different heights allow fill elements of differing total thicknesses of up to 4 mm to be balanced.
- Differently high, split seals allow a balance between
- filling elements of different total thickness of up to
- 6 mm.
- When mounting the clamping strips, be aware of aluminium profile expansion (see section 2.2.1 - Material information).

Outer seal mullions

e.g. GD 6024

Outer seal transom



e.g. GD 6054

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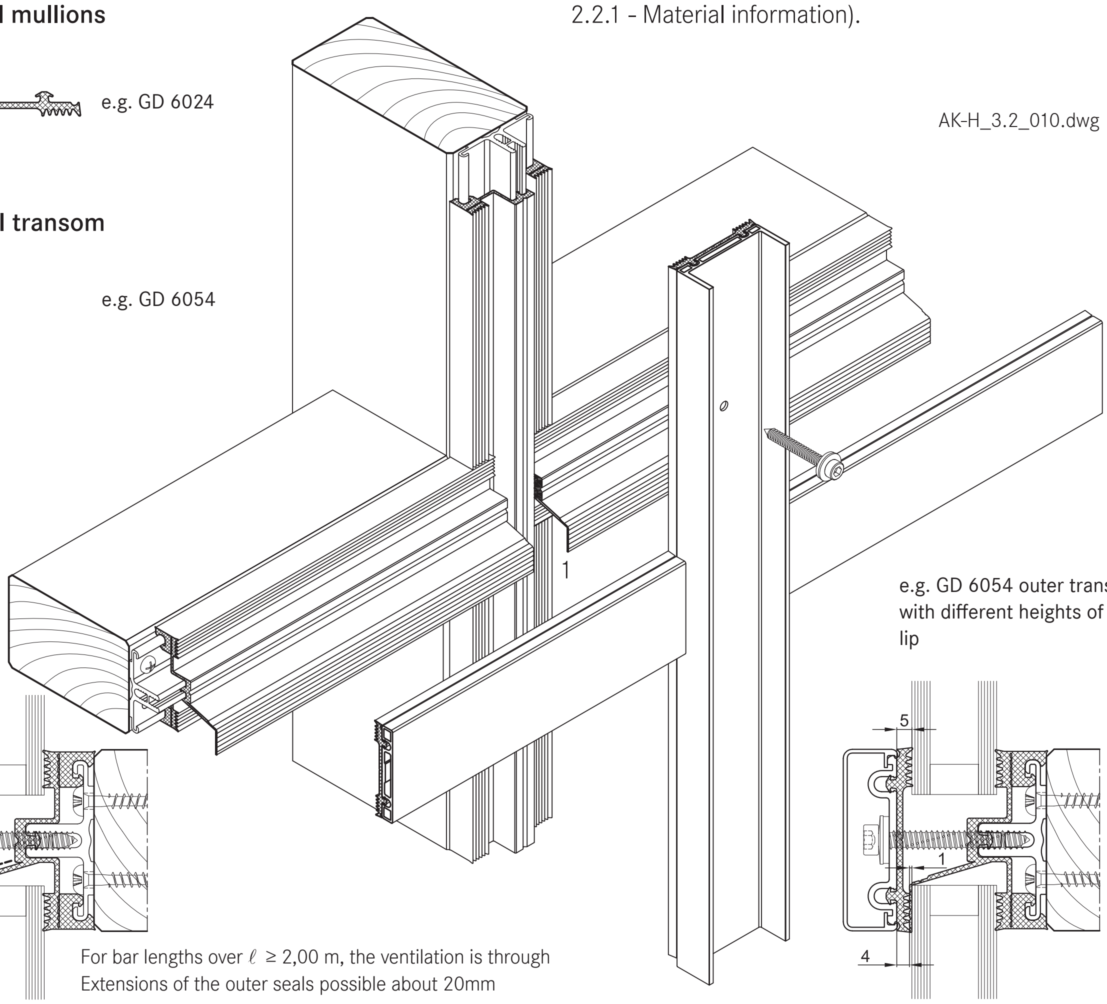
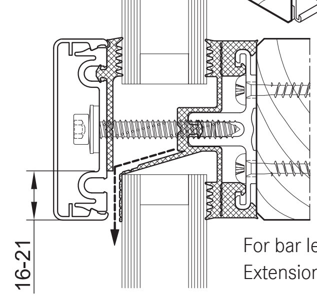


e.g. GD 6054 outer transom seal with different heights of sealing lip



For bar lengths over ℓ ≥ 2,00 m, the ventilation is through
Extensions of the outer seals possible about 20mm

Seals - roof

Assemble the inner seal for roof glazing - 2 overlapping layers

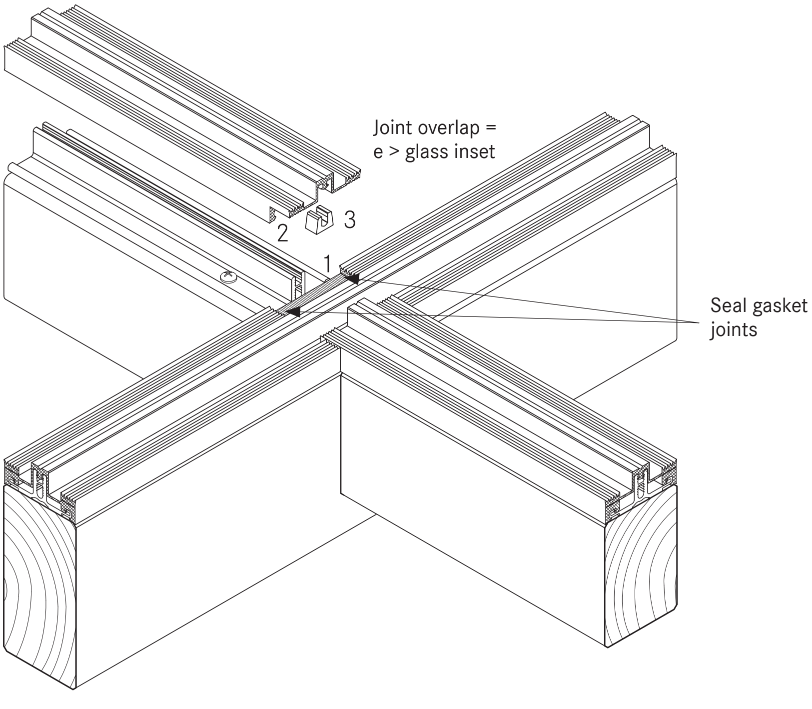
In the roof area as in the facade, seals with offset water channels can be used in the facade area which safely drain any moisture or condensation to the outside.
The 16.5 mm high seals can be divided across their height to allow a simple overlap at critical transom joints.

Rafter seals

- These are laid in fundamentally the same way as for vertical glazing.
- The use of intermediate mullions creates an exception. The principles of vertical facades can also be used as a basis here. However, due to the inclined position, each separate case should be evaluated and special attention given to sealing and ensuring drainage of any moisture that has got inside and condensation build-up. Generally, intermediate mullions should be avoided in glazed roofs.

Transom seal

- In the next step, the transom seals are clipped into the add-on channel.
- These are cut and laid in fundamentally the same way as for vertical glazing.
- Transom seals in roofs have no seal flap. The geometric form of the seal should be created in such a way as to form condensation channels in the inclined mounted position. These channels (1st drainage level) drains from the overlapping transom joint in the rafters.
- The gasket joints are sealed in the same way as described for vertical facades.



1 remove the upper perforated part on the rafter seal
2 remove the lower perforated part on the transom seal
3 Fix sealing piece Z 0062 into the transom seal and seal gasket joints.

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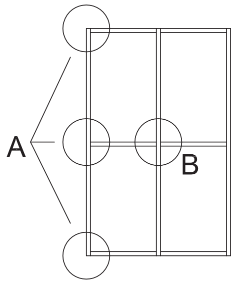
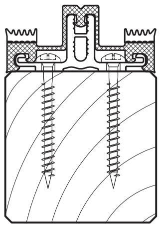
Seals - roof

Assembly of the inner seal for roof glazing - rafters/transoms



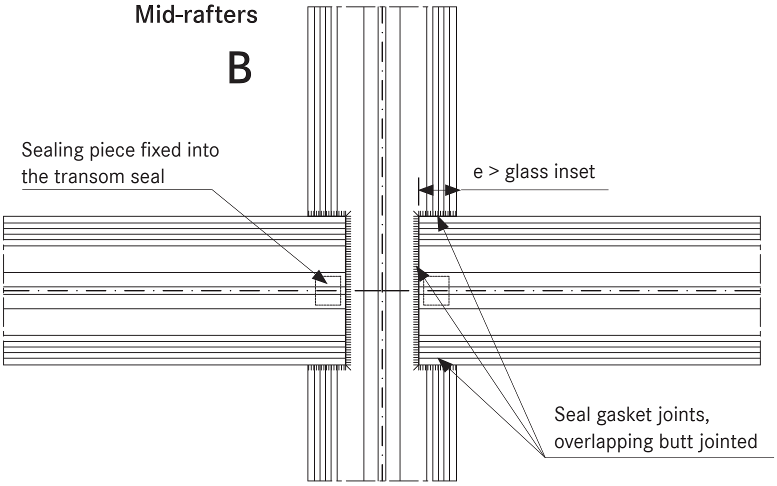
Completed glued joints Intermediate mullion and end mullion



Mullion seal
around a transom upper section
separate at the width of the transom seal

Mid-rafters

B

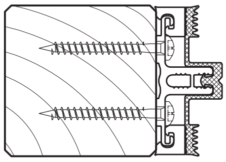


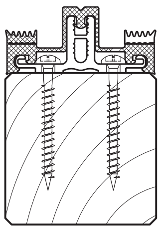
Sealing piece fixed into the transom seal

e > glass inset

Seal gasket joints, overlapping butt jointed

Transoms
Transom seal
separate lower section at length of the overlap “e”

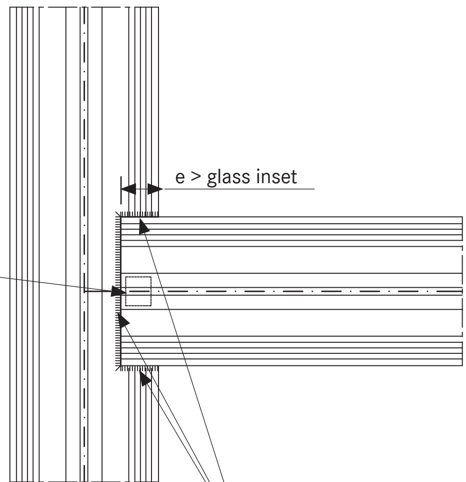




Verge rafter seal
around a transom upper section
separate at the width of the transom seal

Verge rafter

A

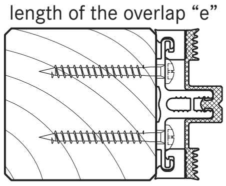


Sealing piece fixed into the transom seal

e > glass inset

Seal gasket joints, overlapping butt jointed

Transoms
Transom seal
separate lower section at length of the overlap “e”



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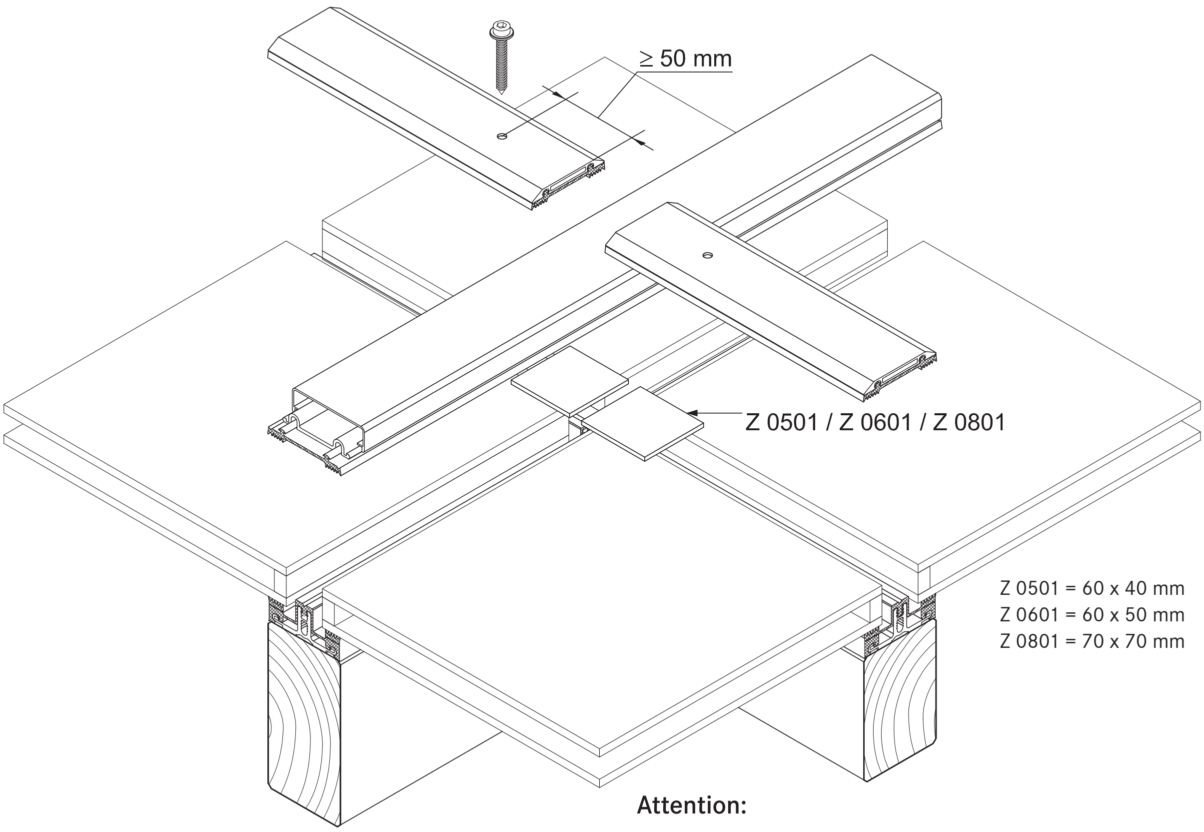
Seals - roof

Assembly of the outer seal for for glazed roofing

- These are laid in fundamentally the same way as for vertical glazing. Split seals such as GD 1932 are not suitable for transom seals in roofs. Split seals can only be installed in mullions in combination with slab insulation. Each installation situation will differ to some degree and always check how well sealed it is.
- For cross joints we recommend using our self-adhesive stainless steel sealing plates Z 0501 for System 50, Z 0601 for System 60 and Z 0801 for System 80.
- The stainless steel sealing plates are attached to the edge of the glass panes parallel to the mullion axis.
- Butyl tape is not suitable as a sealing tape between the glass and the outer seal.
- The outer mullion seals are laid continuously and the transom seals are joined.
- Sealant joints are to be laid flat with a slight excess in dimensions. Exact specifications depends on the situation in which the system is used.
- For glass insets of 15 mm, the first screw fittings for the transom cover profile begin 50 mm from the end of the cover profile.



Z 0501 = 60 x 40 mm
Z 0601 = 60 x 50 mm
Z 0801 = 70 x 70 mm

Attention:

The sealing plates must be placed centrally to the transom axis!

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Seals - roof

Assembly of the outer seal for glazed roofing - clamping strips

When using aluminium cover profiles on roofs, take account of the expansion factor as a result of the high degree of heat absorption when selecting the length to use. Equally, the use of single-piece cover profiles should be carefully considered. In this case it is recommended that holes for screwing on the cover profile are created with a diameter of d = 9 mm.
For wider spans and in rafters we recommend using concealed screw fittings when selecting the clamping strips (lower + upper strip). This is the preferred option for rafters. Unused holes in the pressure profile must be sealed.

Some roof areas, such as the eaves, see the use of several different materials (glass, sealing materials, aluminium sheets, ...) each with different expansion coefficients. To avoid the formation of cracks, aluminium sheets should be installed with expansion joints.

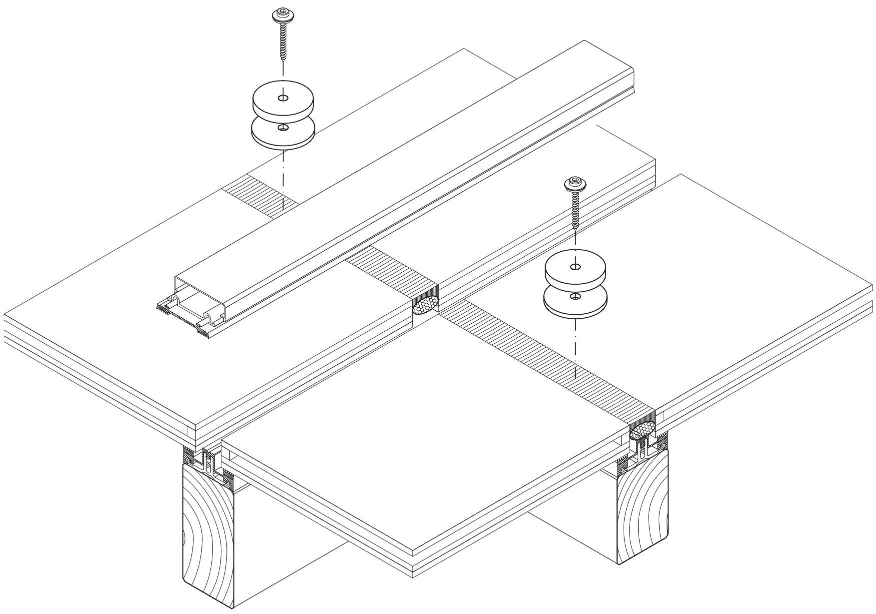
Note:

- Horizontal clamping strips prevent the free run off of rain water and dirt.
- Cover strips and upper strips with angled edges reduce the build up of water in front of the clamping strip.
- To improve water drainage, clamping strips in the joint area of transoms should be shortened by 5 mm. Gasket joints, however, are to be laid flat with a slight excess in dimensions. Open ends of transom clamping strips (upper and cover profiles) should be sealed.

Seals - roof

Assembly of the outer seal for for inclined glazed roofing ≥ 2°.

- These are laid in fundamentally the same way as for vertical glazing. Split seals around the mullions in roofs such as GD 1932 are only suitable when using in combination with slab insulation. Each installation situation will differ to some degree and always check how well sealed it is.
- To ensure free run-off of rain water and dirt on roofs inclined ≥ 2°, we recommend not using clamping strips in the transoms.
- Instead, the rebate spaces should be sealed with all-weather silicone.
- Implementation of the outer sealing section around mullions is done in the same way as conventional roofs with an inclination up to 15°.
- At the high point or ridge area of the inclined glazing, it is recommended to also install and outer sealing section in the transoms with clamping strips.
- Only certified sealing materials may be used for sealing the transom rebate space.
- Pay attention to all information provided by the manufacturer and the sealing work must be carried out by trained persons. It is recommended that a licensed and certified specialist contractor is hired for this purpose. We further refer you to the DIN 52460 standard and IVD data sheets (Trade Association for Sealants).



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Tips for all roof designs:

When using aluminium cover strips on roofs, take account of the expansion factor as a result of the high degree of heat absorption when selecting the length to use. Equally, the use of single-piece cover strips should be carefully considered. In this case it is recommended that holes for screwing on the cover strip are created with a diameter of d = 9 mm (refer to Section 1.2.1 - Material information).

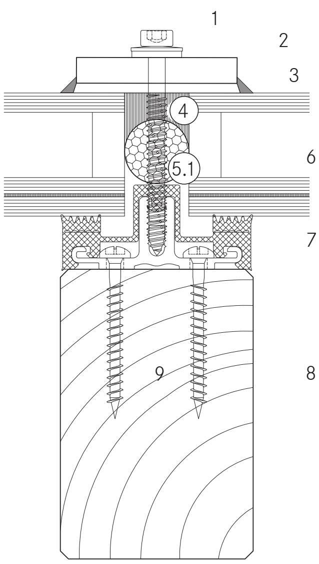
For wide spans we recommend using concealed screw fittings when selecting the clamping strips (lower + upper strip). This is the preferred option for rafters. Unused holes in the pressure profile must be sealed.
Some roof areas, such as the eaves, see the use of several different materials (glass, silicone, aluminium sheets, ...) each with different expansion coefficients. To avoid the formation of cracks, aluminium sheets should be installed with expansion joints.

Seals - roof

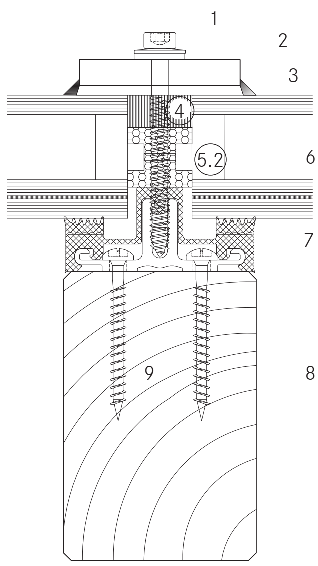
Assembly of the outer seal for for inclined glazed roofing ≥ 2°.

- The compatibility of the materials is particularly important when using all-weather silicone. In this case, the compatibility of the sealant with the edge bonding of the glass and the backfill of the joints. If self-cleaning glass is used, the compatibility must be established in advance.
- Glass sealants and edge bonding must be UV-resistant. The incline of roofs should also be taken into account. Information about UV-resistance can be requested from the manufacturer. Silicone edge bonding generally provides better UV-resistance than polysulfide-based materials. The advantage lies in its high vapour sealing properties which is particularly useful when using more volatile argon fillings.
- Highly elastic, weatherproof and UV-resistant seals meet the widest range of demands for reliable joints.
- If the silicone joint is created without additional mechanical safety devices, ensure that the glass is supported from two sides only. Selective installation of holding clamps can be used to achieve all round support for glass edges.
- The clamps are made from stainless steal with silicone washers and are screwed in the same as pressure strips. The hold-down clamp should be additionally sealed around the perimeter with silicone sealant. The design is based upon the dimensions of the glass as documented in the glass static analysis.

Transom inclined glazing ≥ 2° inclination with all-weather silicone and round section rope seal.



Transom inclined glazing ≥ 2° inclination with all-weather silicone and slab insulation.



1 Hold-down clamp
2 Silicone washer
3 Silicone sealant / seal around the clamp
4 All weather silicone seal
5.1 Round section rope seal
5.2 Slab insulation
6 Glass / filling element
7 Inner seal 10 mm transom
8 timber profile
9 System screw fittings

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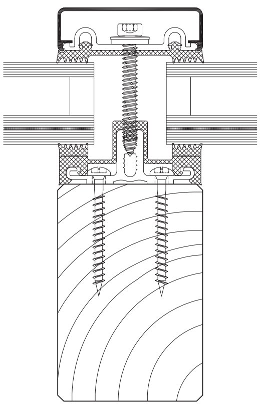
Seals - roof

3.2
8

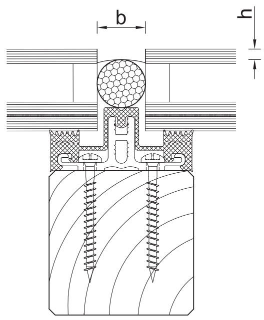
Assembly of the outer seal for for inclined glazed roofing ≥ 2°.

- The joint width and the joint height for Stabalux System AK-H are defined as w x h = 20 mm x 10 mm. These measurements should always checked when selecting the sealing material and adapted if necessary. Generally: w : h = 2 : 1 - 3.5 : 1
- PE round section seals or Stabalux slab insulation is suitable as a back fill material.
- Silicone sealant should be applied before laying the mullion seals and cover strips.
- After the specified setting time, the seals and screw fittings can be installed in the areas around mullions.
- The mullion-transom joints around the clamps are then sealed.
- Before applying this second layer, the joints around transoms must have completely set.

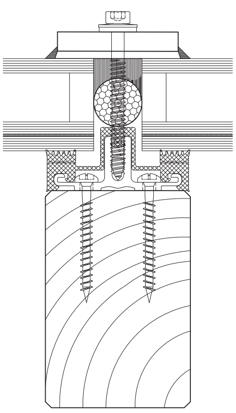
Rafters with clamping strips



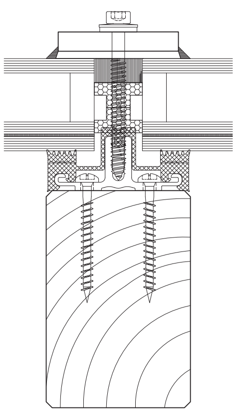
Joint design according to manufacturers specifications! generally: w : h = 2 : 1 - 3.5 : 1



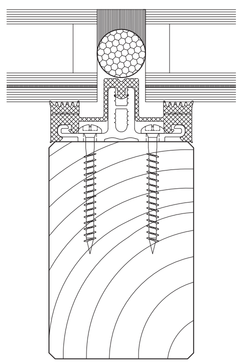
Transom with clamp, All weather silicone seal and round section rope seal



Transom with clamp, All weather silicone seal and slab insulation



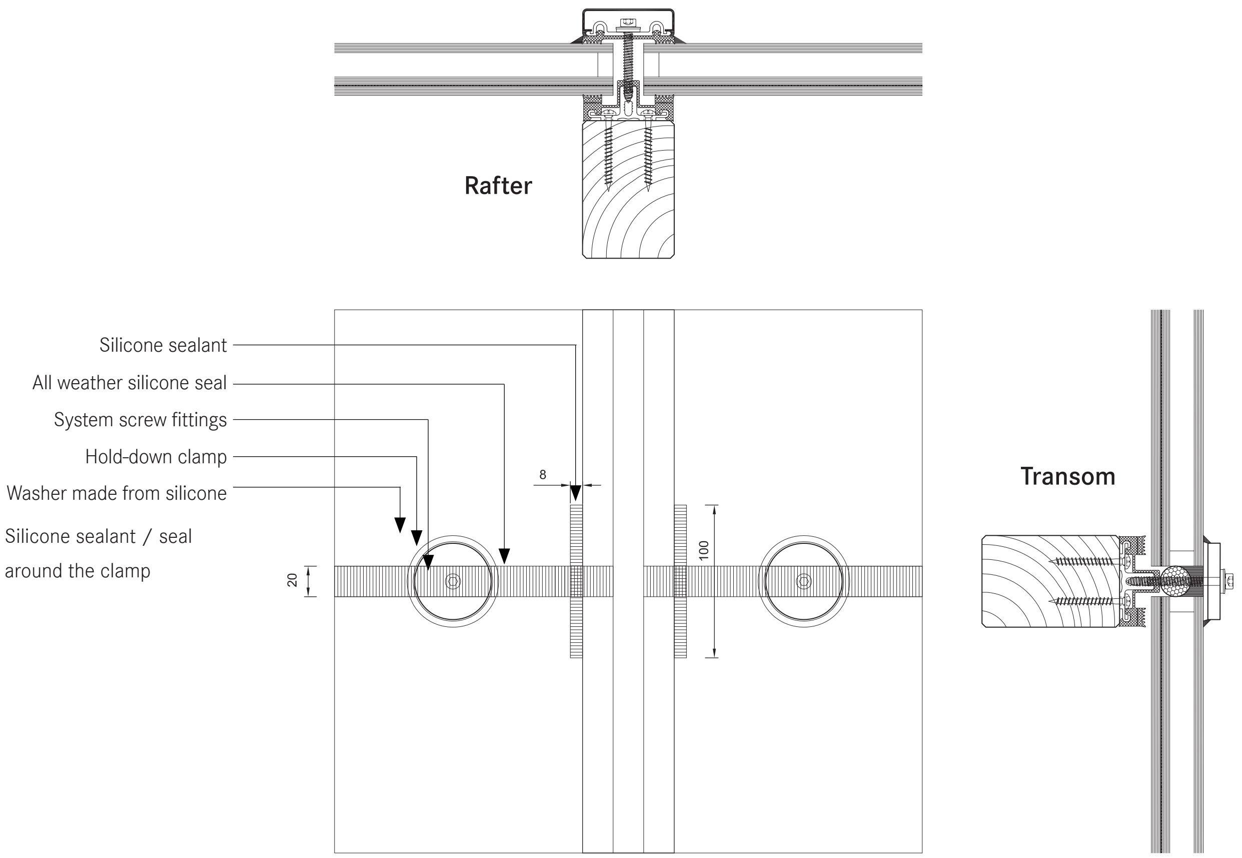
Transom with all-weather silicone and round section rope seal



Seals - roof

Steps for implementing the seal with silicone

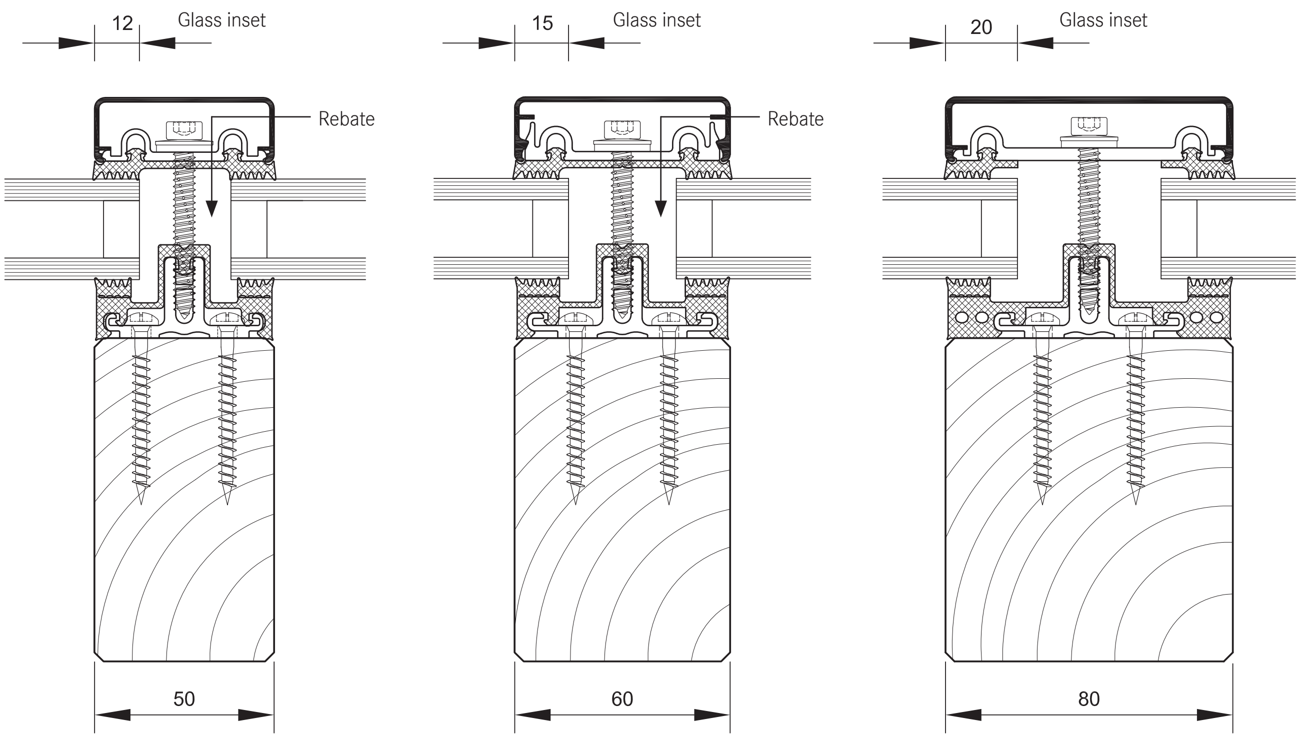
- Test silicone sealant and glass edge bondings and other contact surfaces (e.g. panels) for suitability.
- Clean edge bonding adhesive impurities from the surfaces to which sealant will be applied following manufacturer's directions.
- Fill the joints as per the joint dimensions using only non-water absorbent closed-cell PE profiles (no damage to the edge bonding).
- The remaining space in the glass rebate must be large enough that the pressure is able to equalise and a drainage level is available.
- Clean any impurities from the surfaces to which the sealing material is to be applied and any adjacent surfaces according to manufacturer's directions.
- Be particularly aware of any adjacent metal components. Prime according to manufacturer's directions.
- Seal joints without leaving any cavities or bubbles. Mask any adjacent components in advance where necessary.
- Smooth out the filled joints using the manufacturer's smoothing agents and conventional tools with as little water as possible. Remove adhesive tape.
- If two or more reactive sealants are used in combination, the first must completely set before the second is applied.



Glass inset and glass support

Glass inset

- Glass industry guidelines must be observed.
- 50 mm system width = 12 mm glass inset
- 60 mm system width = 15 mm glass inset
- 80 mm system width = 20 mm glass inset
  (15 mm glass inset possible)



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Glass supports

Glass support types and choosing the glass support

The weight of the glass must be permanently and securely supported. The weight of the glass cannot be supported by the add-on channel without additional actions. Glass supports and additional attachments for the add-on channel on the supporting structure serve to carry the load of the glass panes through to the structure. The choice of glass support is made independent of the system width used. The glass supports used are dependent on the glass structure and weight. The depth of the glass supports is determined by the thickness of the glass. The system glass supports are all tested and regulated by general building control certification. Mullion-transom connections (T-joints) must be implemented as per the statically chosen system (as articulated or rigid joints). For articulated joints, it must be ensured that there is no excessive twisting of the transom profile in the design that would lead to a lowering of glass support area. The planner and processor must take particular care in this regard.

There are three different types of glass support with three attachment variants in the Stabalux AK-H system.

- Glass supports GH 6071 with a length of ℓ = 100 mm are attached directly into the add-on channel using 3 Stabalux system screws. An additional attachment to secure the add-on channel to the supporting structure is made in the area of the glass support. Glass thicknesses of 20 – 60 mm can be used.
- Glass supports GH 6072 with a length of ℓ = 200 mm are attached directly into the add-on channel using 6 Stabalux system screws. An additional attachment to secure the add-on channel to the supporting structure is made in the area of the glass support. The strengthened attachment and longer load transfer area can support a greater glass weight. Glass thicknesses of 20 – 60 mm can be used.
- Glass supports GH 6073 made from 3 mm thick aluminium sheets and a length of ℓ = 100 mm are attached directly into the add-on channel using 3 countersunk screws (Stabalux system screw Z 0193). The bars in the add-on channel should be pre-drilled. This glass support can be used with glass thicknesses between 8 and 18 mm. The installation of 5 mm thick glass panes is still possible, but adjustments must be made and geometrically checked.

Mounting the glass supports

- Positioning the glass supports and glazing according to glass industry guidelines and guidelines of the Institute for Window Technology.
- Glazing industry technical directive no. 3 “Blocking of glazing units” says: “The distance of the blocks from the corner of the glazing unit should be about the length of 1 block. The distance of the blocks may be reduced in individual cases up to 20 mm if the risk of breakage to the glass is not increased by the structure and position of the block. For very wide, fixed glazing units, a distance of about 250 mm from the corners of the glazing unit can be kept. The support blocks must sit over an attachment point in the frame.”
- Transfer of the glass weight takes place using glass supports that are mounted to the add-on channels or directly into the transoms.
- The weight of the glass must be permanently and securely supported.
- The Stabalux glass supports can be placed with an edge distance from 50 - 130 mm according to Z-14.4-767. We recommend a distance of 100 mm from the end of the transom. The position of T-joints should always be considered.
- Distance g is measured from the end of the transom.
- For all glass support variants, the position of the additional attachment to secure the add-on channel to the supporting structure should be ensured.
- So that the same pattern of holes can be created on both left and right of the transom ends for mounting the glass supports, we recommend separating the add-on channel in the area around a transom and joining creating a joint in the middle of the transom. A pair of screws is always placed at the ends of the add-on channel.
- The pre-drilled add-on channels (with slot 5.4 x 7.2 mm and 9.5 x 35 mm with distance c = 200 mm) make mounting easier. Any additional holes required around the glass support or generally required by the design should be drilled with a diameter of d = 5.5 mm.
- Inner seal penetrations must be sealed using Stabalux connecting paste Z 0094 with the exception of the Stabalux screw fittings.

Glass supports

Glazing blocks

- Glazing blocks must be compatible with the edge bonding of the insulated glass panes.
- They should be stable under constant pressure and be able to withstand loads, aging and temperature changes.
- It is important that the blocking allows sufficient surrounding space for pressure equalisation and that drainage of condensation is not obstructed as well as allowing small design tolerances to be accommodated.
- If the length of the glass support is more than 100 mm, blocks should be placed along the entire length of the glass support to ensure equal load distribution.

When mounting the glass supports we recommend maintaining the distances"g" from the end of the transom:

Add-on channel	**AK 6010**
Glass support types	Distance **g** measured from the end of the transom
GH 6071 (100 mm long)	100 mm
GH 6072 (200 mm long)	100 mm
GH 6073 (100 mm long)	100 mm

Additional attachments around the glass supports

Add-on channel	**AK 6010**
Glass support types	Additional add-on channel attachments around the glass supports per glass support
GH 6071 (100 mm long)	6
GH 6072 (200 mm long)	11
GH 6073 (100 mm long)	6

Glass support GH 6071

Additional attachments for AK 5010/ AK 6010

- The add-on channel is screwed into the timber structure using Stabalux Z 0170 system screws. Pre-drilling of timber profiles is generally not necessary.
- Around the GH 6071 glass support, 6 additional screw fittings Z 0170 are required. The following diagram shows the arrangement and must be adhered to.
- The additional holes in the add-on channel are drilled with a diameter of d = 5.5 mm.

Edge distances transom / add-on channel

- Edge distances are given in the diagram.

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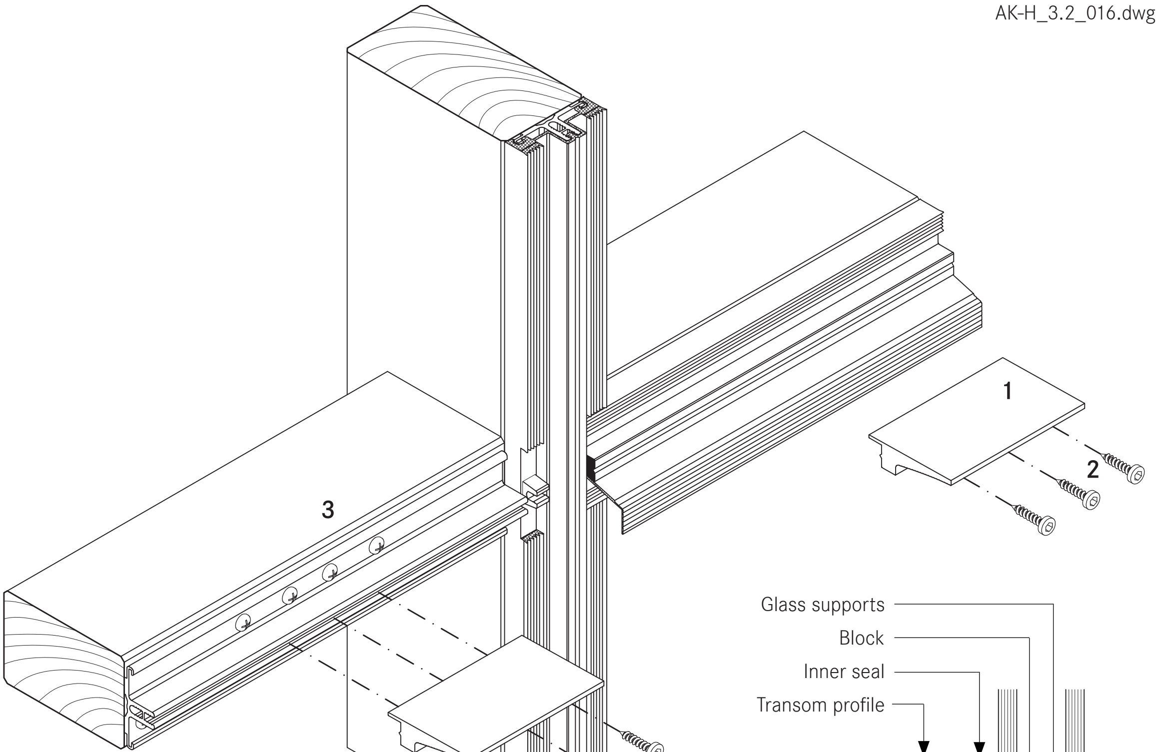
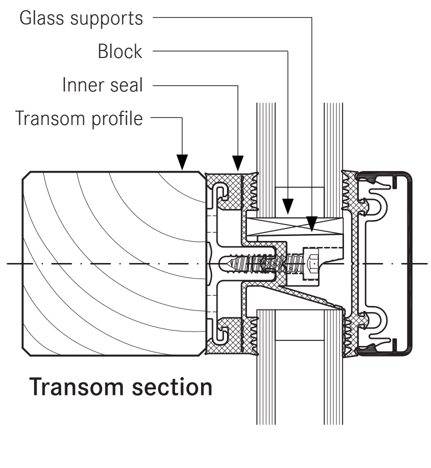


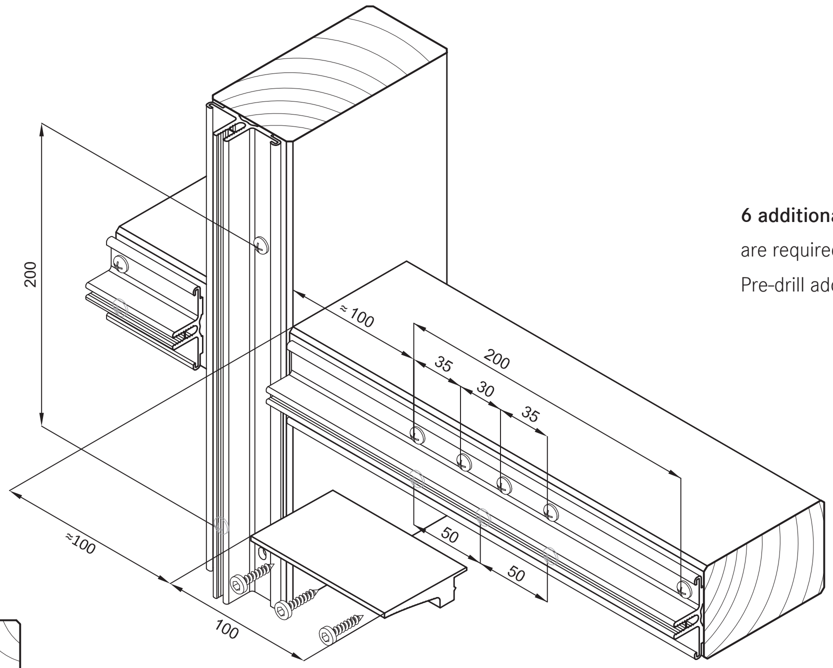
1 Glass support GH 6071
2 Stabalux system screws 3 x Z 0247
3 Additional attachments around the glass supports



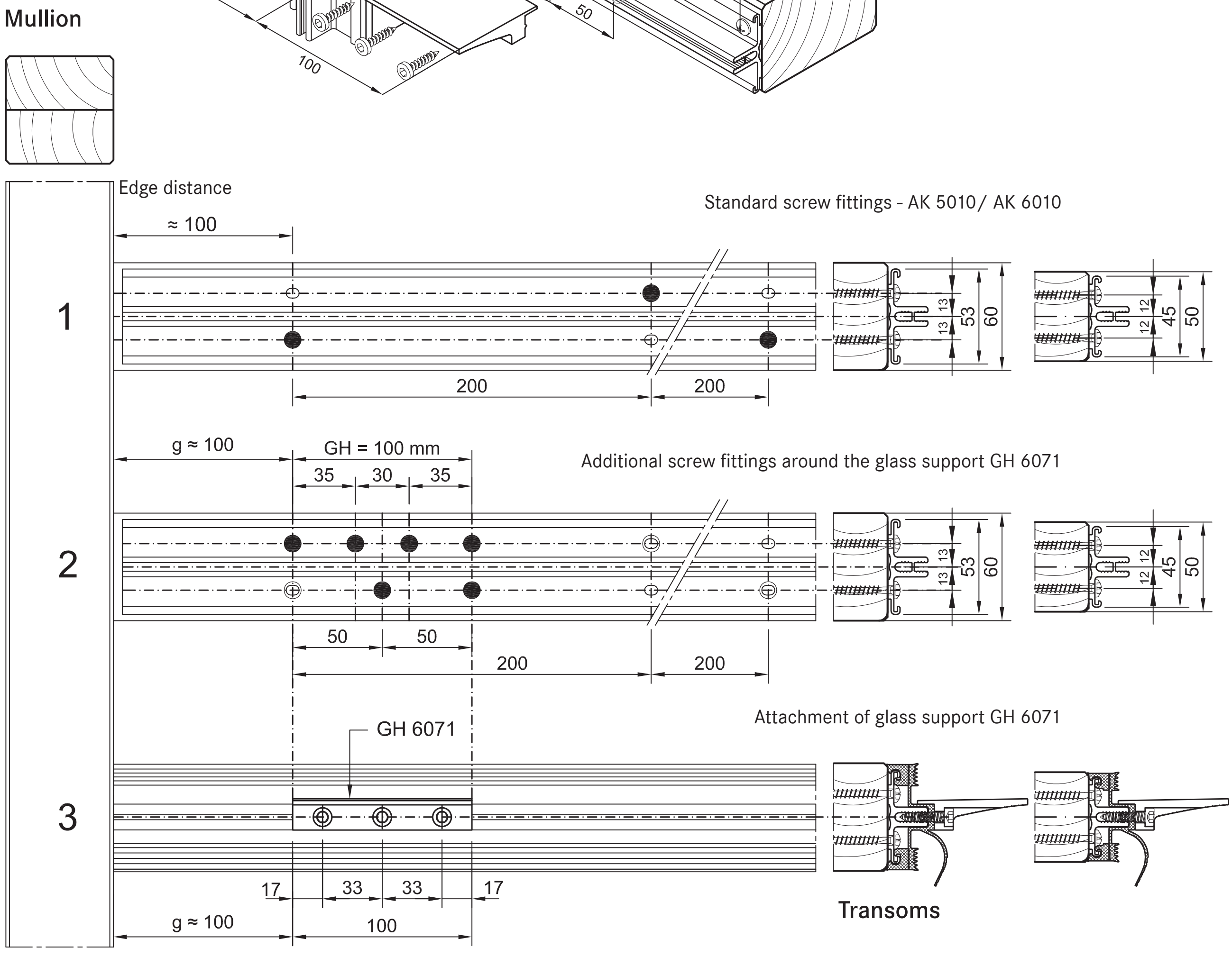
Transom section

Glass support GH 6071

AK 5010/ AK 6010 screwed to structural timber



6 additional screws
are required around the glass support
Pre-drill add-on channel with d = 5.5 mm



AK-H_3.2_017.dwg

Glass support GH 6072

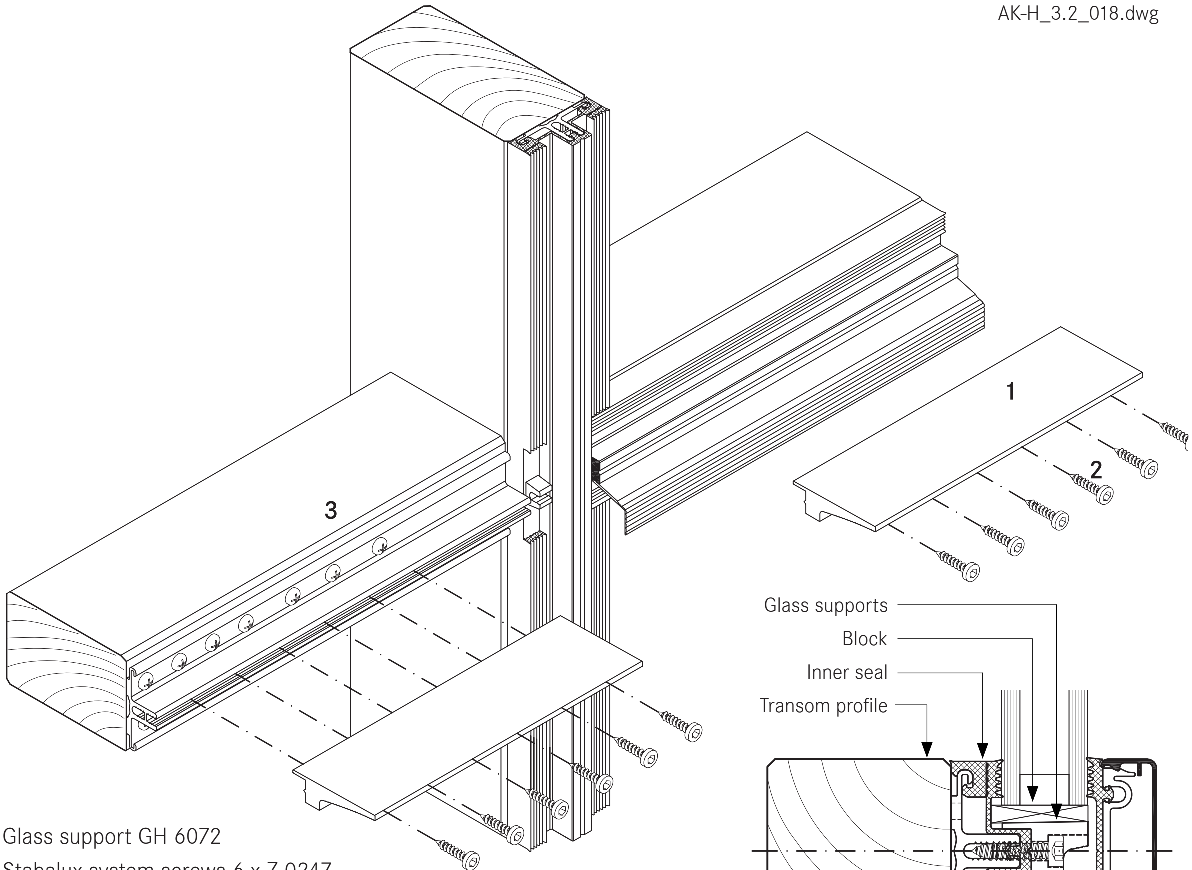
Additional attachments for AK 5010/ AK 6010

- The add-on channel is screwed into the timber structure using Stabalux Z 0170 system screws. Pre-drilling of timber profiles is not necessary.
- Around the GH 6072 glass support, 11 additional screw fittings Z 0170 are required. The following diagram shows the arrangement and must be adhered to.
- The additional holes in the add-on channel are drilled with a diameter of d = 5.5 mm.

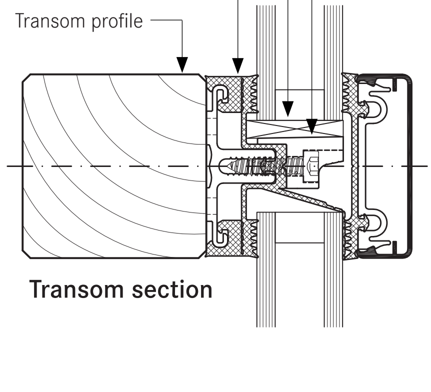
Edge distances transom / add-on channel

- Edge distances are given in the diagram.

AK-H_3.2_018.dwg



1 Glass support GH 6072
2 Stabalux system screws 6 x Z 0247
3 Additional attachments around the glass supports

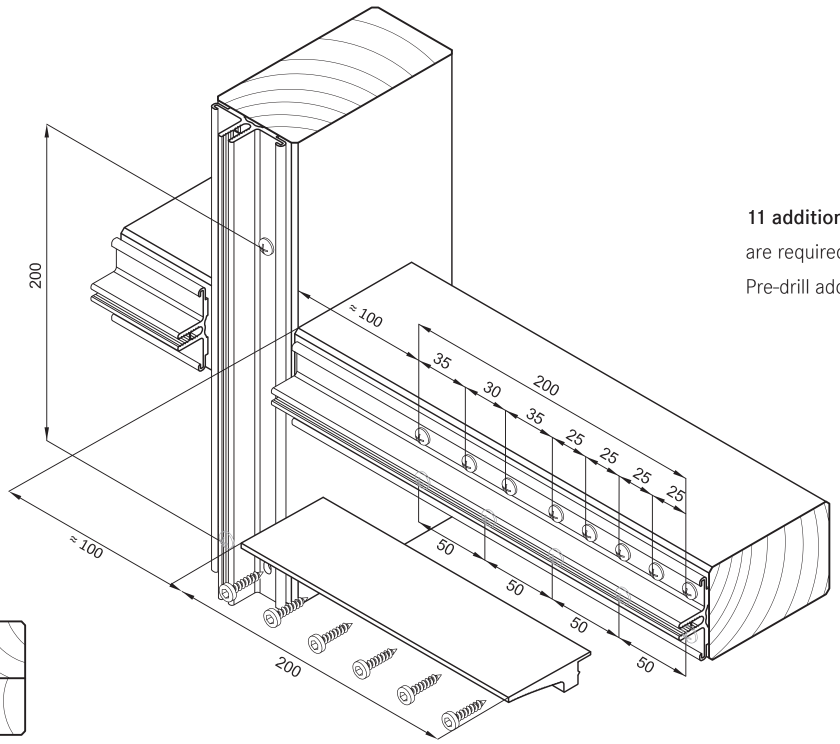


Transom section

Glass support GH 6072

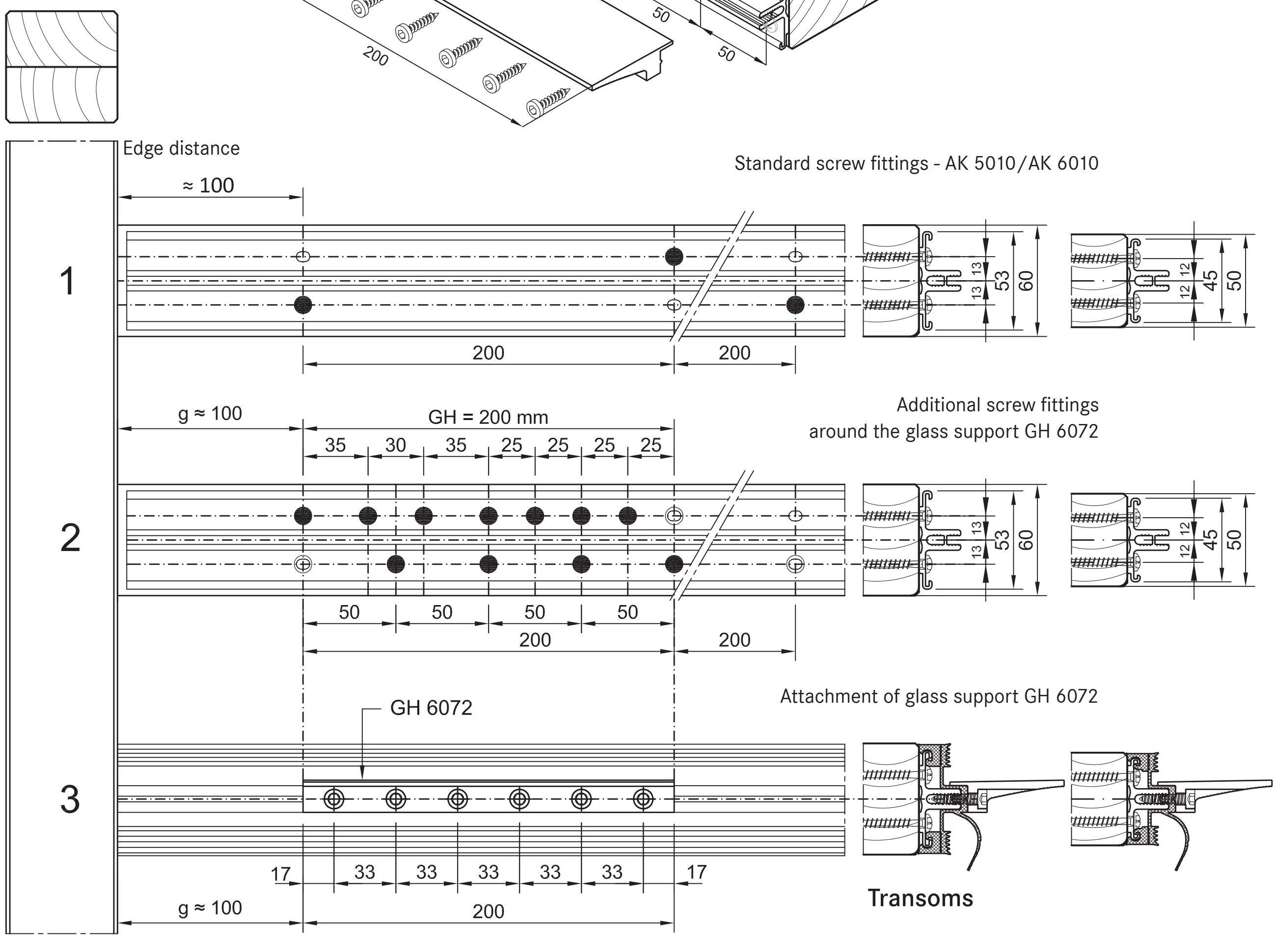
3.2
12

AK 5010/ AK 6010 screwed to structural timber



11 additional screws.
are required around the glass support
Pre-drill add-on channel with d = 5.5 mm

Mullion



AK-H_3.2_019.dwg

Section of glass support GH 6071 / GH 6072

Acceptable glass weights for glass support GH 6071 and GH 6072

Permitted glass weights can be found in authorisation Z-14.4-767 and section 9.

Glass thicknesses of 20 – 60 mm can be used

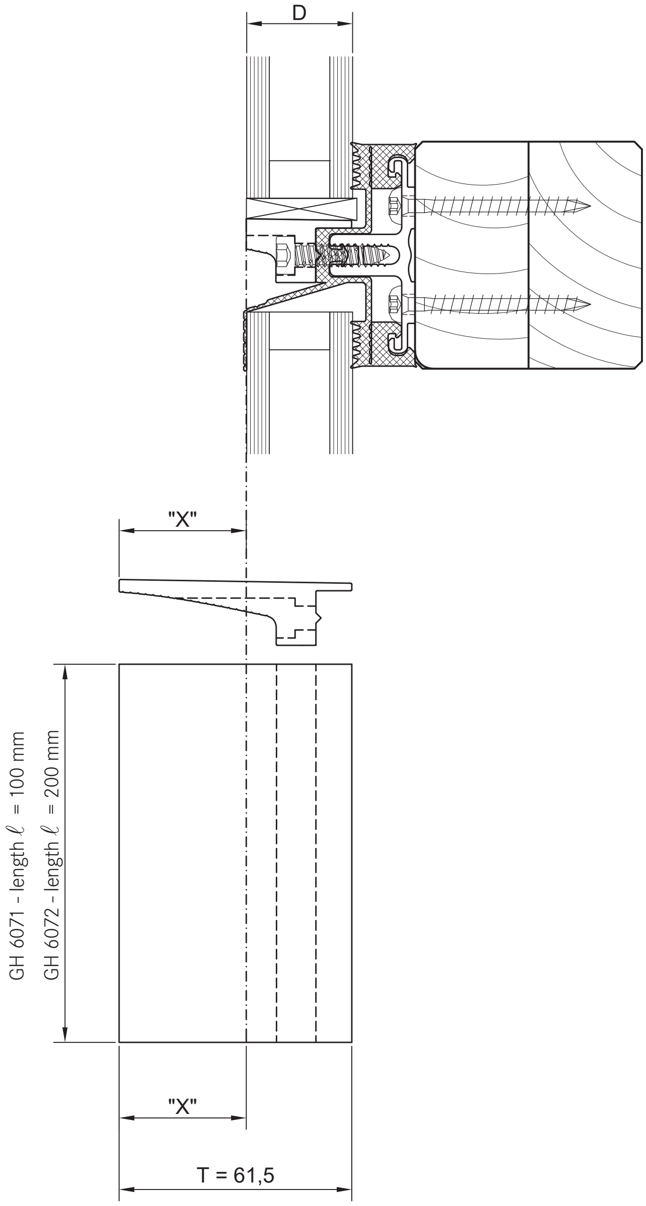
Depending on the thickness of the glass, the depth of the glass support must be shortened by "X"

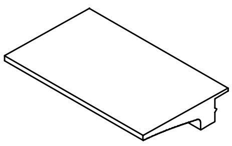
T = depth of glass support
D = thickness of glass pane

X = T - D

Example:
Depth of glass support
T = 61.5 mm
Thickness of pane 6 / 16 /6
D = 28 mm

X = 61.5 - 28
T = 33.5 mm





AK-H_3.2_022.dwg

Glass support GH 6073

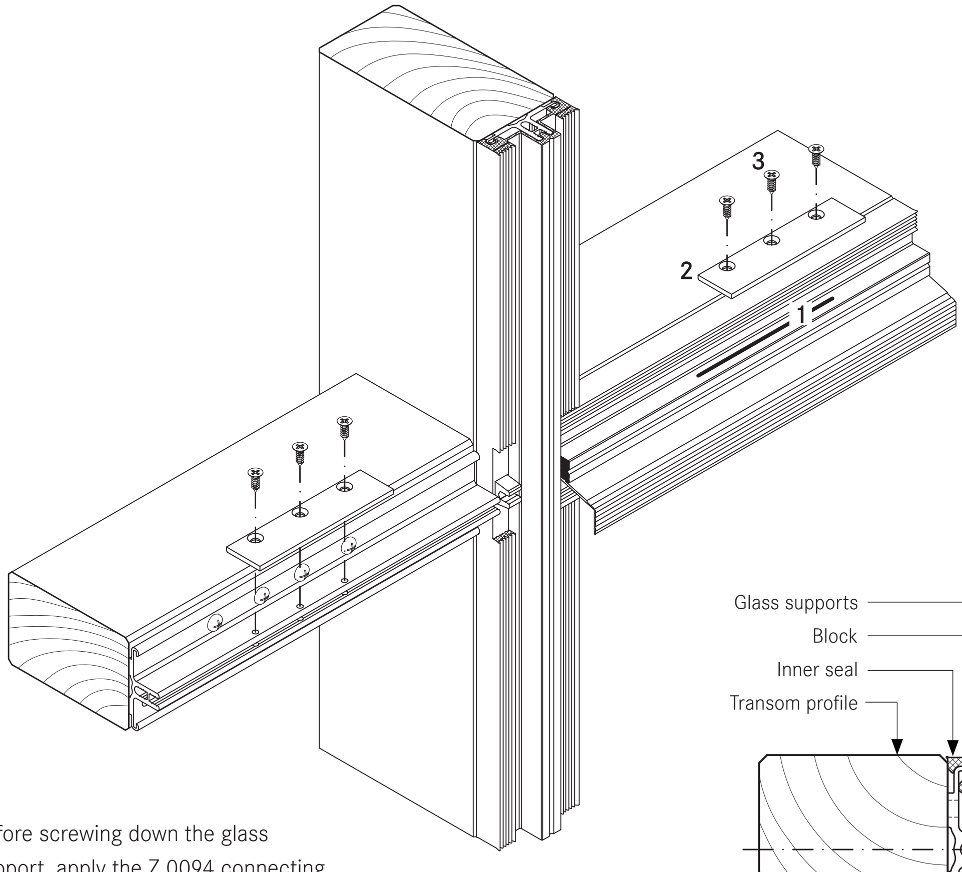
Additional attachments for AK 5010/ AK 6010

- The add-on channel is screwed into the timber structure using Stabalux Z 0170 system screws. Pre-drilling of timber profiles is not necessary.
- Around the GH 6073 glass support, 6 additional screw fittings Z 0170 are required. The following diagram shows the arrangement and must be adhered to.
- The additional holes in the add-on channel are drilled with a diameter of d = 5.5 mm.

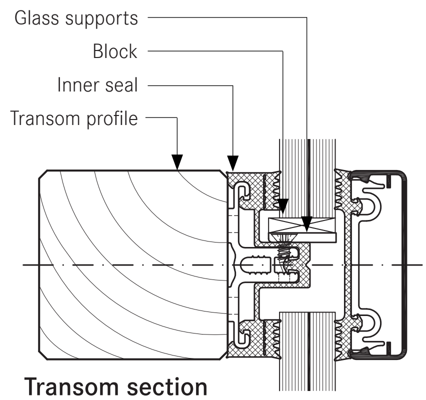
Edge distances transom / add-on channel

- Edge distances are given in the diagram.

AK-H_3.2_020.dwg



1 Before screwing down the glass support, apply the Z 0094 connecting paste around the screw fitting.
2 Glass support GH 6073
3 Stabalux system screws 3 x Z 0193

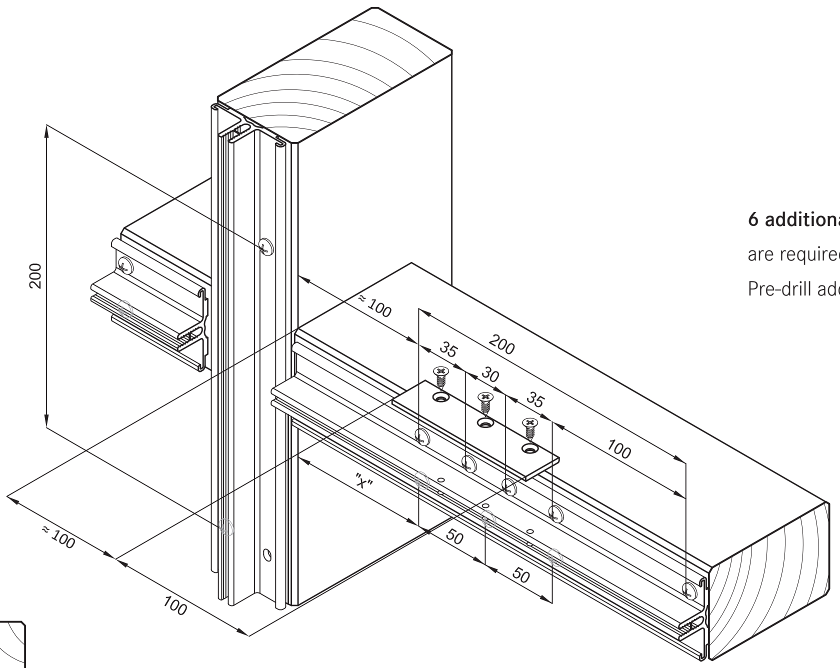


Transom section

Glass support GH 6073

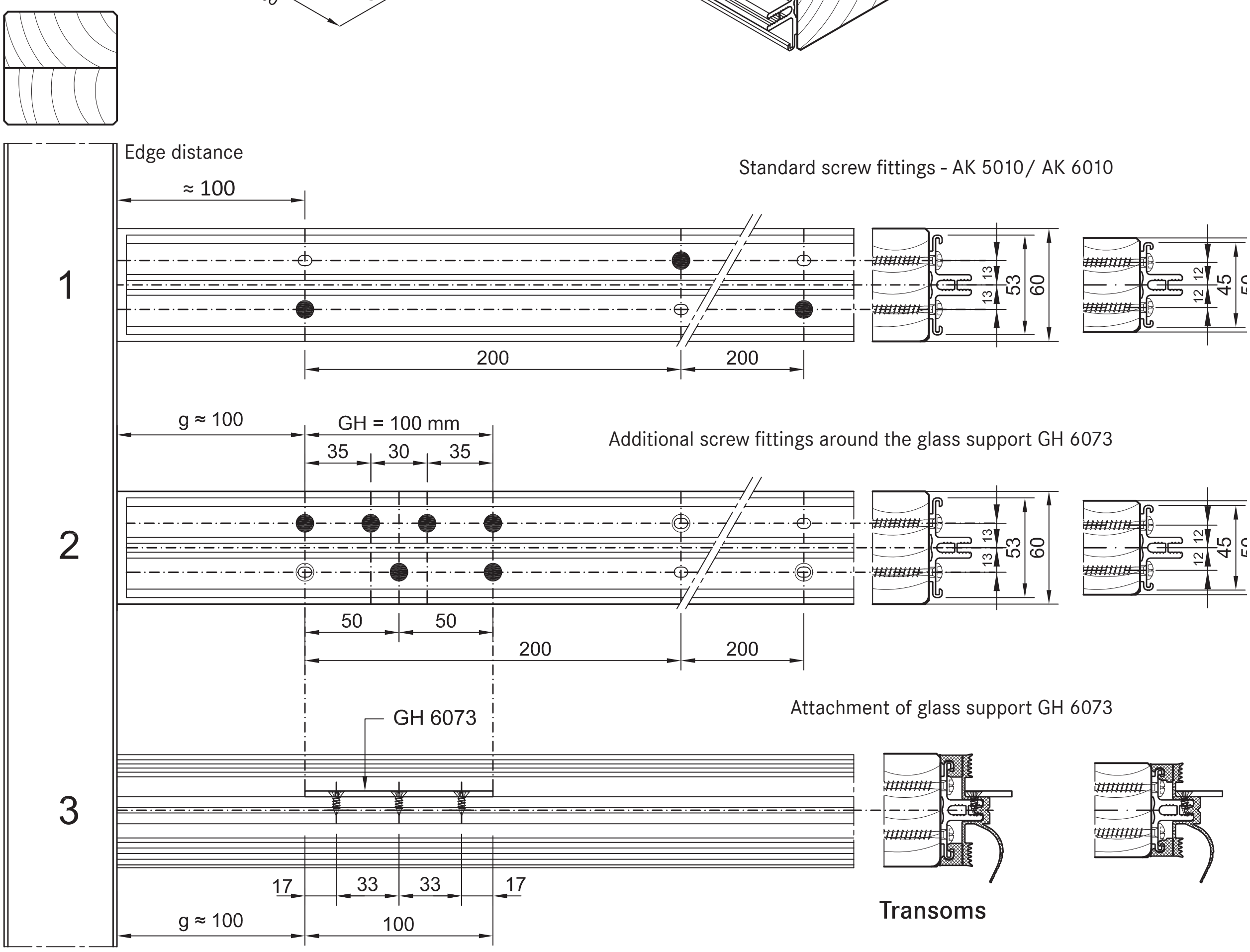
3.2
14

AK 5010/ AK 6010 screwed to structural timber



6 additional screws
are required around the glass support
Pre-drill add-on channel with d = 5.5 mm

Mullion



AK-H_3.2_021.dwg

Glass support GH 6073

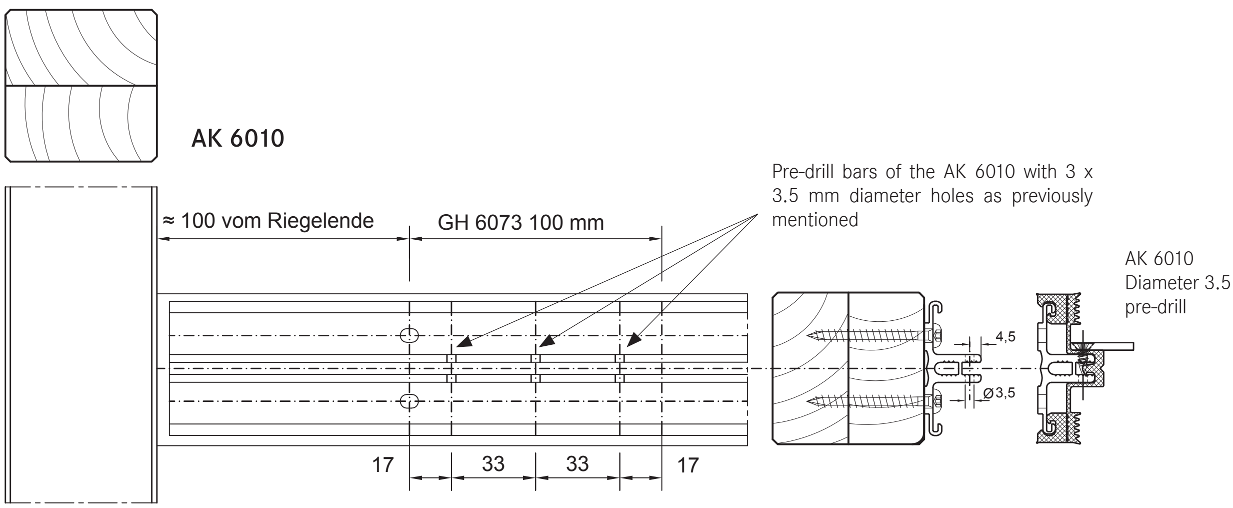
Additional holes in the add-on channel bars

- Glass support GH 6073 is fixed to the add-on channel using 3 Stabalux system screws Z 0193 (countersunk screw diameter 4.2 x 13 mm).
- The bars of the add-on channel should also be predrilled at a distance of 4.5 mm from the edge of the bar and with a diameter of d = 3.5 mm.
- Longitudinal positioning of the add-on channel is required.

Note 1:

Glass support GH 6073 is fixed to the add-on channel AK 6010 using three Stabalux system screws Z 0193 (diameter 4.2 x 13 mm). Before screwing down the glass support, apply the Z 0094 connecting paste around the screw fitting.

Mullion



Note 2:

Assembly of the GH 6073 on AK 5010 is with AK 6010 identical.

AK-H_3.2_021.dwg

Section of glass support GH 6073

Acceptable glass weights for glass support GH 6073

Permitted glass weights can be found in authorisation Z-14.4-767 and section 9.

Glass thicknesses of 10 – 18 mm can be used

The installation of 8 mm thick glass panes is still possible, but adjustments must be made and geometrically checked.

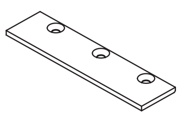
Depending on the thickness of the glass, the depth of the glass support must be shortened by "X"

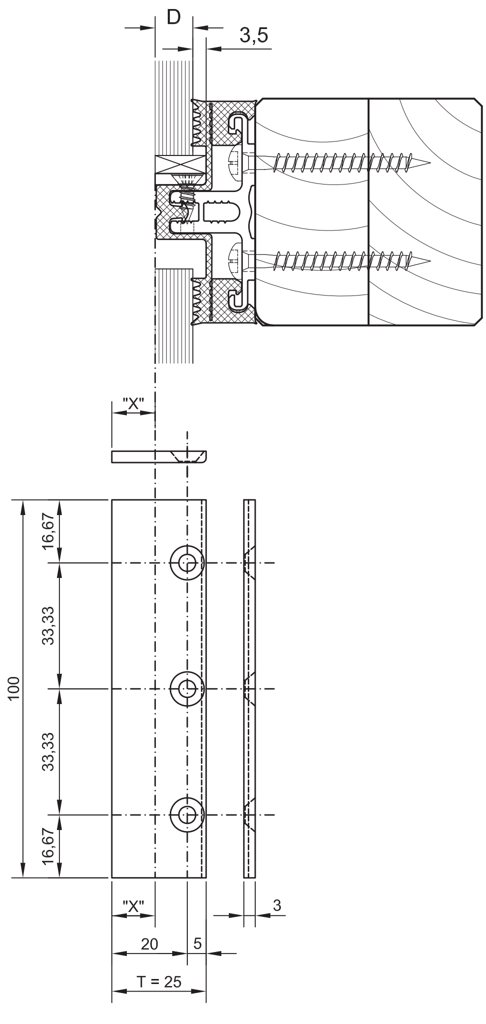
T = depth of glass support
D = thickness of glass pane
Δ = 3.5 mm (system size)

X = T - D - Δ

Example:
Depth of glass support
T = 25 mm
Thickness of glass pane 10 mm
D = 10 mm
System size
Δ = 3.5 mm

X = 25 - 10 - 3.5
X = 11.5 mm





AK-H_3.2_022.dwg

Screw fittings

Fastenings

- The fastenings for the Stabalux AK-H system allow filling elements to be easily secured.
- The clamping strips are connected to the add-on channel using Stabalux system screws.
- Stainless steel 1.4301 DIN EN 10088 is the material used to produce screws for the Stabalux system. To make screws easier to install, they are coated with a lubricating zinc layer.
- Depending on the type of screw fittings chosen, Stabalux system screws are available with and without sealing gaskets. These special sealing gaskets are made from stainless steel with a 4 mm thick vulcanised EPDM seal.

- For special use cases, separate 2 and 4 mm vulcanised EPDM gaskets are available. A plastic (PA) 1.5 mm thick washer with a diameter of 10 mm is additional available.
- The AK-H system can be used with glass from 8 mm thick. The installation of 3 mm thick glass panes is still possible, but adjustments must be made and tested. An exception to this is the use of cover profiles DL 5073/DL 6073/DL 8073, which require a minimum glass thickness of 18 mm.
- Screw lengths are available for all common glass thicknesses. The screw length is determined from a table.
- The minimum screw depth is 12.5 mm. The maximum screw depth is 17 mm.
- The distance for screw fittings is variable. The maximum distance for clamping strip screw fittings is a = 250 mm.
- On mullions, the edge distance for clamp joints measured from the end of the mullion must be maintained at f ≤ 100 mm.
- The edge distance for the first screw fittings of the transom clamp connection should be in the area of 50 to 130 mm measured from the transom end. The placement and choice of glass support should be taken into account.
- The clamp connection is exclusively subject to tensile forces. The maximum tensile force that can be taken by the tested system is regulated in general building approval Z-14.4-767. The information provided on characteristic loads allows crash-proof glazing to be demonstrated according to DIN 18008.
- Screw fittings are applied using a conventional electric screwdriver with depth stop. This guarantees uniform application of pressure. The depth setting should be chosen so that a gasket compression of 1.5 - 1.8 mm is achieved.

Screw fittings

Concealed screw fittings

- Choosing pre-drilled clamping strips (e.g. UL 5009L, UL 6009-L and UL 8009-L, slot 7 x 10 mm, a = 125 mm) with clippable upper strips makes assembly easier. The remaining clamping strips should be provided with a round hold of d = 8 mm. The functionality of the clip procedure can be checked after the first upper strip has been pushed against the pressure profile.

Visible screw fittings

- Cover strips should be drilling with a round hole of d = 8 mm (see note below).

Visible recessed screw fittings

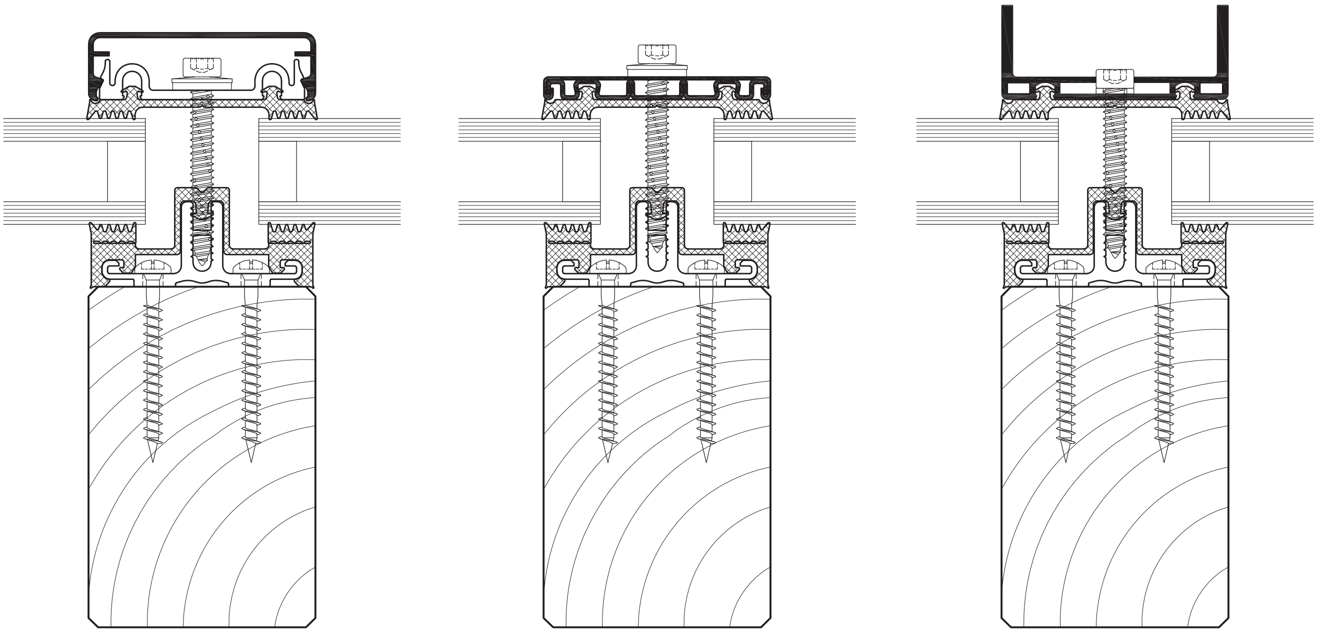
- When creating visible recessed screw fittings, a stepped bore is required. The lower part of the cover profile should be drilled with a d = 7 mm diameter. The upper part of the cover profile needs a d = 11 mm diameter for the screw head. It is recommended to install a washer (PA washer, Z 0033) with all screw fittings.
- Additional factors must be considered for installing cover profiles DL 5073/ DL 6073/DL 8073.

Note

When using aluminium strips on roofs, take account of the expansion factor as a result of the high degree of heat absorption when selecting the length to use. Equally, the use of single-piece cover profiles should be carefully considered. In these cases it is recommended that holes for screwing the clamping strips (cover and pressure profiles) are created with a diameter of d = 9 mm.

Screw fittings

Fastenings



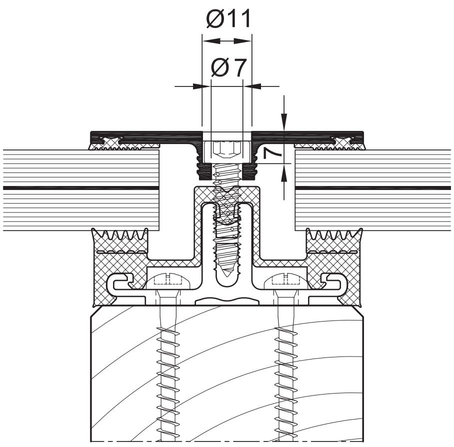
Concealed screw fittings
Stabalux system screws with cylinder head
d = 10 mm und 4 mm sealing gasket
e.g. Z 0153

Visible screw fittings
Stabalux system screws with cylinder head
d = 10 mm und 4 mm sealing gasket
e.g. Z 0153

Visible recessed screw fittings
Stabalux system screws with cylinder head
d = 10 mm with additional PA washer
e.g. Z 0252 with Z 0033

AK-H_3.2_023.dwg

Calculating the screw length for DL 6073/DL 8073



Attention!

For special cover profiles DL 5073/ DL 6073/DL 8073, the calculation to determine screw lengths is:

System width + 8 mm for system width 60 mm
System width + 9 mm for system width 80 mm

Using the system add-on channel, the use of DL 5073/ DL 6073/DL 8073 is possible from a glass thickness of 18 mm.

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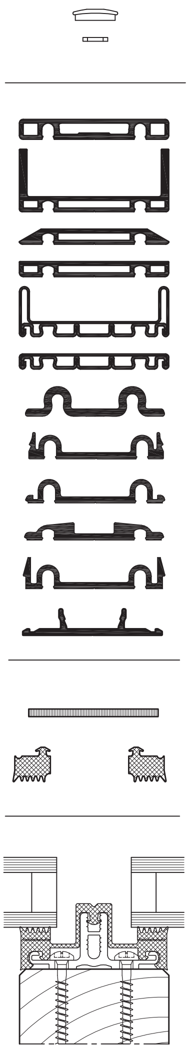
Screw fittings

3.2
16

Calculating the screw length



	System width 50/ 60 mm		System width 80 mm [1]		
Sealing washer		3,0 mm	Sealing washer	3,0 mm	mm
PA-washer		1,5 mm	PA-washer	1,5 mm	
DL 5059 / DL 6059 (*)		(2,5) 8,0 mm	DL 8059	(3,5) 8,0 mm	+
DL 5061 / DL 6061 (*)		(1,5) 6,0 mm	DL 8061 (*)	(2,0) 7,0 mm	
DL 5067 / DL 6067 (*)		(1,5) 6,0 mm	DL 8067 (*)	(2,0) 7,0 mm	
DL 5071 / DL 6071 (*)		(1,5) 6,0 mm	DL 8071 (*)	(2,0) 7,0 mm	
DL 6044		6,0 mm			mm
DL 6043		6,0 mm			
UL 5110 / UL 6110		3,0 mm	UL 8110	3,0 mm	
UL 6009		2,5 mm	UL 8009	3,5 mm	
UL 5009		2,5 mm			
UL 6005		2,5 mm	UL 8005	3,5 mm	+
UL 6007 / UL 6008		2,5 mm	UL 8007 / UL 8008	3,5 mm	
UL 6003		2,5 mm	UL 8003	3,5 mm	

(*) 

For visible recessed screw fittings PA-washers have to be used.
The values in ( ) must be considered for the calculation of the screw length.

The thickness of the outer seal can be found in the list on catalog pages 18 and 19. GD 5009 e.g. 3 mm or GD 1940 e.g. 10 mm. — mm

\+

Glas thickness — mm

\+

Add-On Channel — 11 mm

=

mm = Screw length

Result has to be rounded down to the next five-part division

[1] Delivered upon request

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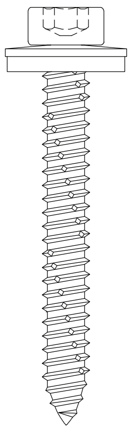
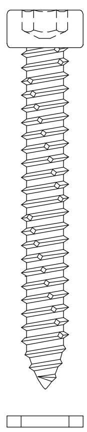
Screw fittings

System screws for Stabalux AK-H



Cylinder head screws ⌀ 10 mm with hex socket | with sealing gasket

Z 0148	Cylinder head screw	6.3x 30 mm
Z 0149	Cylinder head screw	6.3x 35 mm
Z 0151	Cylinder head screw	6.3x 40 mm
Z 0152	Cylinder head screw	6.3x 45 mm
Z 0153	Cylinder head screw	6.3x 50 mm
Z 0154	Cylinder head screw	6.3x 55 mm
Z 0155	Cylinder head screw	6.3x 60 mm
Z 0156	Cylinder head screw	6.3x 65 mm
Z 0157	Cylinder head screw	6.3x 70 mm
Z 0158	Cylinder head screw	6.3x 75 mm
Z 0161	Cylinder head screw	6.3x 80 mm
Z 0162	Cylinder head screw	6.3x 85 mm
Z 0163	Cylinder head screw	6.3x 90 mm
Z 0164	Cylinder head screw	6.3x 95 mm
Z 0165	Cylinder head screw	6.3x100 mm
Z 0166	Cylinder head screw	6.3x120 mm



Cylinder head screws ⌀ 10 mm with hex socket | without sealing gasket

Z 0293	Cylinder head screw	6.3x 18 mm
Z 0247	Cylinder head screw	6.3x 25 mm
Z 0116	Cylinder head screw	6.3x 30 mm
Z 0249	Cylinder head screw	6.3x 35 mm
Z 0118	Cylinder head screw	6.3x 40 mm
Z 0119	Cylinder head screw	6.3x 45 mm
Z 0253	Cylinder head screw	6.3x 50 mm
Z 0114	Cylinder head screw	6.3x 55 mm
Z 0255	Cylinder head screw	6.3x 60 mm
Z 0256	Cylinder head screw	6.3x 65 mm
Z 0257	Cylinder head screw	6.3x 70 mm
Z 0258	Cylinder head screw	6.3x 75 mm
Z 0241	Cylinder head screw	6.3x 80 mm
Z 0242	Cylinder head screw	6.3x 85 mm
Z 0243	Cylinder head screw	6.3x 90 mm
Z 0033	**PA washer**	⌀ 10 x 1.5 mm

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Flat cover profile DL 5073/ DL 6073/DL 8073

Tips for laying the cover profile DL 5073/ DL 6073/DL 8073

We assume that this cover profile will be used with glass panes that are supported on two sides and the recessed screw head is concealed. In this case, a cylinder head screw with inner hex is to be used e.g. Z 0253. When covering with a 2 mm cover plug Z 0089, a bore depth of 7 mm is calculated.

Depending on the precision of the bore, it should be decided on case by case basis if any slight changes to this depth are necessary. The cover plug Z 0089 does not need to be glued in place, but may be levelled using levelling compound.

Coating the cover profile

Profile production (aluminium extrusion moulding) with different mass distributions is extremely difficult. Lengthwise shadow formation may result. Resulting actions are to be taken with the agreement of the coater.

Intersections

Due to the special shape of the strip (the material extends into the rebate), there is no closed sealing section available at intersections. We therefore recommend placing particular attention to ensure tightness of the joints and fill will Stabalux connecting paste Z 0094.

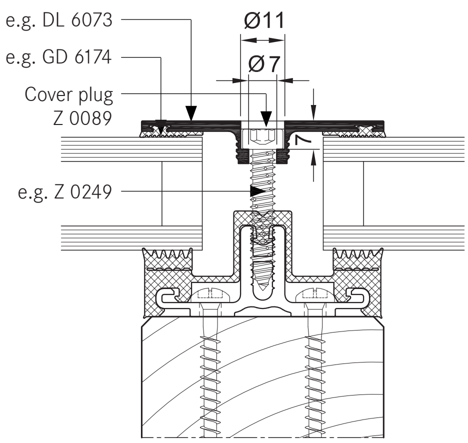
Glass thickness

When using cover profiles DL 5073/ DL 6073/DL 8073 in combination with the add-on channel, a glass thickness of at least ≥ 18 must be used.

Glass supports/blocking

- The glass support GH 6073 can be installed with a glass thickness of 18 mm.
- Because the cover profile protrudes centrally into the rebate, the glass supports GH 6071 and GH 6072 will collide with the strip.
- Accordingly, a special glass support can be designed by shortening the glass support and strengthening it by applying a aluminium plate. The aluminium plate should be 3 mm thick and must be fixed into position. Ensure that sufficient space is available for the glazing block.
- Alternatively, the cover profile should be milled out around the glass support.
- When using GH 6071 and GH 6072 the glass thickness is d ≥ 28 mm.
- In all cases, to support the panes, glazing blocks must be installed that can carry the load to safely ensure the glass load is distributed effectively.

Mullion



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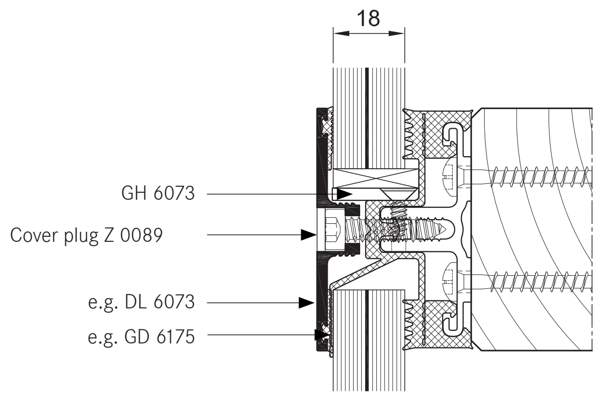
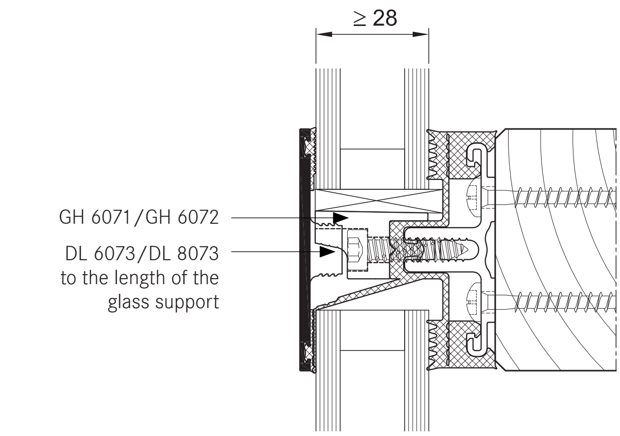
Flat cover profile DL 5073/ DL 6073/DL 8073

Transoms

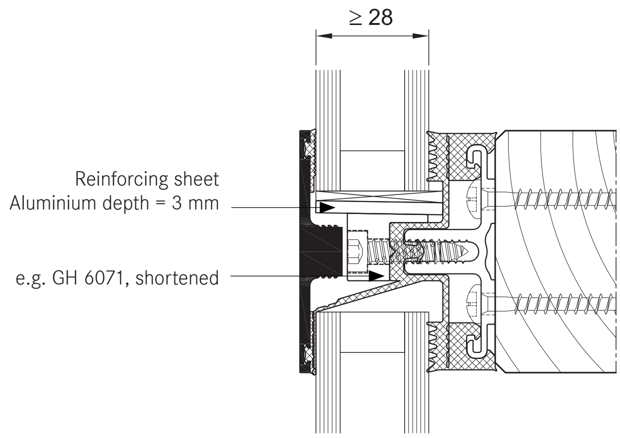
Flat cover profile and glass support GH 6073



Mill flat cover profile and glass support GH 6071/GH 6072



Flat cover profile and glass support GH 6071/GH 6072



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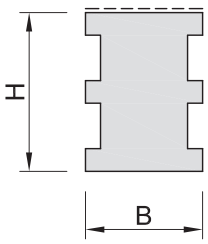
Using slab insulation

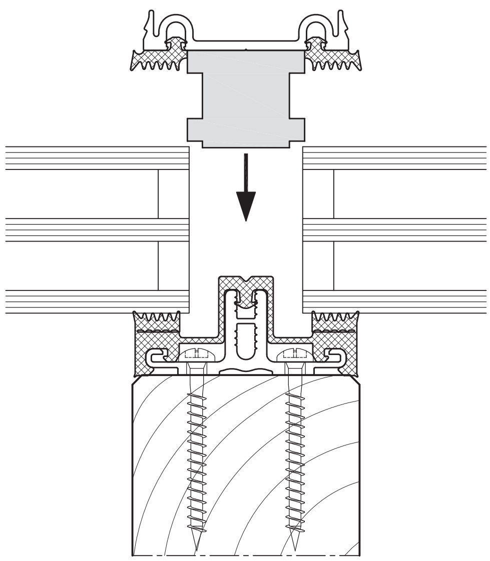
Using slab insulation significantly reduces heat dissipation. The highly effective insulation blocks have a permanently adhesive HOT-MELT. Depending on the situation where they are used, insulation blocks can be directly applied to the cover profile/pressure profile or placed into the rebate over the screw fittings and pushed into position with the cover profile/pressure profile.

The use of insulation blocks with cover profiles DL5073/ DL 6073 / DL 8073 should be tested for each individual situation.

2-piece outer seals are always used with slab insulation blocks:

- System width 50 mm
  Glass inset 12 mm – outer insulation **GD 1932** with insulation block Z 0607 or Z 0608





- System width 60 mm
  Glass inset 15 mm – outer insulation **GD 1932** with insulation block Z 0607 or Z 0608

- System width 80 mm
  Glass inset 20 mm – outer insulation **GD 1932** with insulation block 2x Z 0605 or 2x Z 0606. Insulation block with corresponding rebate width available upon request.

System width 50 mm

Insulation block	Width “W” (=rebate width)	Height “H”
Z 0606 Insulation block 20/26	26 mm	26 mm glass thickness from 32 mm
Z 06075 slab insulation 20/42	26 mm	42 mm glass thickness from 48 mm

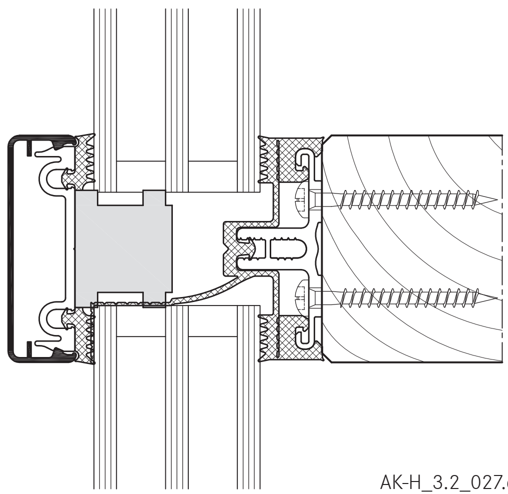
System width 60 mm

Insulation block	Width “W” (=rebate width)	Height “H”
Z 0608 Insulation block 30/26	30 mm	26 mm glass thickness from 32 mm
Z 0607 slab insulation 30/42	30 mm	42 mm glass thickness from 48 mm

System width 80 mm

Insulation block	Width “W” (=rebate width)	Height “H”
2 x Z 0606 Insulation block 20/26	40 mm	26 mm glass thickness from 32 mm
2x Z 0605 Insulation block 20/42	40 mm	42 mm glass thickness from 48 mm

Note:
Correctly position the seal flap when installing the insulation blocks



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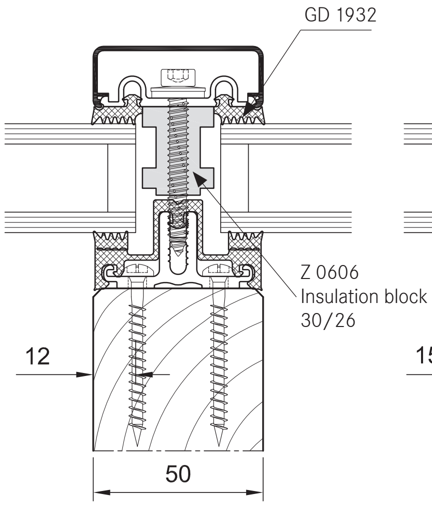
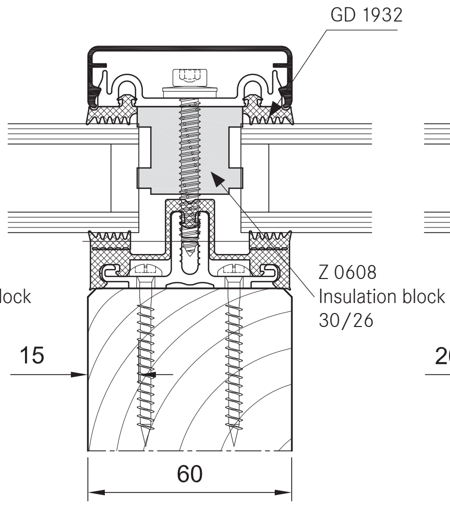
Using slab insulation

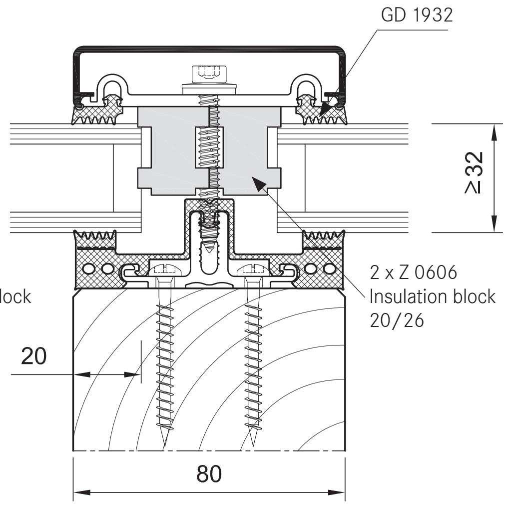
Examples for installing insulation blocks



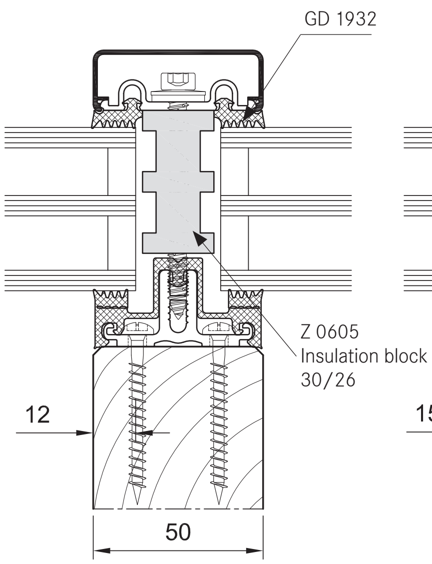
System width 50 mm



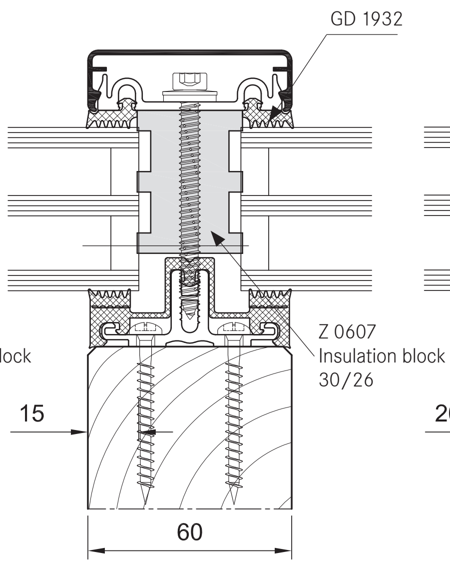
System width 60 mm



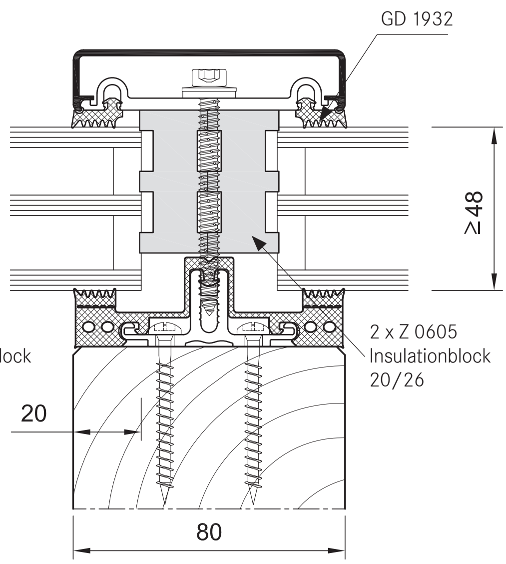
System width 80 mm



System width 50 mm



System width 60 mm



System width 80 mm

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Pane support variants

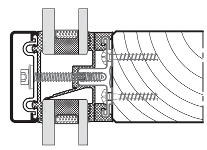
Special design

Glass structures that partially refrain from using visible cover profiles are considered special designs.

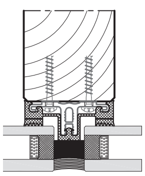
These designs do not conform to the intended uses of the system. No guarantees are made for e.g. quality of seals, durability and structural stability. Responsibility here lies entirely with the company implementing the design.

Based on our experience we recommend paying close attention to the points made on the following pages during planning and implementation.

Mullion-transom structure, 2-sided cover profile

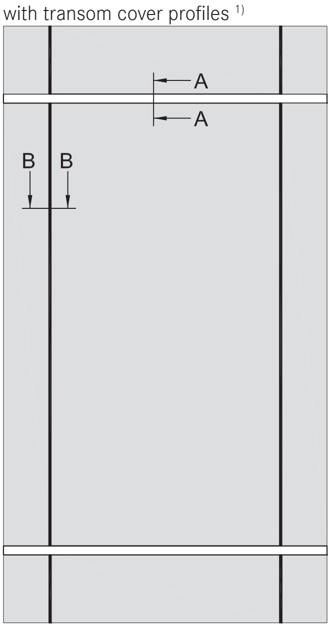


Section A-A



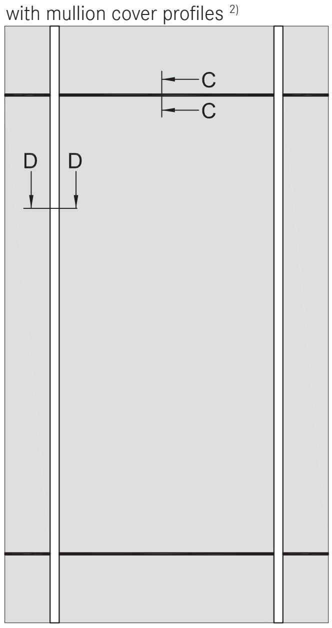
Section B-B

Mullion-transom structure
with transom cover profiles [1)]

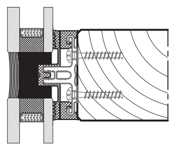


[1)] Seals with 1, 2 or 3 sections are possible

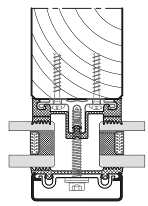
Mullion-transom structure
with mullion cover profiles [2)]



[2)] Use of mullion seals with 1 section in mullions and transoms



Section C-C



Section D-D

AK-H_3.3_027_1.

Pane support variants

Vapour seal:

When using this type of structure, it is important to be aware that any loss of contact pressure can affect the room-side permeability. There is an increased risk of condensation build up in the rebate.

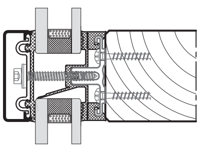
vertical clamping strips:

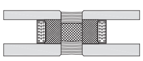
The glass supports should be placed to below the outer pane and sealed with it.

horizontal clamping strips:

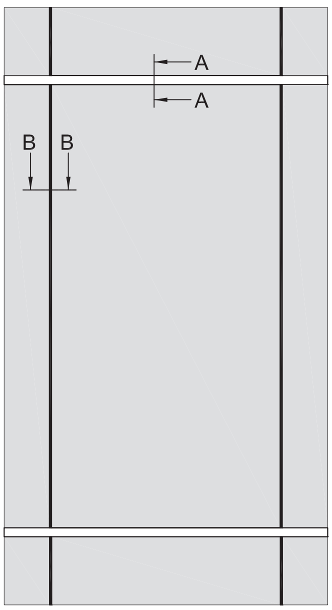
Ventilation and condensation drainage is achieved via a recess in the lower sealing lip in the centre of the outer seal or at one third intervals.

Transom structure, mullion structure 2-sided cover profile

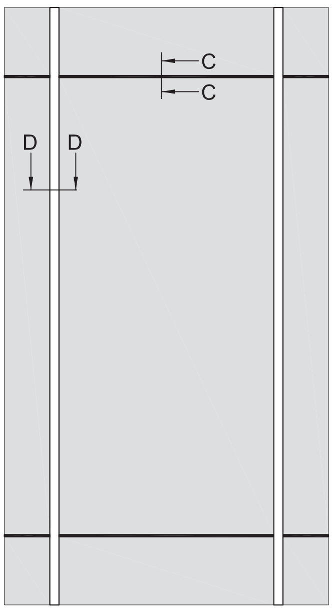

Section A-A

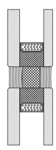

Section B-B

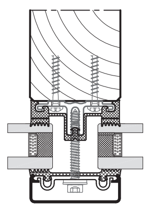
Transom structure



Mullion structure




Section C-C


Section D-D

AK-H_3.3_027_2.

Pane support variants

Requirements for special designs

1 Vapour seal

The room-side level of glazing must have the best possible vapour seal. In this regard, the vapour diffusion properties of the silicone sealant to be used should be tested. Ensure that there are no permeable areas around concave cross joints.

2 Rebate ventilation, pressure equalisation and condensation drainage

Systems with partially sealed rebate represent a limitation to rebate ventilation. Check on a case-by-case basis that no damage will be caused by standing condensation. It is especially critical that designs with sealed vertical joints are evaluated. To allow ventilation of the horizontal rebate we recommend installing a suitable vertical ventilation space. Alternatively, ventilation can be achieved using the outer joints.

3 Weatherproofing

The outward facing seals must be watertight. In cross joints, it is especially important to ensure a firm join between the Stabalux profile seal and the silicone joints. We recommend sealing up to the outer edge of the glass before mounting the cover profiles.
We would like to once again emphasise that our profile seals will not make a permanent bond with commonly used silicone sealants. A seal can only be created at contact points through permanent application of pressure.

4 Mechanical strength screw fittings

Ensure screw fittings are sufficiently planned for. Special attention should be given to the effects of wind suction and the reduced support.

5 Glass weight distribution

Mechanical distribution of the weight of the glass panes through the structure must be ensured. System glass supports can be used for existing horizontal transoms. Designs using “only” mullions require special glass supports which carry the weight of the glass directly into the mullions.

6 Glass sizing

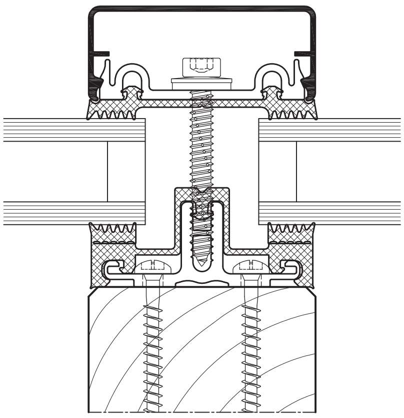
Attention should be given to the reduced support of panes when dimensioning the glass. For example, only the vertical or horizontal cover profiles are effective in the event of wind suction stresses or stress on the fall protection.

7 Material compatibility

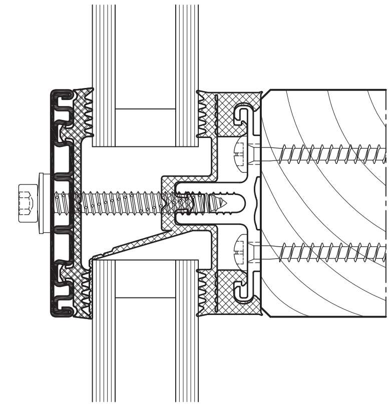
Compatibility of the silicone sealants with our profile sealants and the edge bonding of the glass must be ensured. We recommend the exclusive use of tested silicone sealants from the whole-glass facades sector. Approval is usually given by the silicone manufacturer.

System cross sections

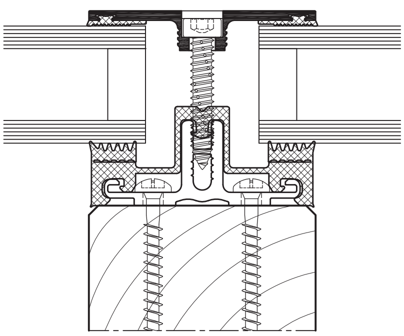
Examples:



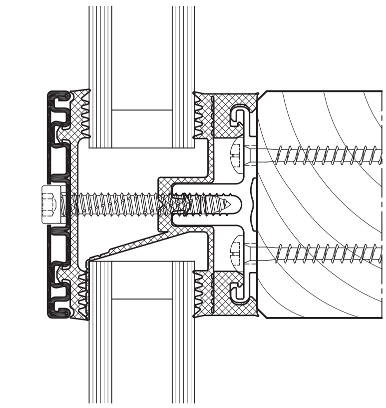
Vertical glazing
Mullion, concealed screw fittings



Vertical glazing
Transom visible screw fittings



Vertical glazing
Mullion flat cover profile DL 6073



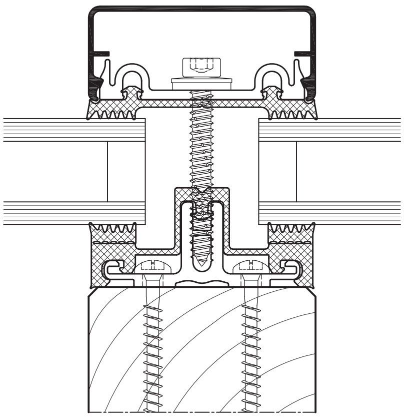
Vertical glazing
Transom, visible recessed screw fittings

AK-H_3.3_001.dwg

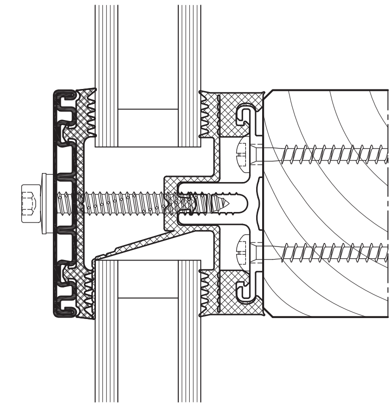
System cross sections

3.3
2

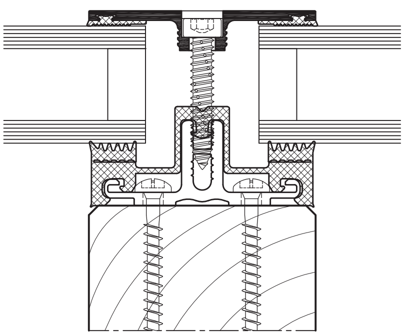
Examples:



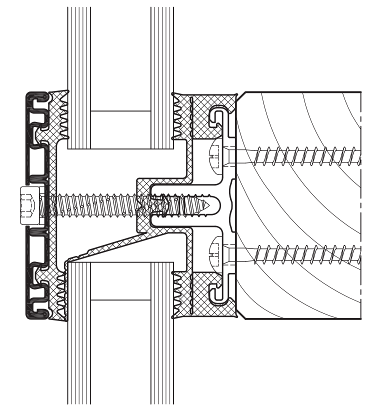
Vertical glazing
Mullion visible recessed screw fittings



Vertical glazing
Transom, concealed screw fittings



Vertical glazing
Mullion visible screw fittings



Inclined glazing
Transom visible screw fittings

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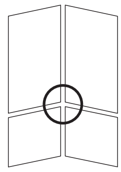
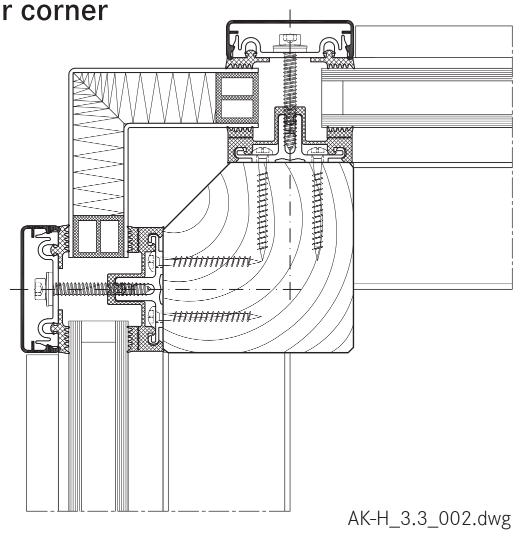
System details



Creating facade corners

At exposed areas such as glass facade corners, consideration must be made to ensure sufficient heat insulation in order to avoid the creation of thermal bridges and prevent condensation build up. Thermal current calculations provide information about the actual heat loss.

Outer corner



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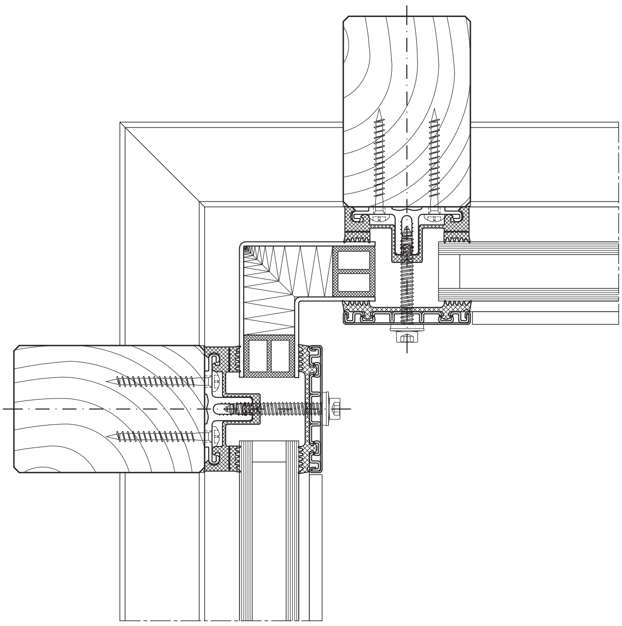
Inner corner



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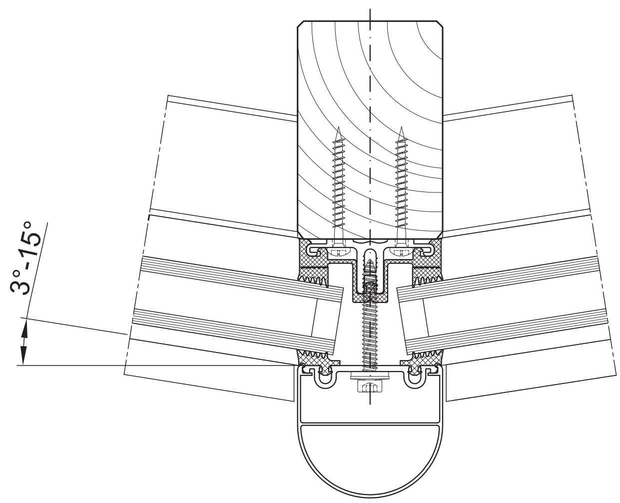
System details

Facade polygon

Special seals allow a polygon shaped arrangement of the facade mullions. For convex glass surfaces an angle between 3° and 15° can be freely chosen. For concave glass surfaces the angle can vary between 3° and 10°.

Attention:
Observe the minimum glass inset,
e.g. ≥ 15 mm for System 60!

Geometrically test feasibility depending on glass thickness, inset and angle!



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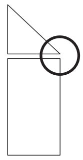
System details



Eaves with glass roof connection

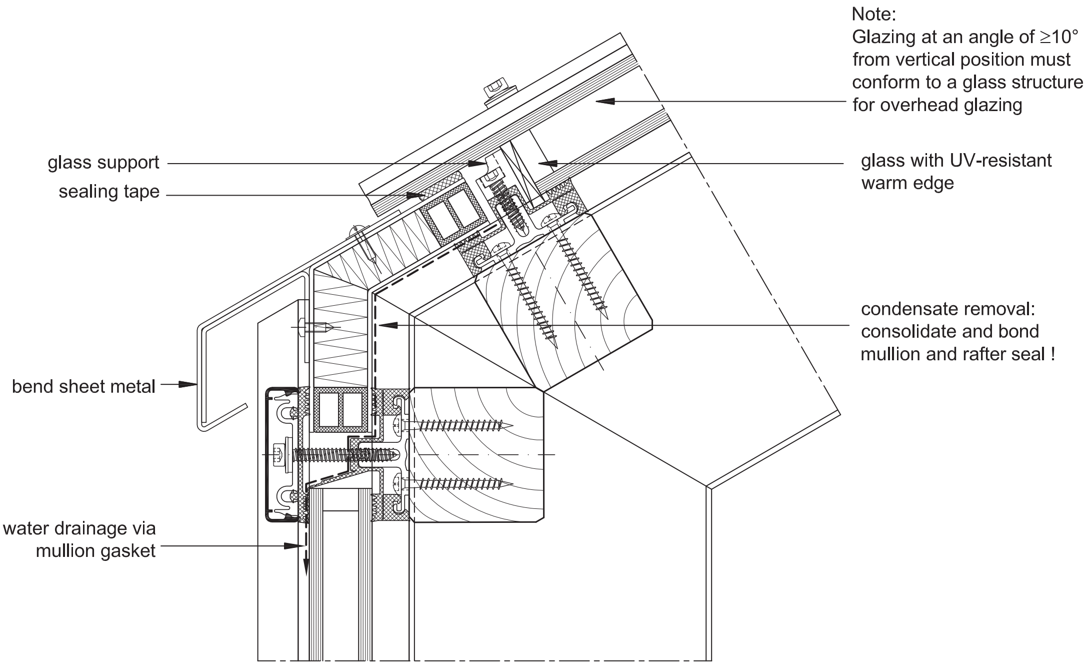
- Depending on the transom construction, a design with or without rain gutters and the choice of stepped glazing or closable cover profiles gives us different variants for implementation.
- All options require condensation and moisture to be drained away at the eaves.

Design with stepped glazing

- With a stepped glazing design it is important to select a UV-resistant edge bonding for the glass. This edge bonding systems, usually silicone-based, are quite permeable to gases and are therefore unable to achieve the required high values for sound and heat insulation of conventional systems and require additional sealing around the edges.
- Our thermal calculations show that stepped glass panes, compared to covered glass edges, have a much less favourable isothermal movement.
- Stepped glass panes must also be statically measured according to their reduced hold against wind suction.
- The additional thermal loads that occur in stepped glass panes should countered by the use of pre-tensioned glass (TVG, ESG) for the outer panes.
- Stepped glass panes should be preferred for flatter inclined roofs as water can drain away at the eaves unhindered.

Example 1:

Design with stepped glazing



AK-H_3.3_005.dwg

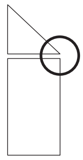
System details

Eaves with glass roof connection design using cover profiles

- Horizontal pressure strips prevent the free run off of rain water and dirt.
- Cover strips with angled edges reduce the build up of water in front of the cover profile.
- The outer sealing level on glass roofs must also be thoroughly sealed.
- In combination with our butyl clad stainless steel panels, glazing with pressure strips on 4 sides achieves a higher level of safety.
- Make sure that the inner sealing section provides guaranteed drainage for condensation.
- To improve drainage and heat-induced expansion, cover profiles should be shortened by 5 mm at transom joints. Gasket joints, however, are to be laid flat with a slight excess in dimensions. Open ends of the transom cover profiles must be sealed.

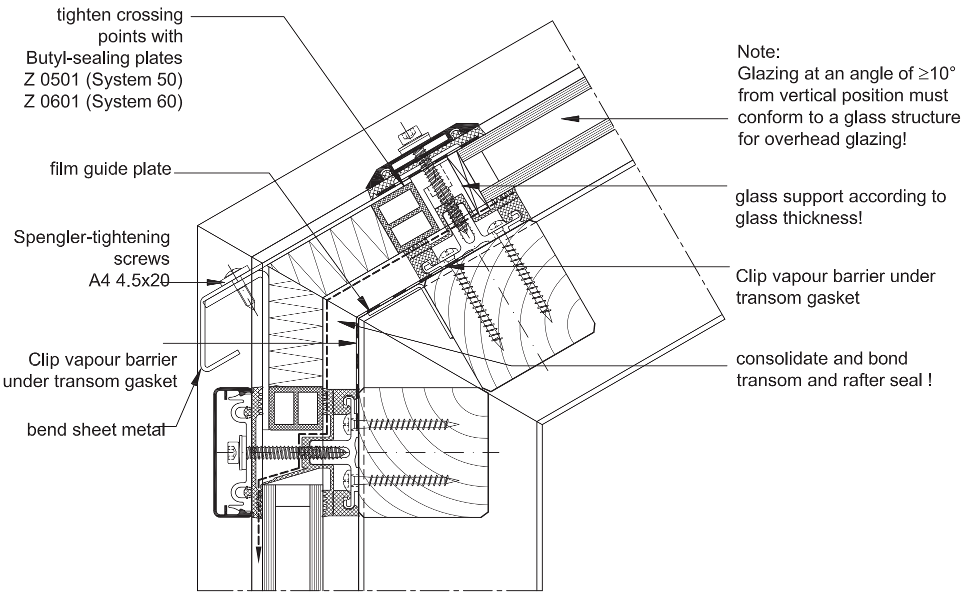
Note:

Due to the increased thermal stresses in the roof, we recommend using concealed screw fitting when choosing clamping strips for larger system lengths and in rafters. Unused holes in the pressure profile must be sealed.



Example 2:

Design using cover profiles



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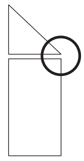
System details

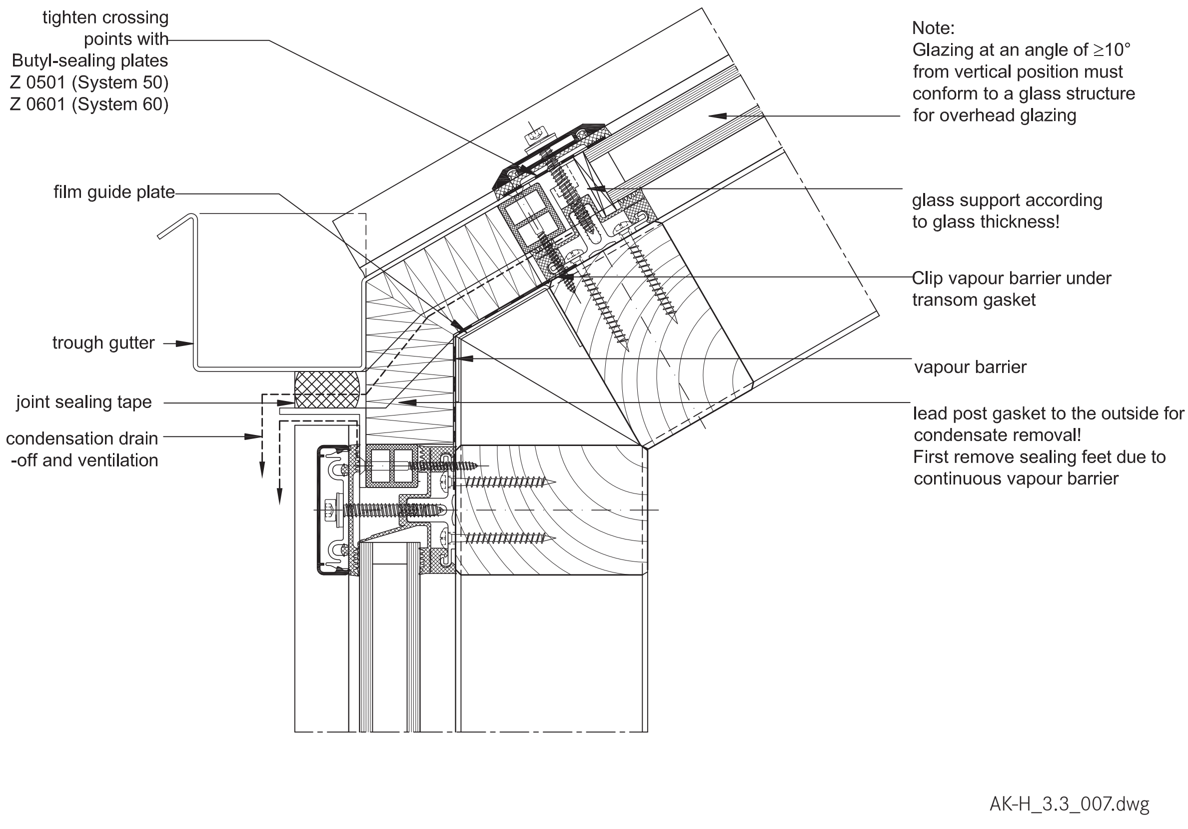


Eaves with glass roof connection design with gutter

- The gutter must be able to take its own weight and mounted in such a way that stresses from its own weight, water and ice will not lead to deformations and directly apply a load to the glazing.
- Overflowing water must not be able to get inside the structure. Alongside the gutter-shaped outer rafter seal, the moisture barrier installed over the guide plate also acts to drain away condensation.

Example 3:

Design with gutter



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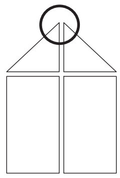
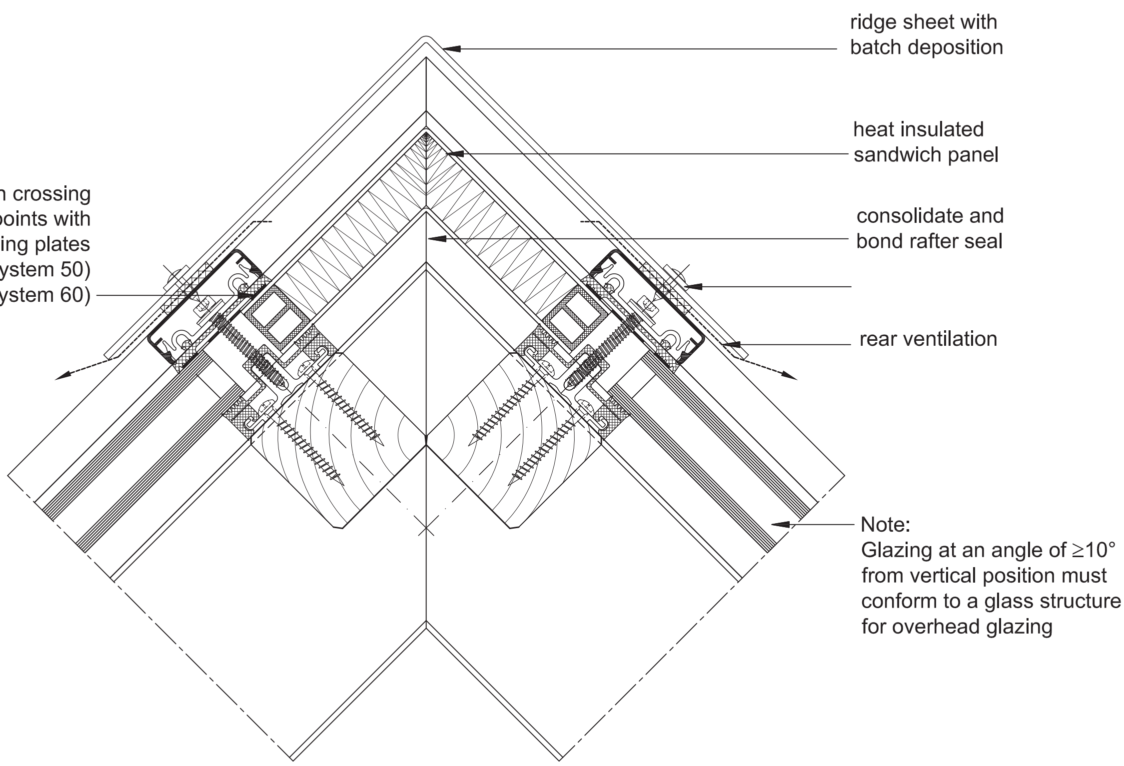
System details

Roof ridge design

- When designing the ridge cap, ensure that the rafter cover profiles are pulled under the ridge cap.





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Structural attachments

Structural attachment film baffles

- Attachment of glazing to the building structure requires a well thought out approach.
- Moisture damage can occur if moisture condenses at any thermal bridges.
- Thermal bridges must be avoided and warm air from the inside spaces must not penetrate too deeply into the structure.
- The required moisture barriers must be installed as deeply as possible into the inner space using impermeable structural film baffles. This prevents moisture penetration into the structure via condensation from the air inside.
- An additional foil to seal against rainwater must be permeable to moisture. Only if this foil has a water vapour diffusion resistance value of μ = 3000 can a dry structure be guaranteed in the transition zone.

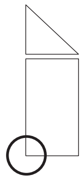
AK-H_3.3_007.dwg

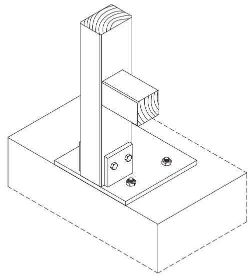
Structural attachments

3.3
4

Facade base

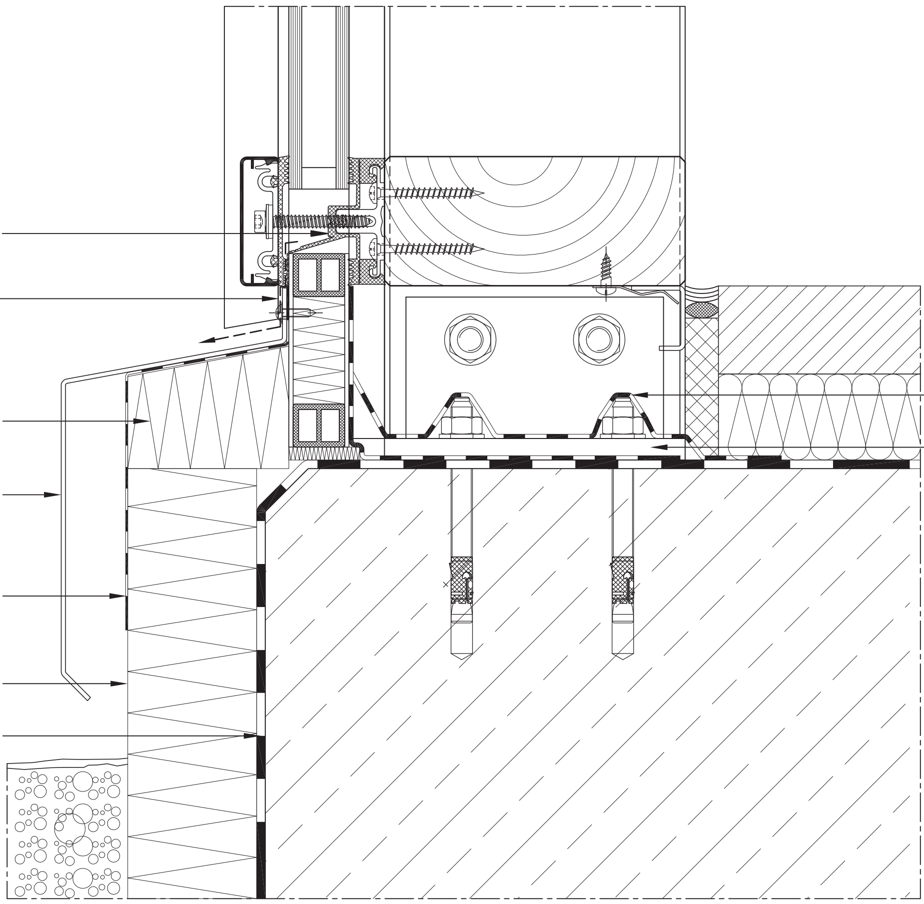
- Controlled drainage of the rebate space can only be ensured if the sealing sections overlap in such a way that no moisture can get under the seals and foils.
- Run foils under the transom seal to act as a moisture barrier and glue to the steel structure. In accordance with DIN 18195 the seal should be run at least 150 mm above the water-guiding layer.
- Attach foil with moisture barrier in accordance with the requirements of DIN 18195.
- Rebate space ventilation is achieved via the open end of the vertical cover profiles.
- Ensure the connection is impermeable to vapour.
- Mullion mountings must be sufficiently statically dimensioned. Required centre and edge distances for anchoring with base plates and the building structure must be observed.





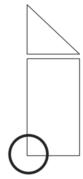
Example 1:

Mounting intermediate mullion to base plate



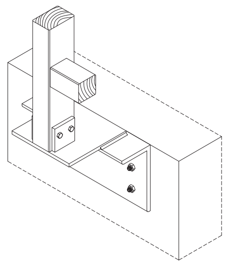
AK-H_3.3_009.dwg

Structural attachments



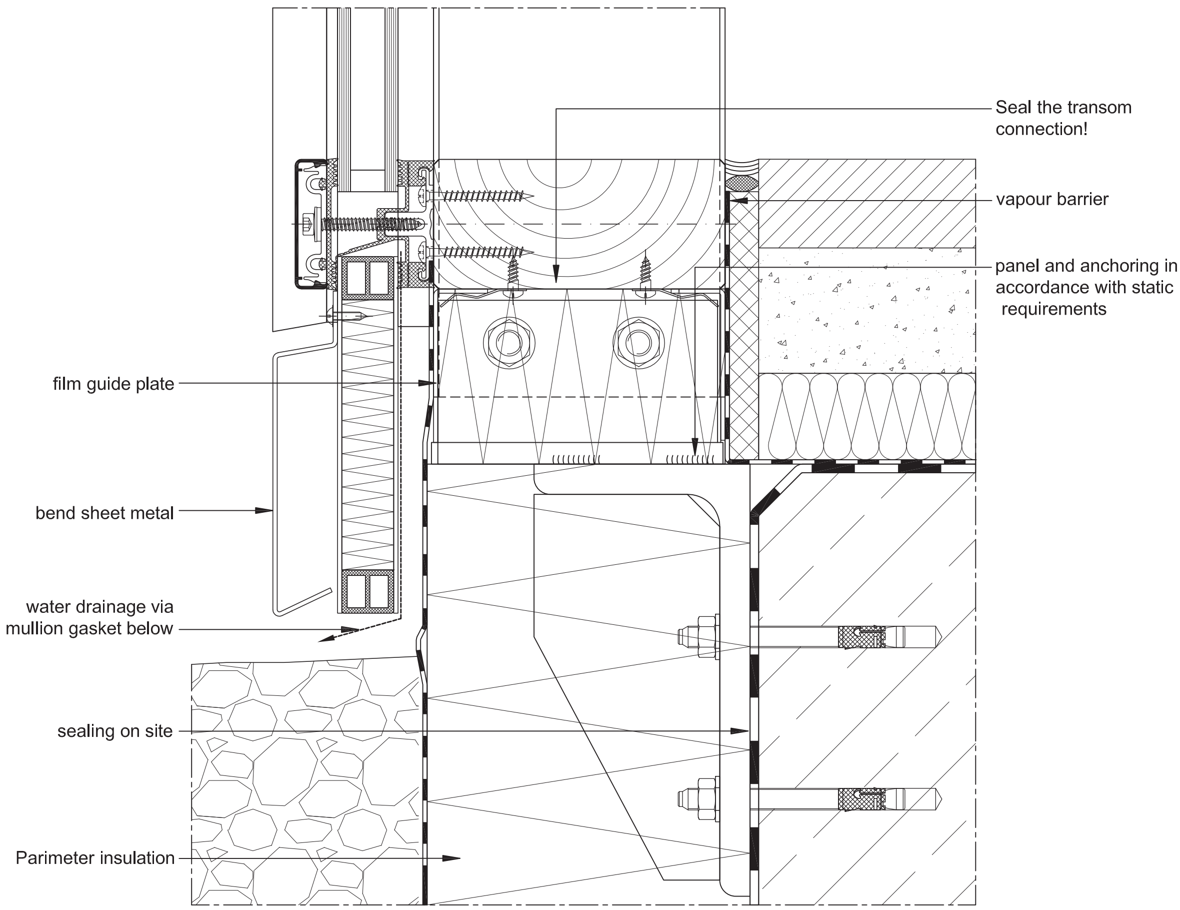
Facade base

- Heat insulation around the structural connection should be designed in such as way as to prevent cold bridges forming.
- Steel parts should also be provided with sufficient protection against corrosion even in concealed areas.
- Weather-protection sheets should be used depending on the requirements of the construction. Sufficient rear ventilation must be ensured.



Example 2:

Attaching intermediate mullion before base plates



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Structural attachments

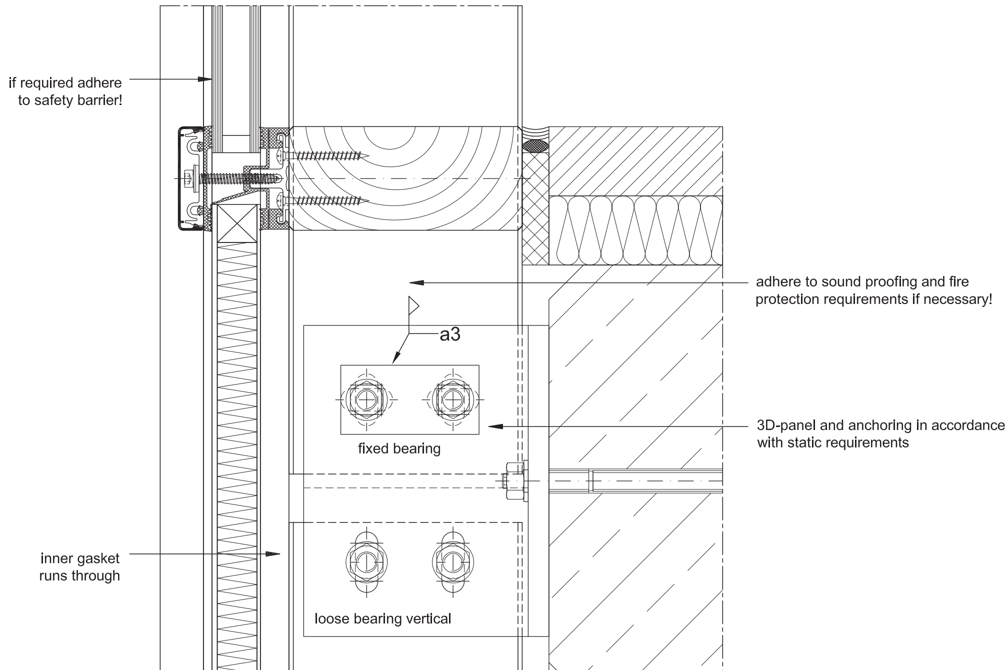
Connection before intermediate floors

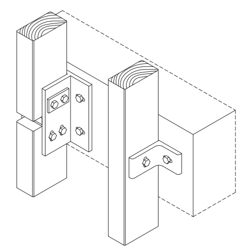
- Depending on requirements, mullions are designed as continuous multi-span transoms or separated at each floor.
- Reasons for separating mullions can include e.g. building settlement, fire protection, sound insulation, etc.
- If the separation joint is intended to absorb expansion, then as well as the required degree of freedom for mullion mullions, the ability for movement of integrated elements must also be ensured.
- The constructive design of the mullion joint and mounting should be chosen according to the statically calculated base system and determines the choice and arrangement of fixed and movable bearings, type of screw fittings, structural connection parts and attachment to the concrete floor.
- With continuous mullions and a corresponding mount the multi-span support principle is in effect. Sagging due to horizontal effects is lower. The required moment of inertia reduces for 2-span supports with the same span length compared to the 1-span support by a factor of 0.415. However, a tension and stability analysis should be carried out.

Example:

Mullions separated at each floor

In this example, distribution of horizontal and vertical loads is achieved at each floor through the existing floor structure.





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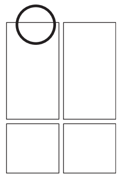
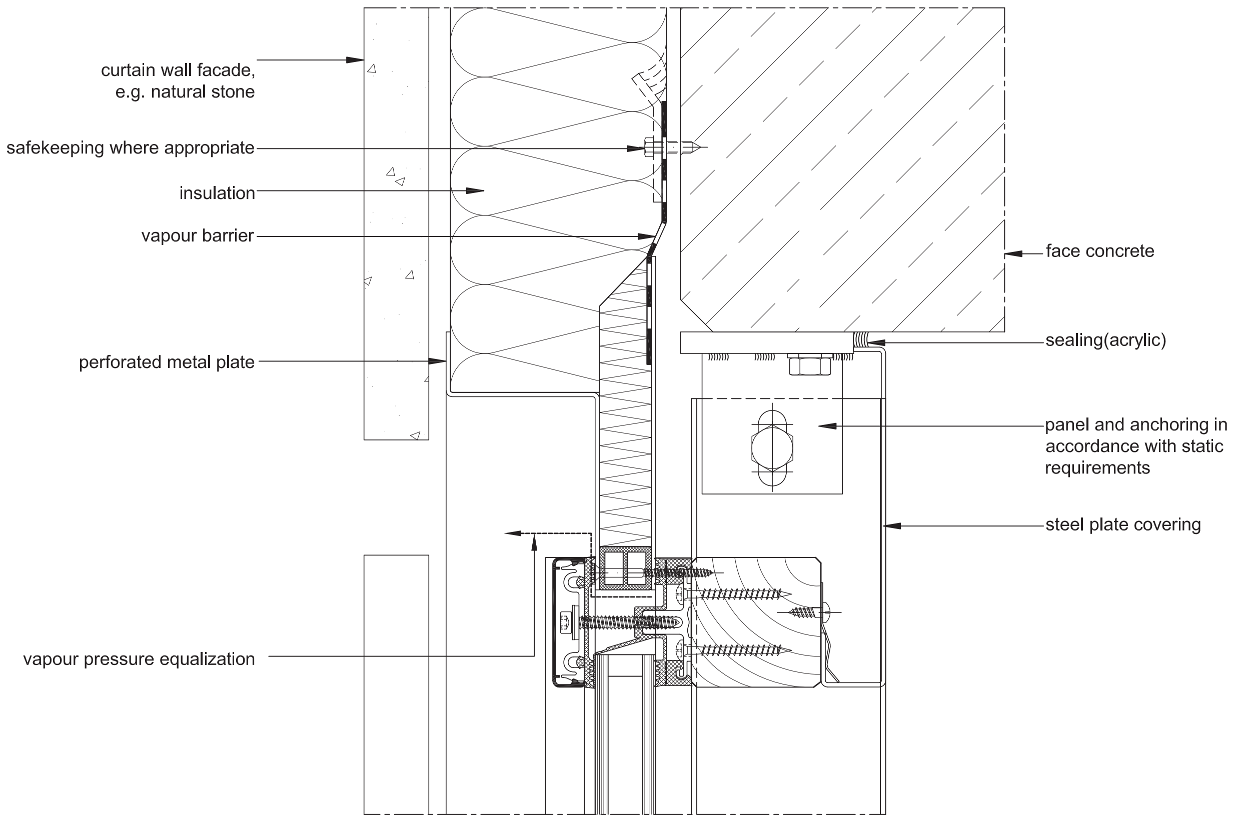
Structural attachments

Ceiling connection

- Structural connections should take account of any movement that may occur.
- As well as temperature induced expansion in the facade, all longitudinal expansions and movements of the affected components must be considered.
- Additional stresses from restraints must be avoided.



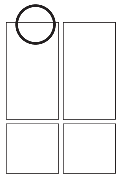


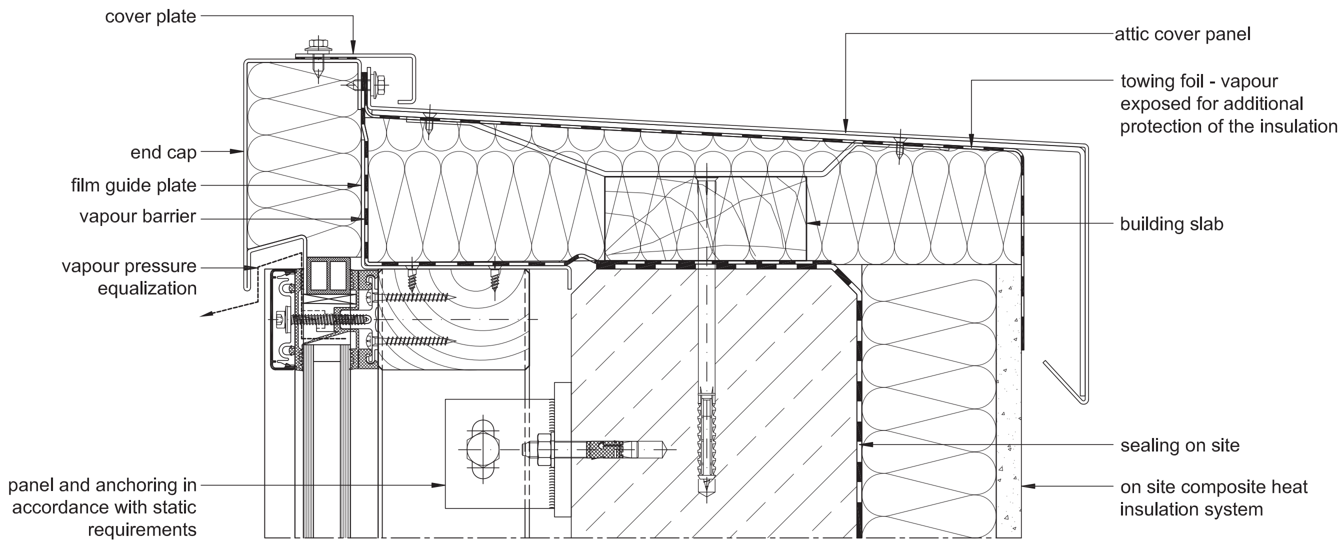
AK-H_3.3_013.dwg

Structural attachments

3.3
4

Facade connection to parapets



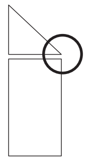


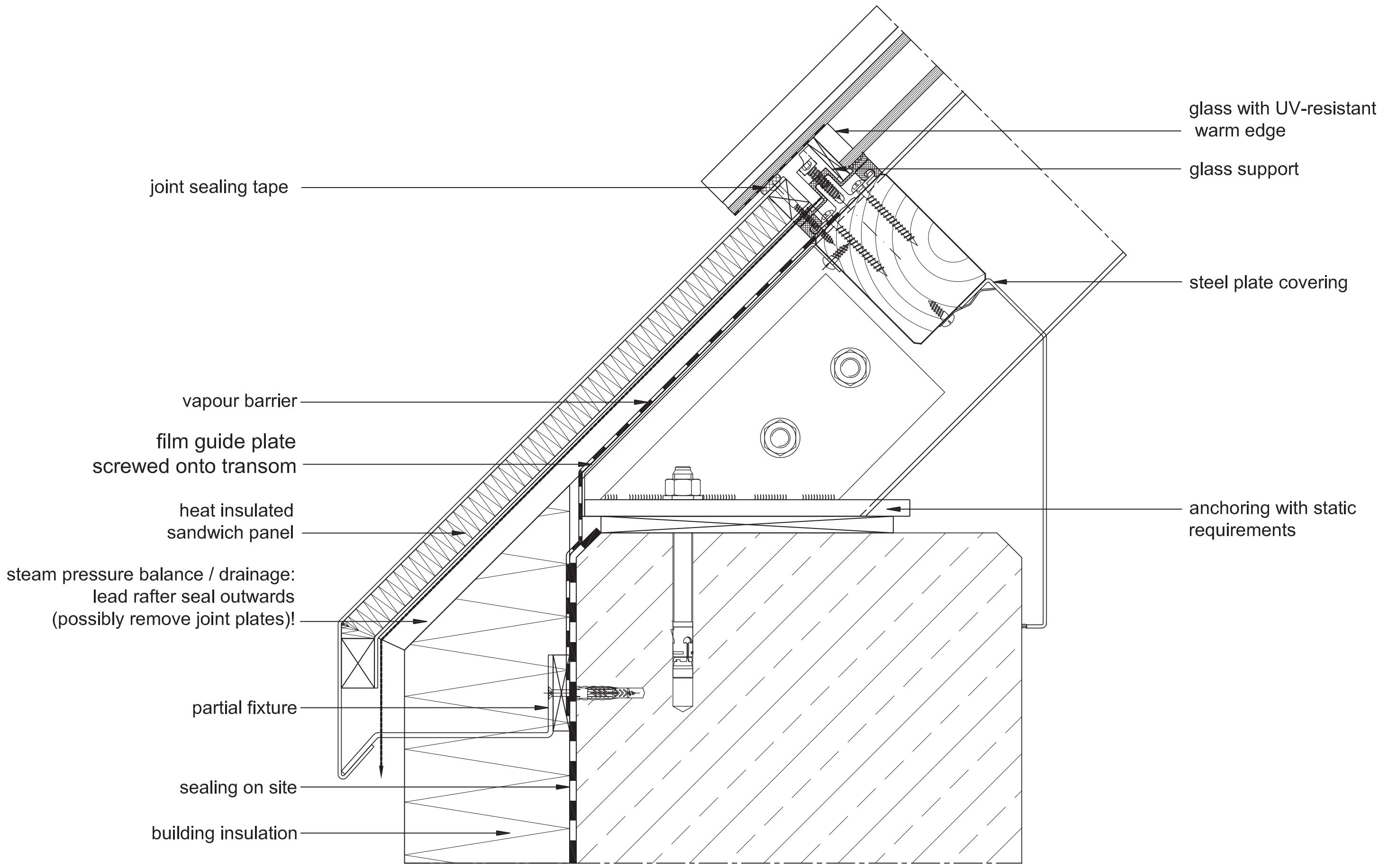
AK-H_3.3_014.dwg

Structural attachments

Connection to structural eaves

- This connection is suitable for glass roofs that are being installed as skylights in the structure. These may be gabled roofs, single pitch roofs, pyramids or arched roofs.



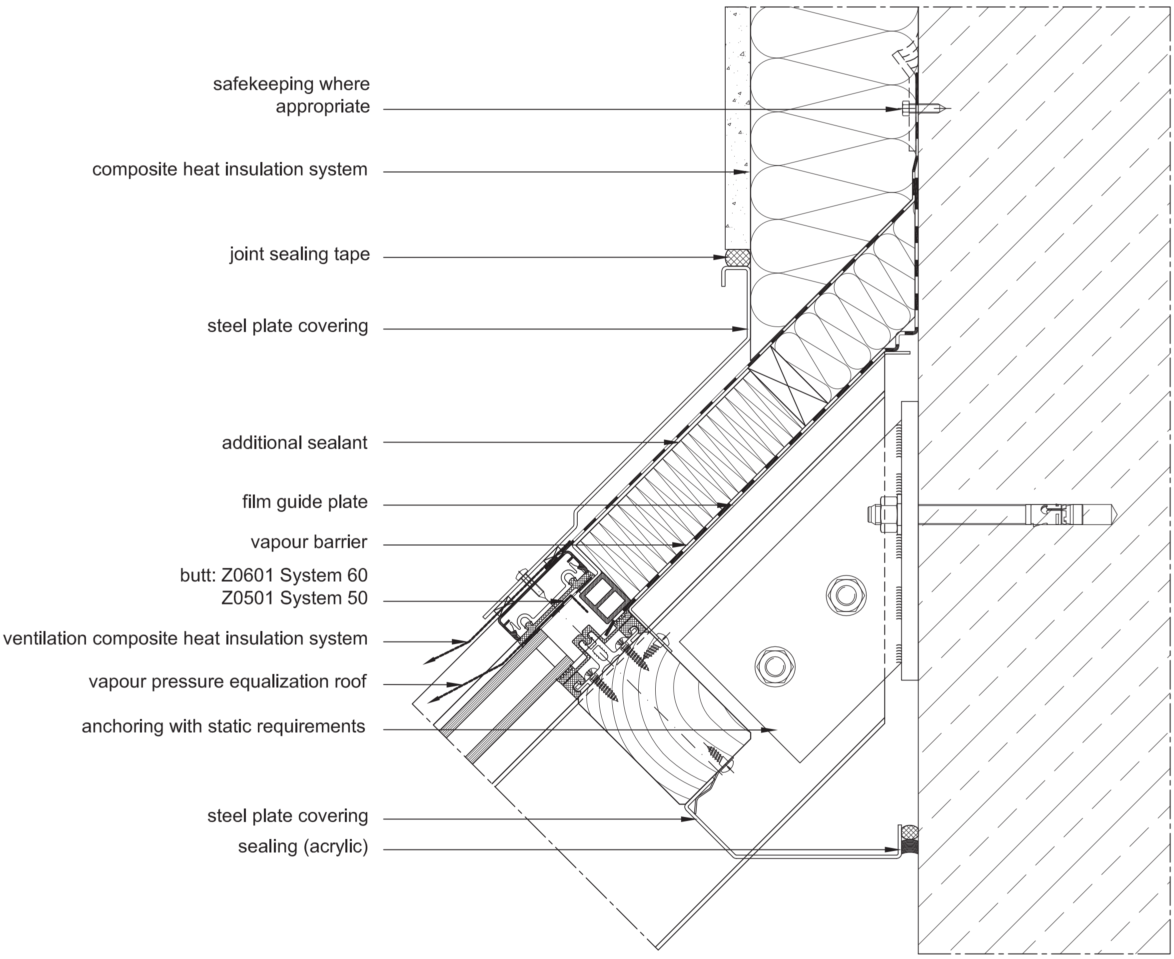


AK-H_3.3_015.dwg

Structural attachments

Ridge connection to walls

- When making ridge connections to walls, permeability to moisture is particularly important. Warm air with a high level of moisture gets into cooler zones of the inner sealing section where the design is not sufficiently sealed and can cause structural damage from penetrating into the connecting structure.
- Joint seals made from butyl-clad stainless steel plates (Z 0601, Z 0801) must be installed on the outside of joint areas.



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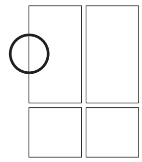
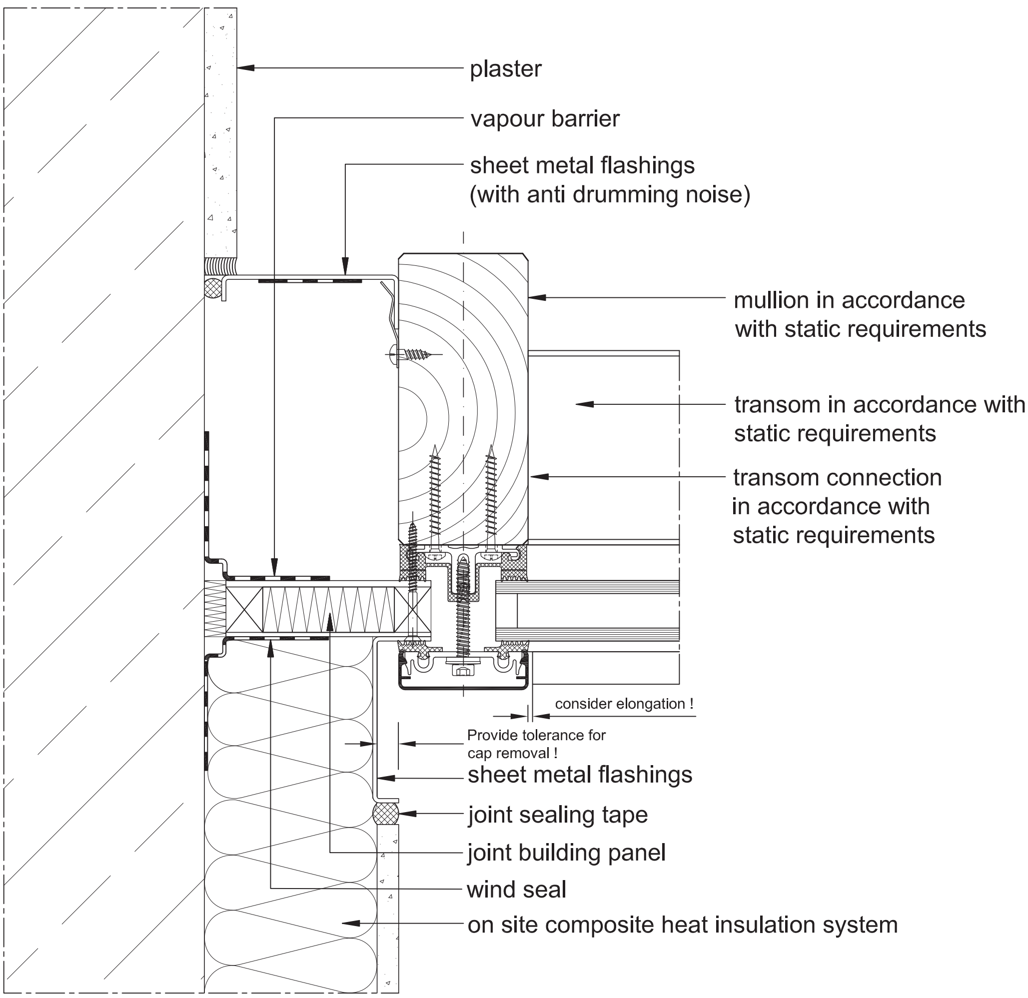
Structural attachments

3.3
4

Horizontal wall connection to heat insulation bonding system

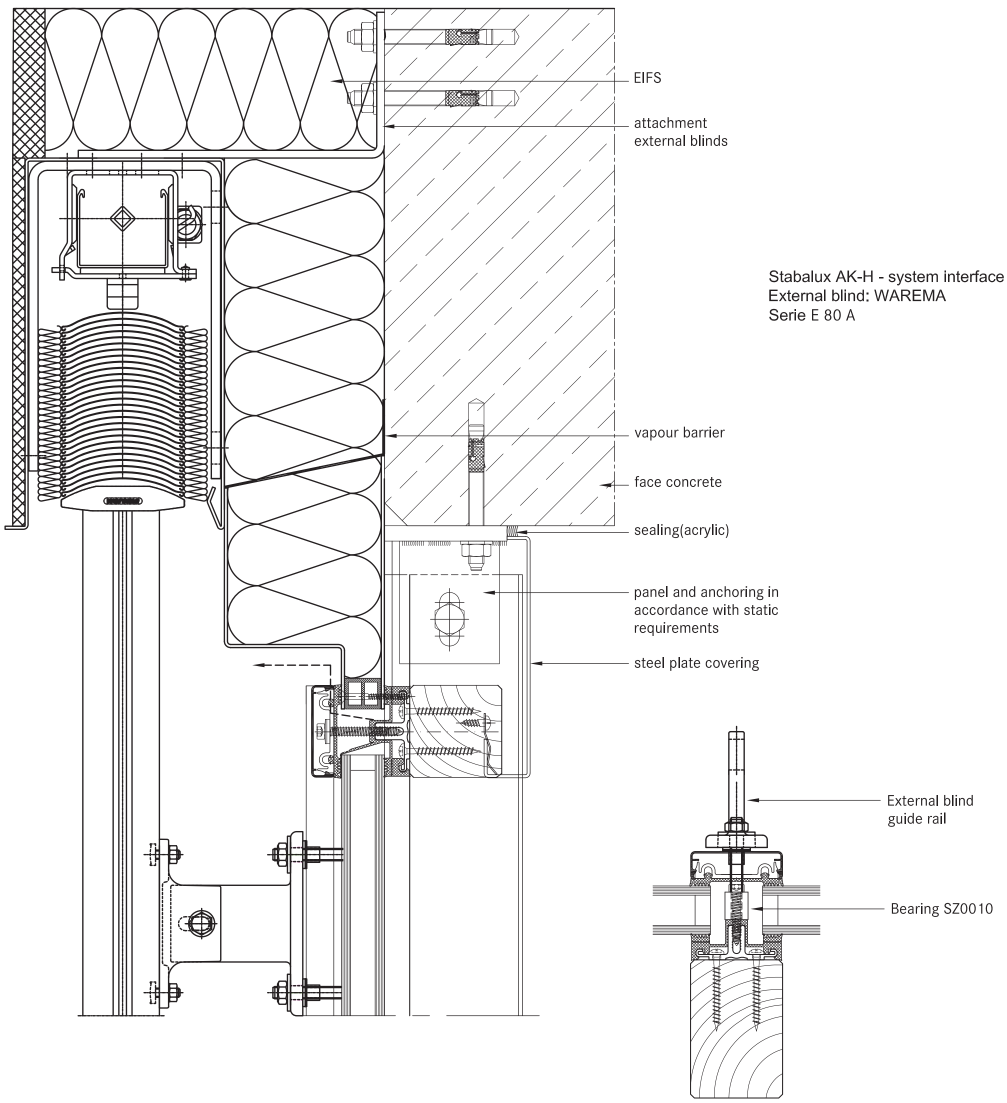




AK-H_3.3_017.dwg

Structural attachments

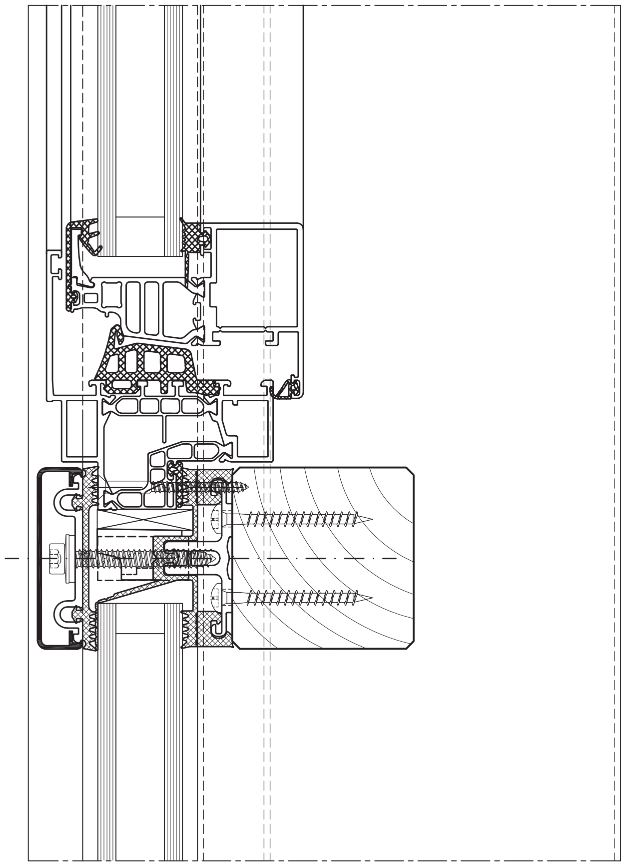
Ceiling connection including WAREMA external blinds



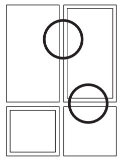
AK-H_3.3_028.dwg

Installing windows and doors

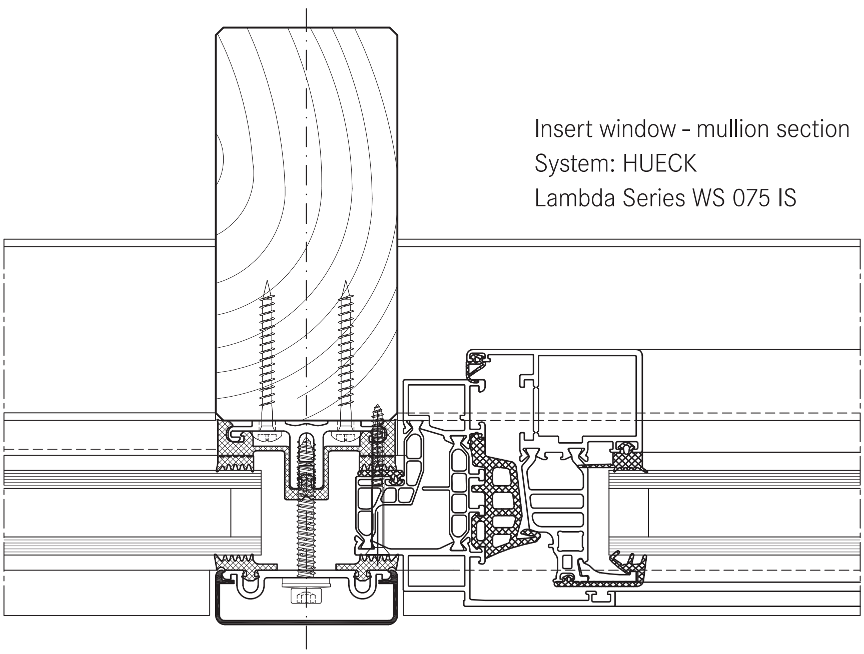
3.3
5



Insert window transom section
System: HUECK
Lambda Series WS 075 IS



Mullion and transom facades and glass roofs from Stabalux are neutral with regards to the selection of insert elements. All commonly available window and door systems made from steel, aluminium, wood or plastic can be used. Frame profiles from the window and door manufacturer's should be selected to match the chosen glass thickness. If no profiles with a suitable insert rebate are available, mountings may be used as shown in the following examples. Like with glass elements, windows are set into the facade on glass supports, padded and then secured against slippage.

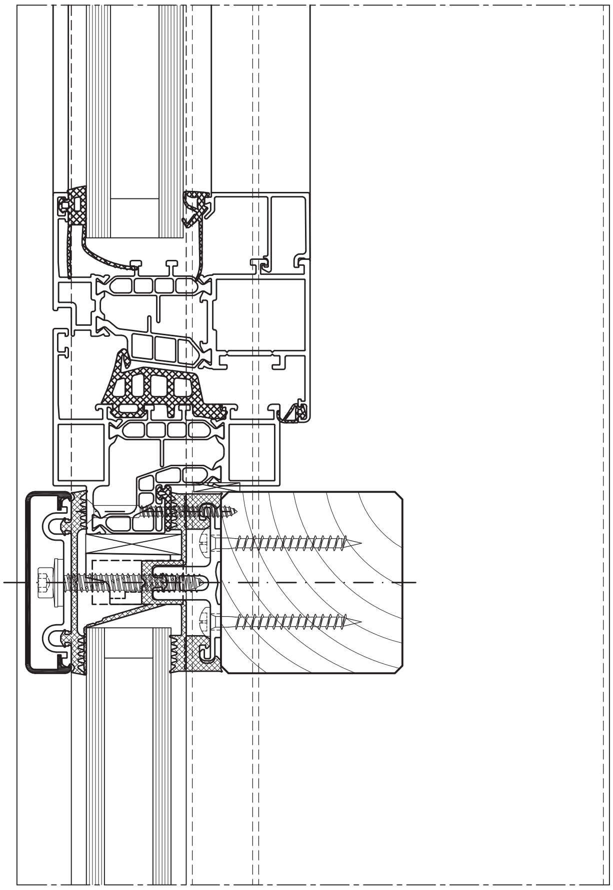


Insert window - mullion section
System: HUECK
Lambda Series WS 075 IS

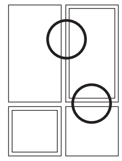
AK-H_3.3_018.dwg

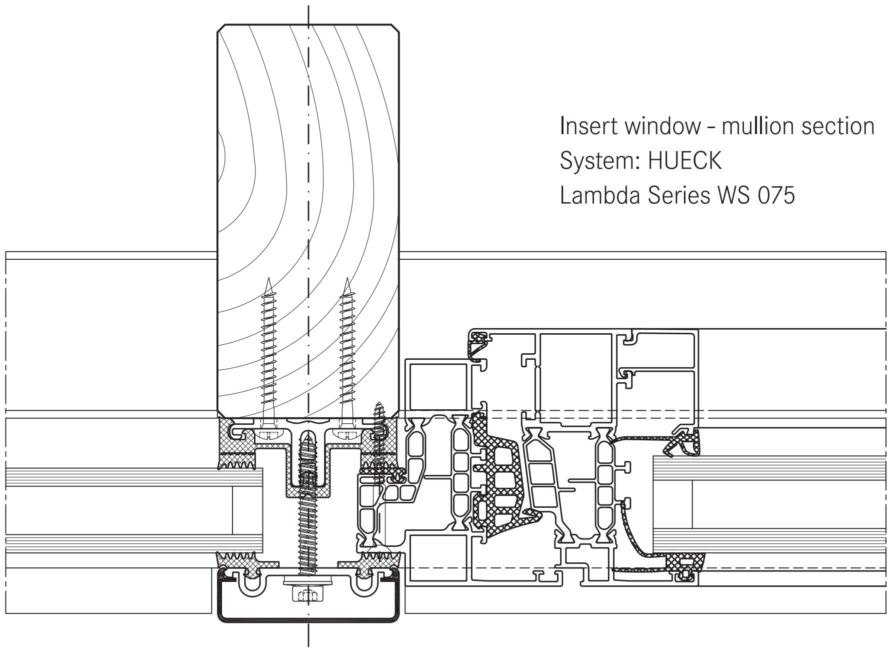
Installing windows and doors

3.3
5



Insert window transom section
System: HUECK
Lambda Series WS 075



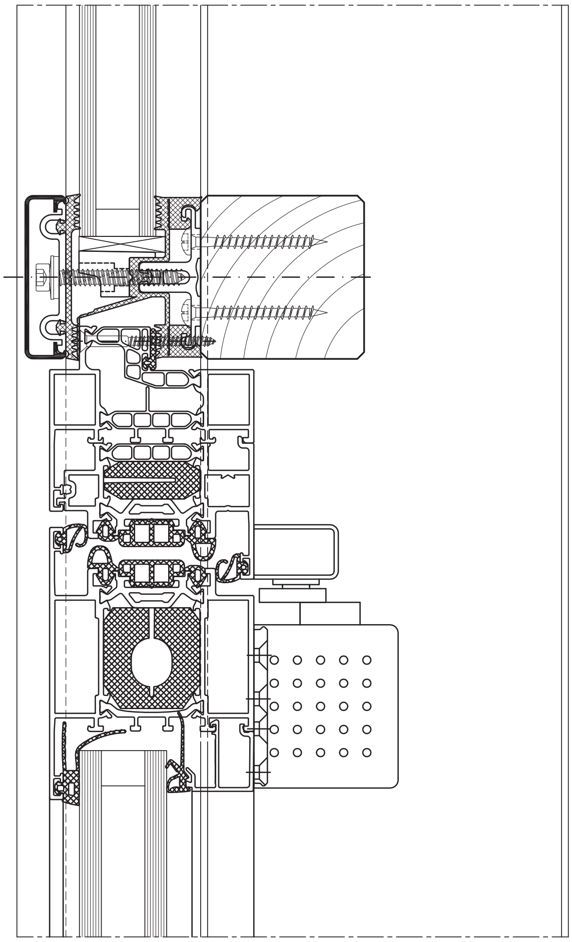


Insert window - mullion section
System: HUECK
Lambda Series WS 075

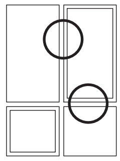
AK-H_3.3_019.dwg

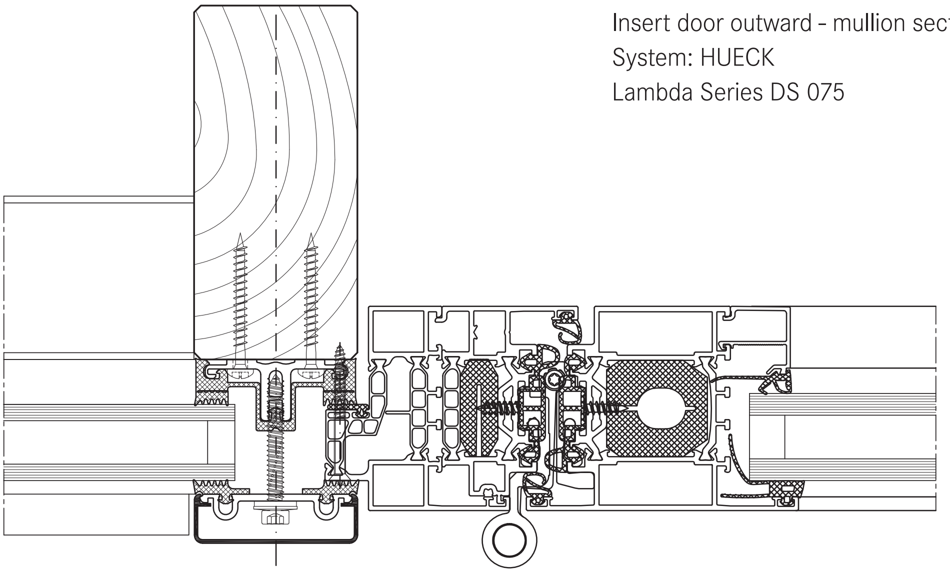
Installing windows and doors

3.3
5



Insert door outward - transom section
System: HUECK
Lambda Series DS 075



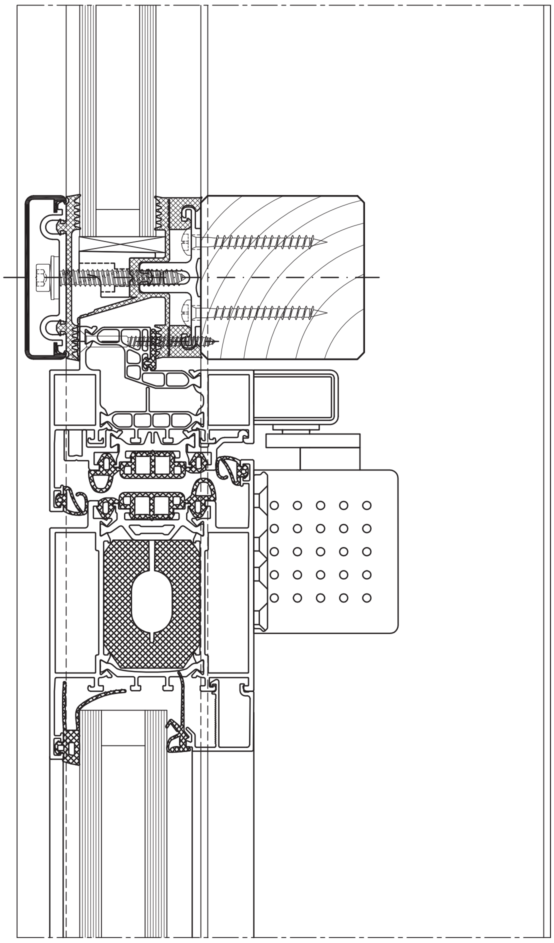


Insert door outward - mullion section
System: HUECK
Lambda Series DS 075

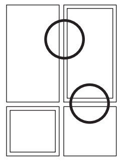
AK-H_3.3_020.dwg

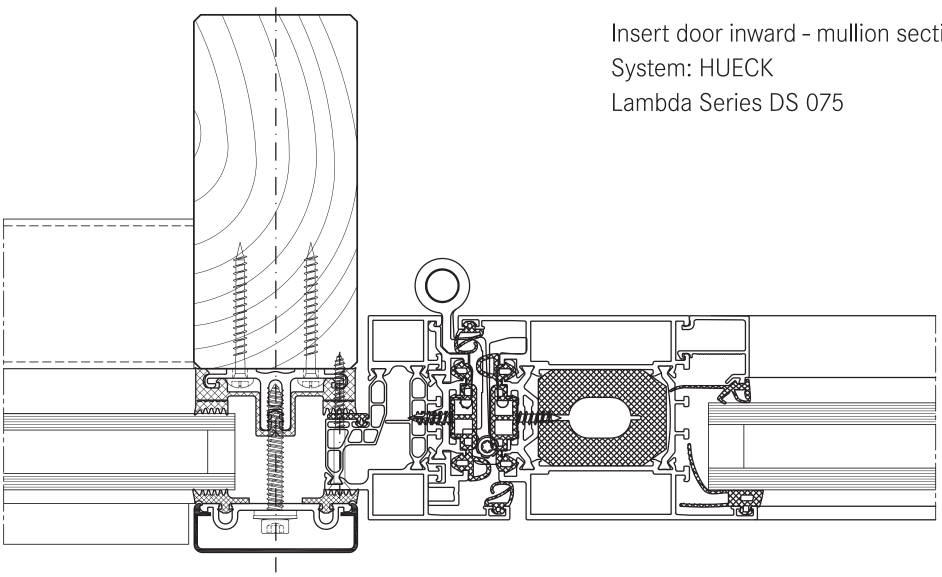
Installing windows and doors

3.3
5



Insert door inward - transom section
System: HUECK
Lambda Series DS 075

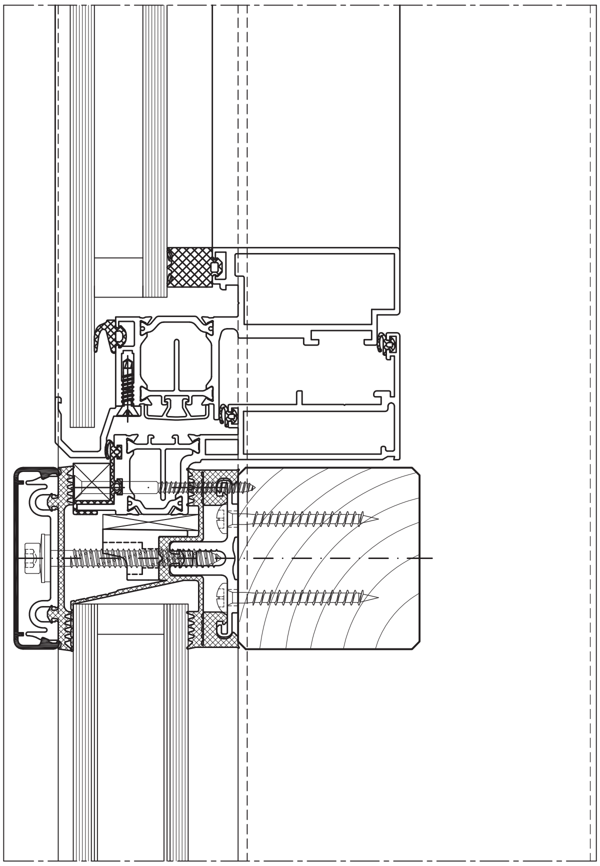




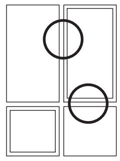
Insert door inward - mullion section
System: HUECK
Lambda Series DS 075

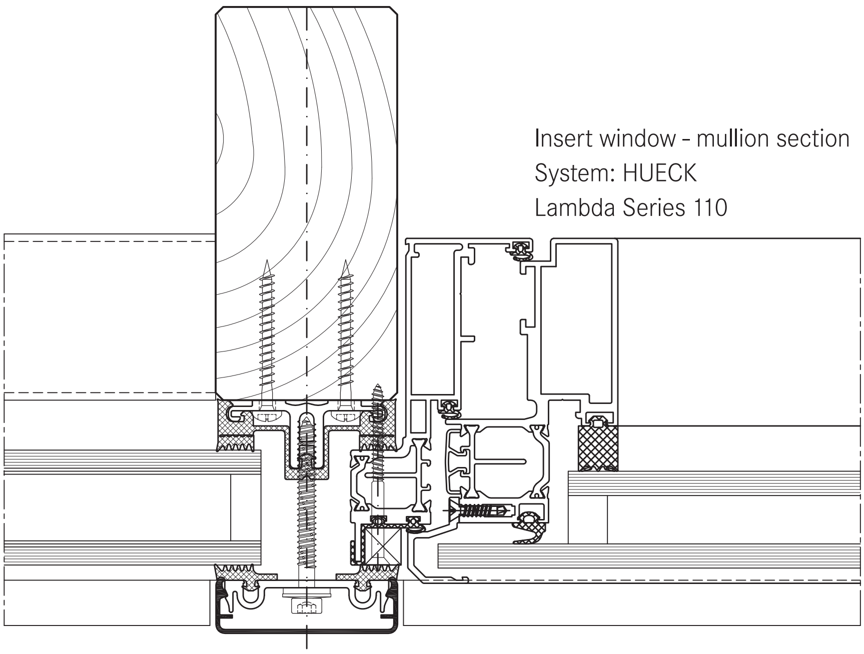
AK-H_3.3_021.dwg

Installing windows and doors



Insert window transom section
System: HUECK
Lambda Series 110

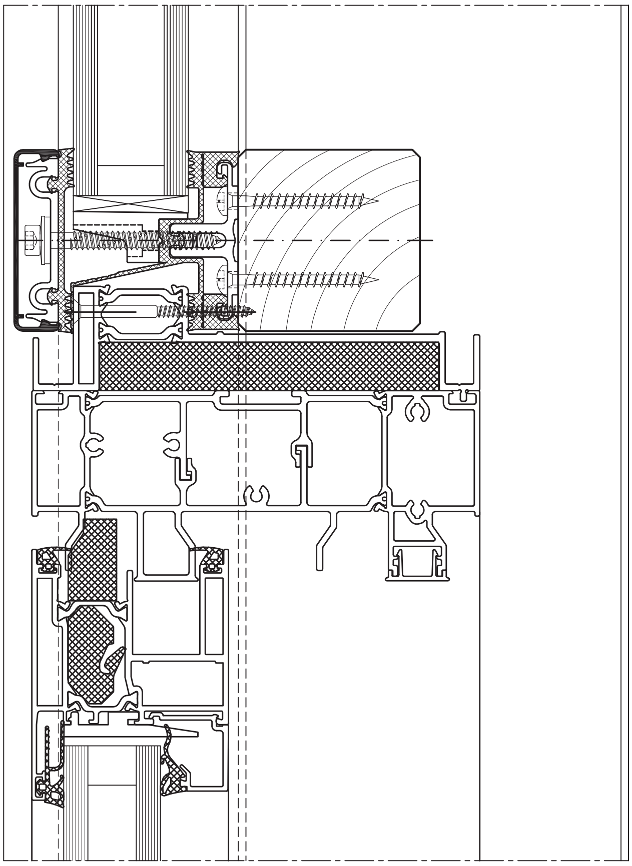




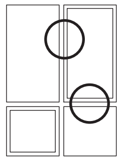
Insert window - mullion section
System: HUECK
Lambda Series 110

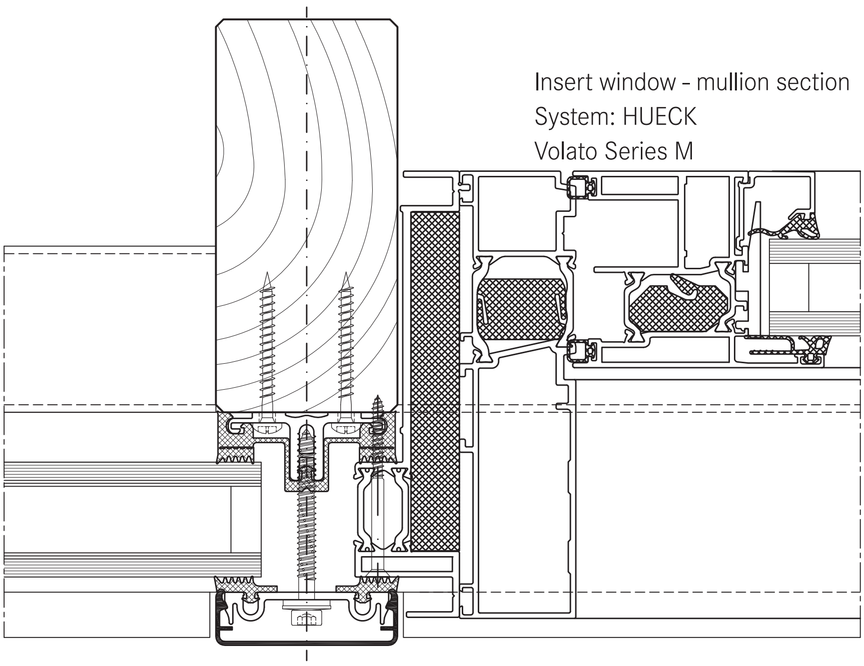
AK-H_3.3_022.dwg

Installing windows and doors



Insert window transom section
System: HUECK
Volato Series M



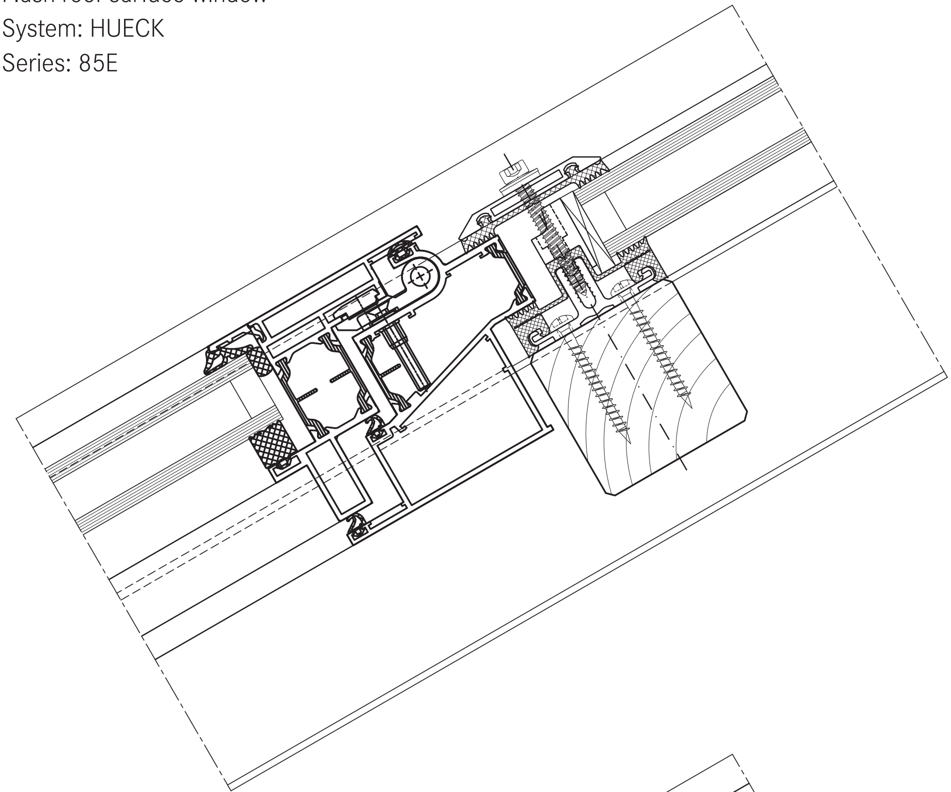


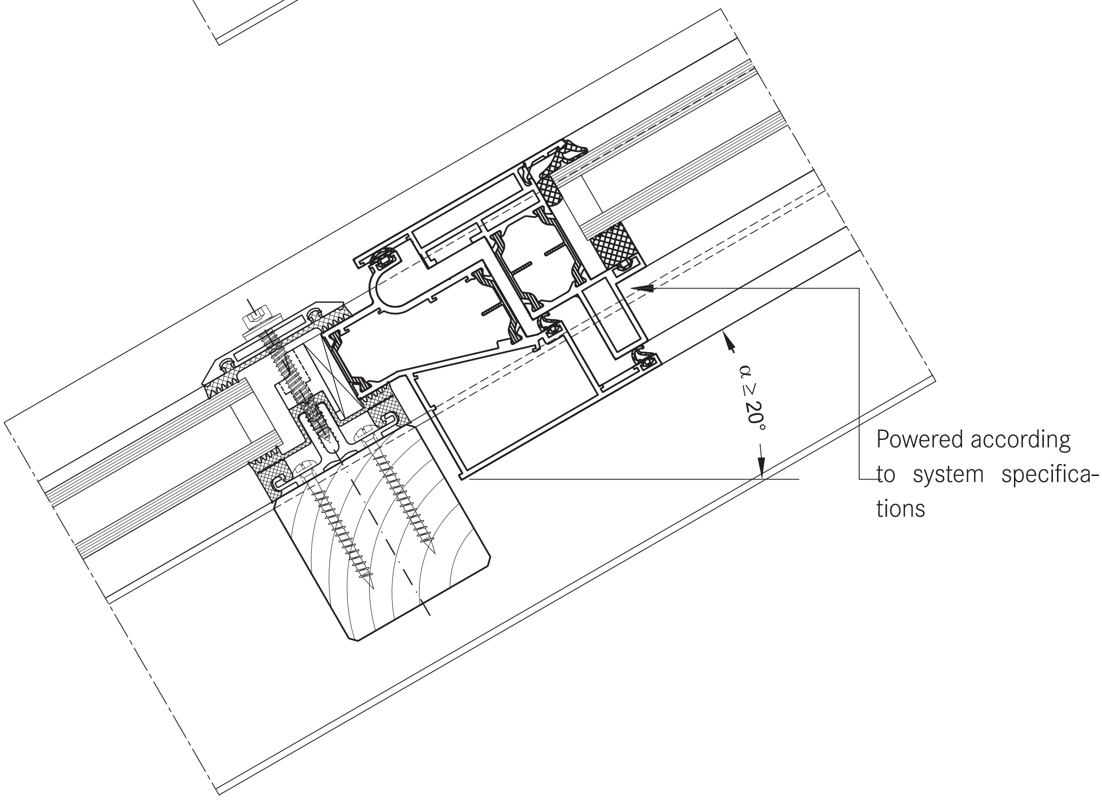
Insert window - mullion section
System: HUECK
Volato Series M

AK-H_3.3_023.dwg

Installing windows and doors

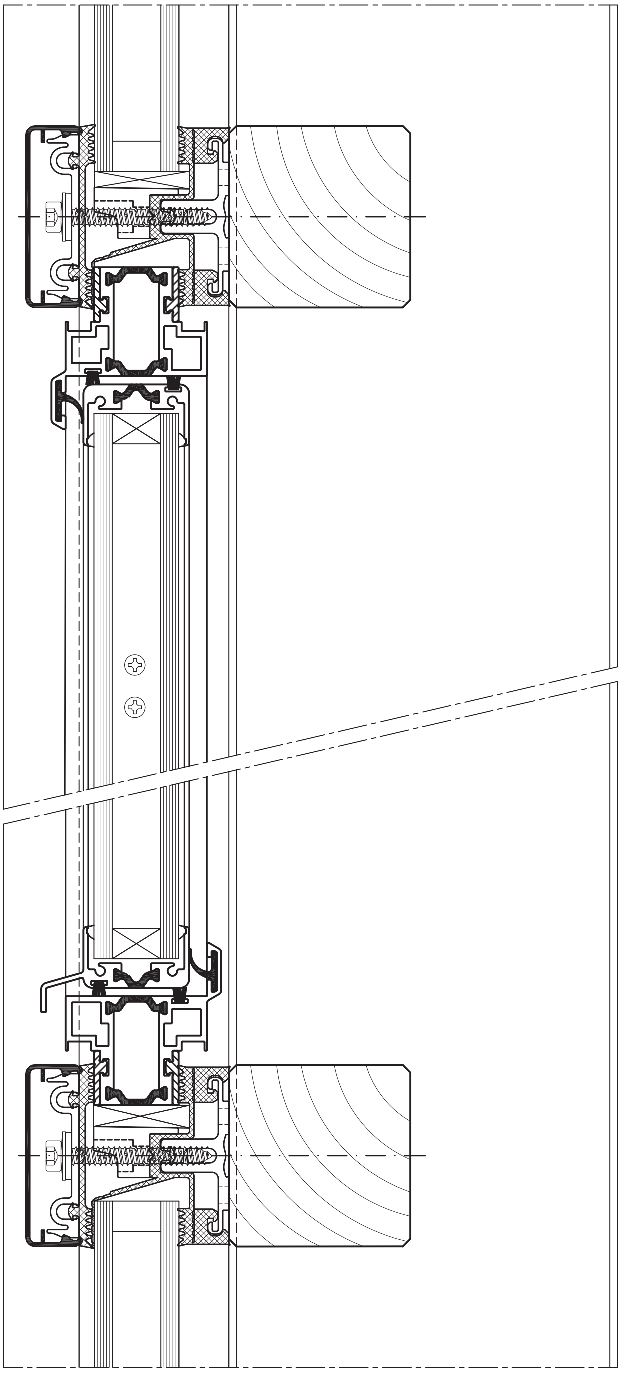
Flush roof surface window
System: HUECK
Series: 85E



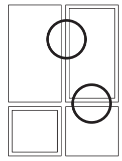


AK-H_3.3_024.dwg

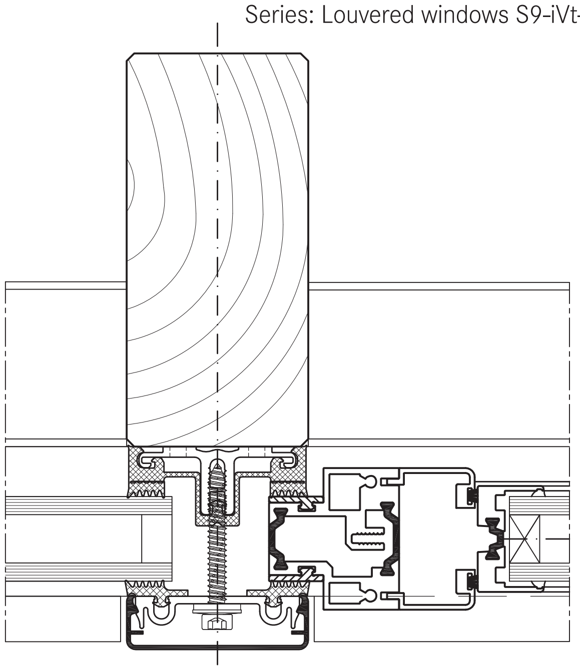
Installing windows and doors



Insert window transom section
System: Hahn
Series: Louvered windows S9-iVt-05

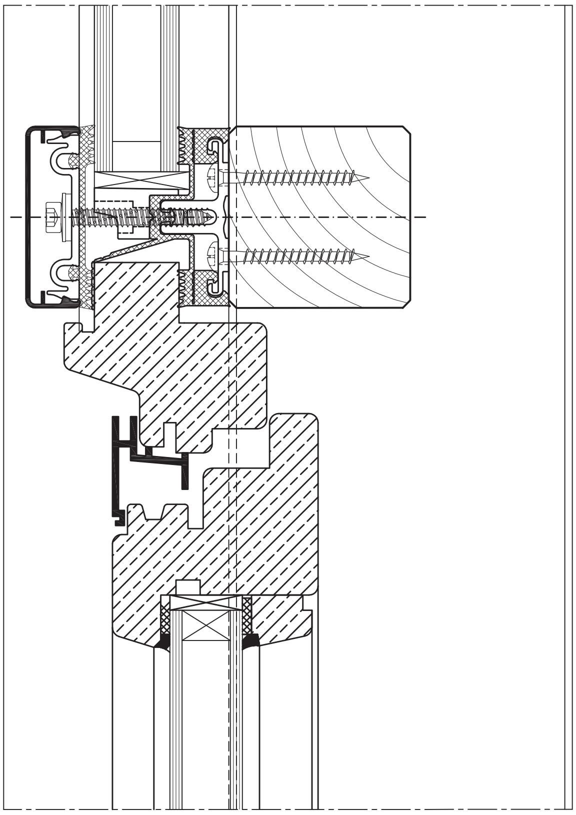


Insert window - mullion section
System: Hahn
Series: Louvered windows S9-iVt-05

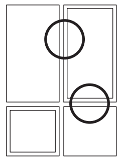


AK-H_3.3_025.dwg

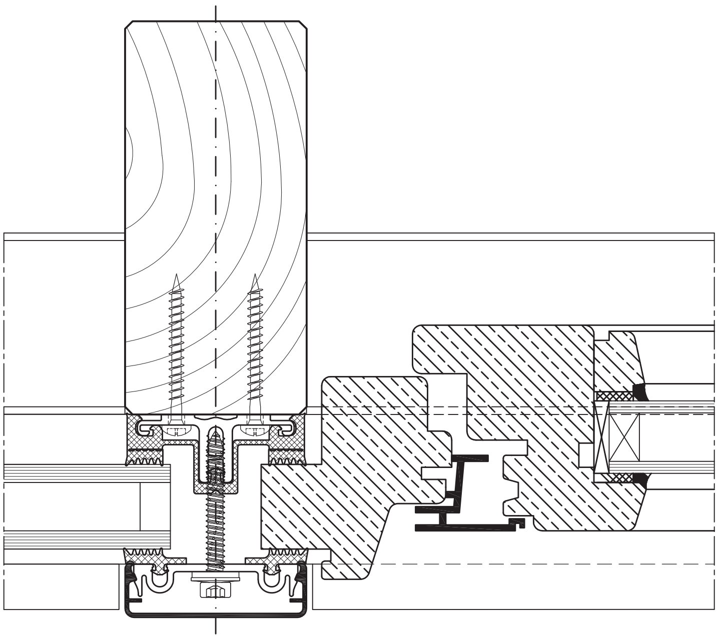
Installing windows and doors



Insert window transom section
Timber



Insert window - mullion section
Timber

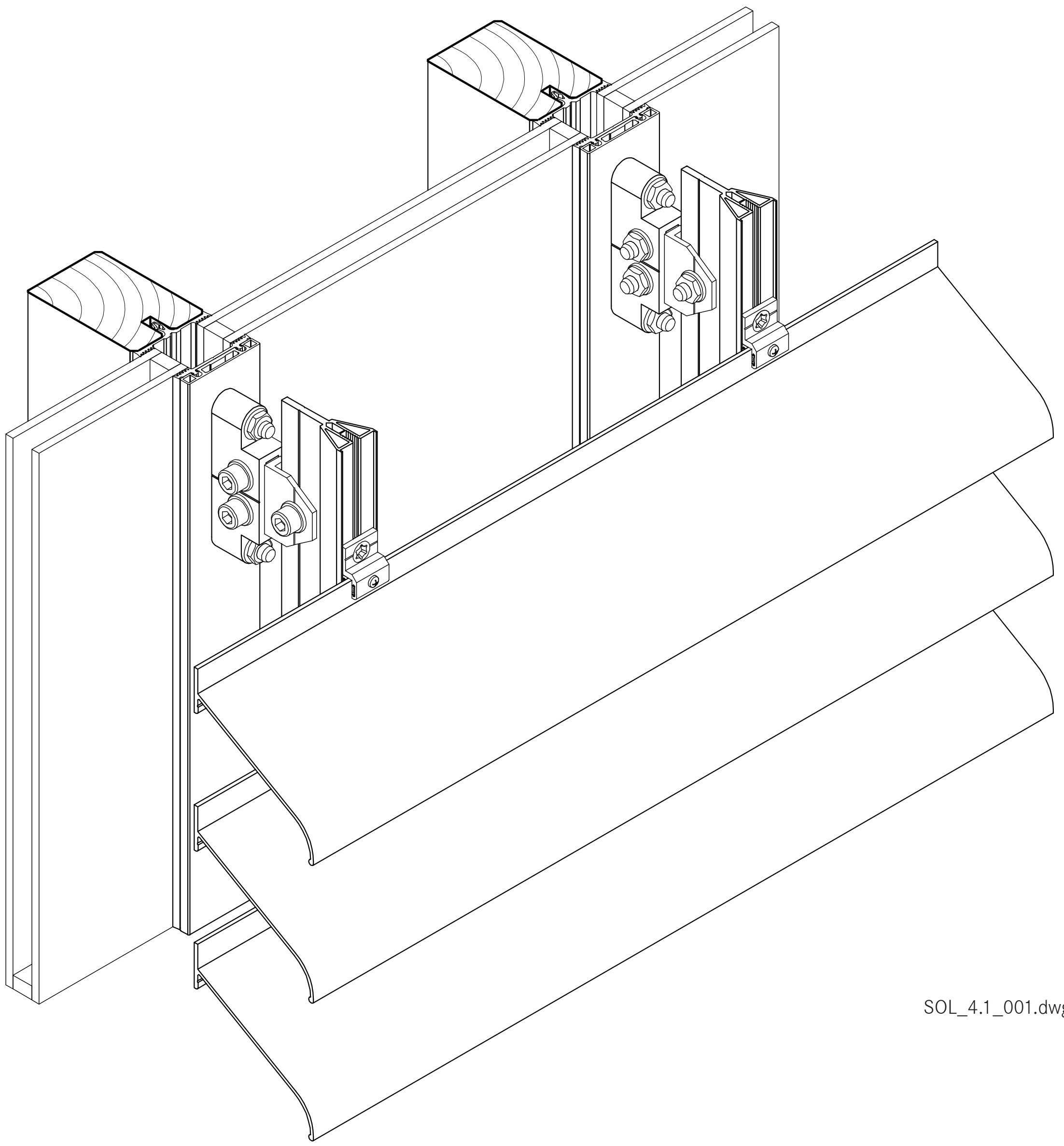


AK-H_3.3_026.dwg

Stabalux SOL

System properties

Sun protection system



SOL_4.1_001.dwg

System properties

Stabalux SOL system description

Stabalux SOL is a rigid aluminium sun protection system that is mounted outside of glass facades, glass roofs or windows.

Stabalux puts together all necessary parts to suit the specific property and delivers them ready to mount.

Different lamellae and variations in the spacing between them are used to control the degree of sun protection and transparency. The lamellae can be mounted parallel with or protruding horizontally in front of the vertical glass surfaces or on glass roofs.

Besides the sun protection requirements, particular care is taken to ensure correct connection with the glazing system during the development of Stabalux SOL. The system fully satisfies the requirements placed in stability, tightness, flexibility and ease of assembly. The loads caused by the sun protection are transferred directly to the supporting structure without exerting any compressive load on the glazing.

The arrangement of the sun protection should be designed to:

- reduce the irradiation energy
- to provide anti-glare
- to ensure the desired transparency
- to allow time-dependent adjustment of the degree of irradiation

Sun position diagrams are available in order to select the suitable lamellae and lamellae spacing.

The sun protection can be mounted on all standard facades and glass roof systems, as well as on solid structures.

Stabalux SOL sun protection is available in natural aluminium colours or in a powder-coated version. Special colours are possible.

Special separating elements allow zonal opening, raising or folding down of the lamellae for cleaning purposes.

System design

Assembly sequence

1. The sun protection bearings (3) are screwed on to the mullions of the glass facade in predefined intervals. It is necessary to dismantle the cover strips if the system is fitted retroactively.

2. Threaded bars M10 (9), designed to suit the glass thickness, are screwed into the sun protection bearings (3) before the cover strips are fitted.

3. After the cover strips are fitted, a sealing washer and a nut tightened by hand (7) seal off the threaded bar channel and keep the sun protection mounts in a predefined interval from the glazing.

4. The clamping plate (8) is pushed on to the threaded bars and fastened against the sun protection bearing using nuts (3). Different system sizes of the clamping plates allow for variable intervals between the sun protection and the glass.

5. The lamella fork (10) is the connecting piece between the clamping plate and the lamella carrier rail (11). At the same time, the lamella fork is the spacer and pivot bearing for the function 'Cleaning position' of the sun protection lamellae. The lamellae are connected to form one unit and can be folded up and down as required. The size of the zonal units is variable. Gas spring solutions are possible to improve handling.

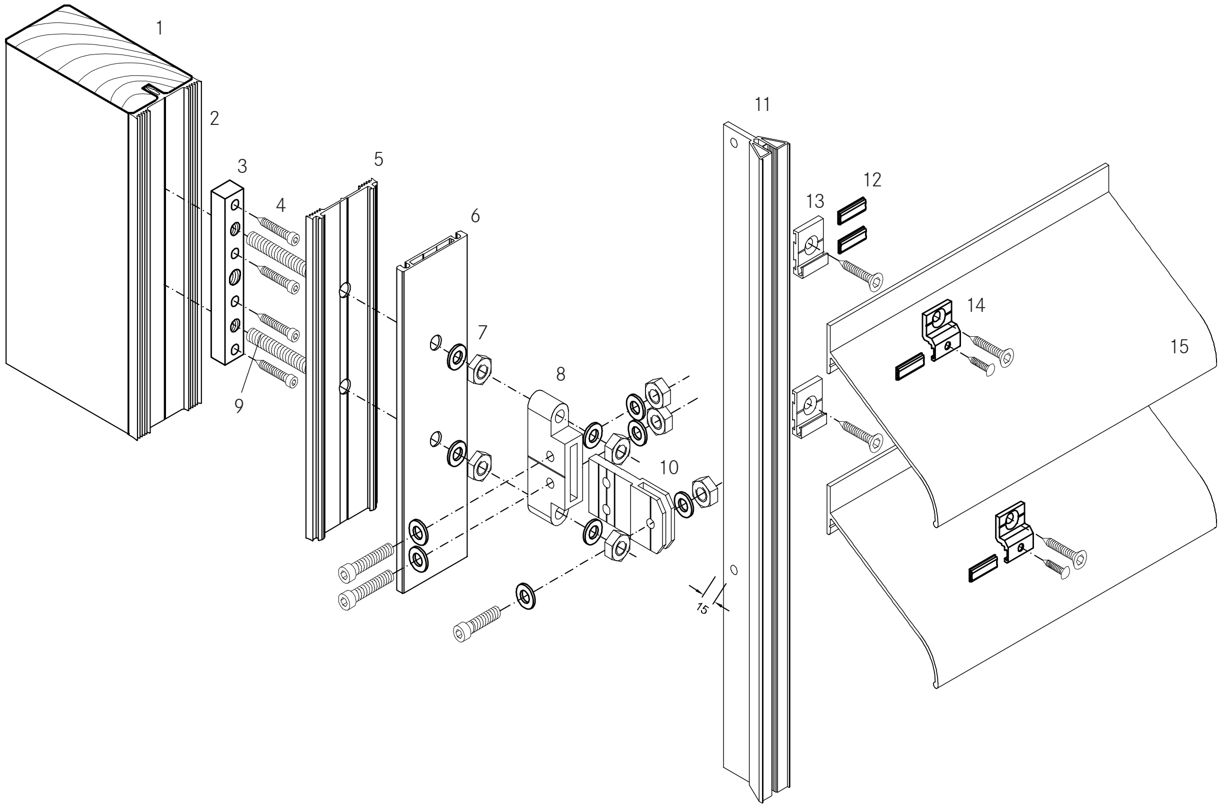
6. The different lamella types (15) are attached to the lamella carrier rail (11) using lamella holders (13) and mounting brackets (14). Rubber profiles (12) reduce the vibration acting on the supporting structure and hence allow the lamellae to move silently when extending longitudinally. An additional mounting bracket is attached at each point to ensure that longitudinal extension proceeds in one defined direction.

Caption:

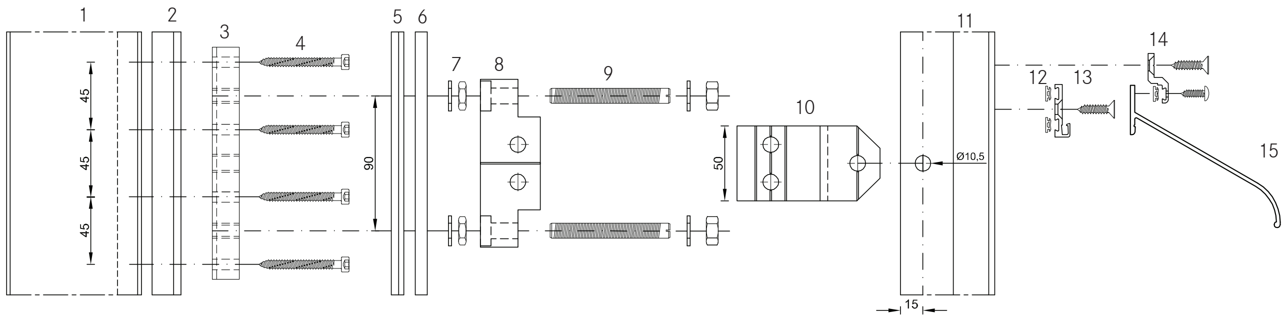
1. Timber profile
2. Inner seal GD 62xx / GD 52xx
3. Bearing SZ 0010
4. Screw Z0733
5. Outer seal GD 6024 /GD 5024
6. Cover strip / Upper strip discretionary
7. Washer SZ 0019 / Nut SZ 0109
8. Clamping plate SZ 0037
9. Threaded bar based on glass thickness, e.g. SZ 0151
10. Lamella fork SZ 0041
11. Supporting profile SZ 0003
12. Rubber profile SZ 0009
13. Lamella holder
14. Mounting bracket SZ 0007
15. Sun protection lamella SL 5001

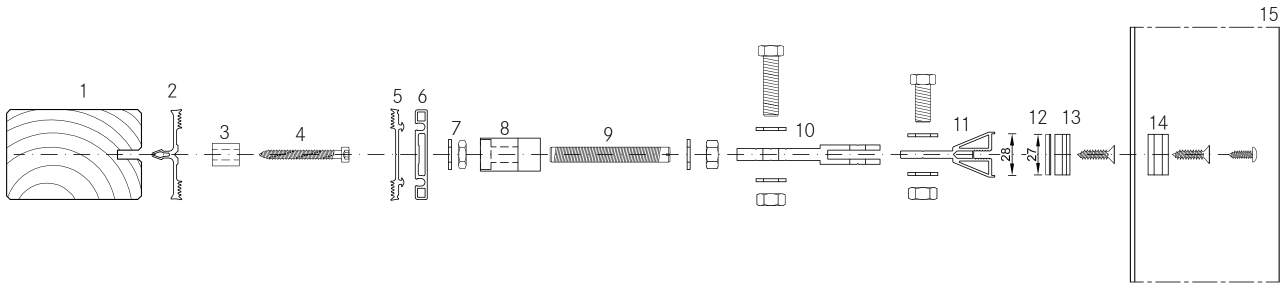
System design

Assembly sequence



SOL_4.1_002.dwg





SOL_4.1_009.dwg

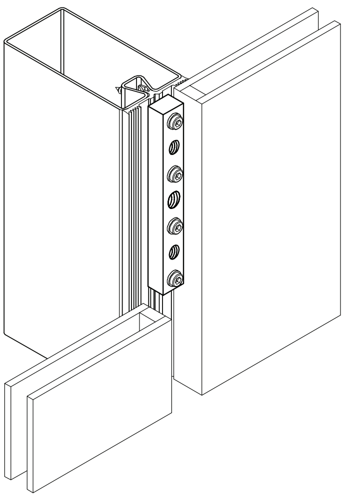
Attachment to the building

4.1
3

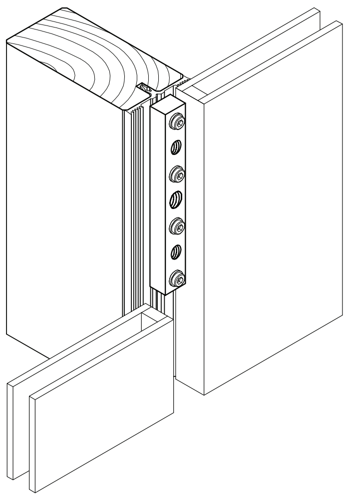
Stainless steel bearings (refer to the following diagrams) are used to directly connect the Stabalux SOL sun protection lamellae with the supporting structure vertical to the glass facades or parallel to the glass surface on glass roofs. This requires a free width of at least 15 mm plus a safety clearance to the glass in the glazing groove. Secure mounting is necessary, as the entire load of the sun protection system is transferred to the bearings. Static analysis is also necessary. The processor is responsible for attaching the sun protection bearings.

Types of attachment

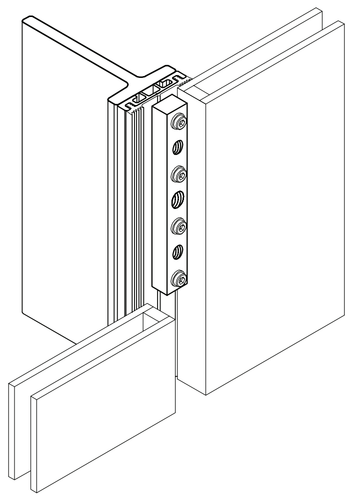
1



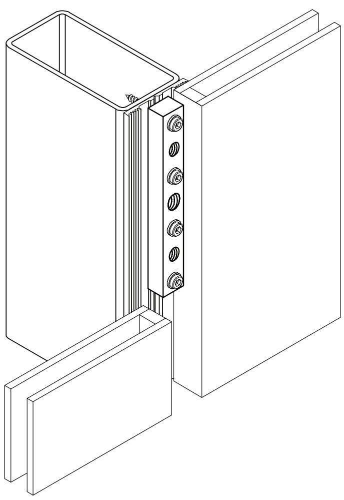
2



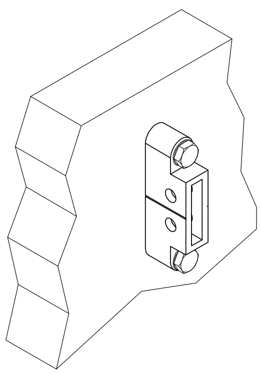
3



4



5



1 Threaded tube with tapping screws Z 0254 inserted through the rear wall
2 Wooden profile with wood screws
3 T-profile with threaded welding studs M6
4 Hollow steel profile with threaded welding studs M6
5 Attachment directly to the masonry using Stabalux clamping plate and dowels.

SOL_4.1_003.dwg

Determining the lamellae spacing

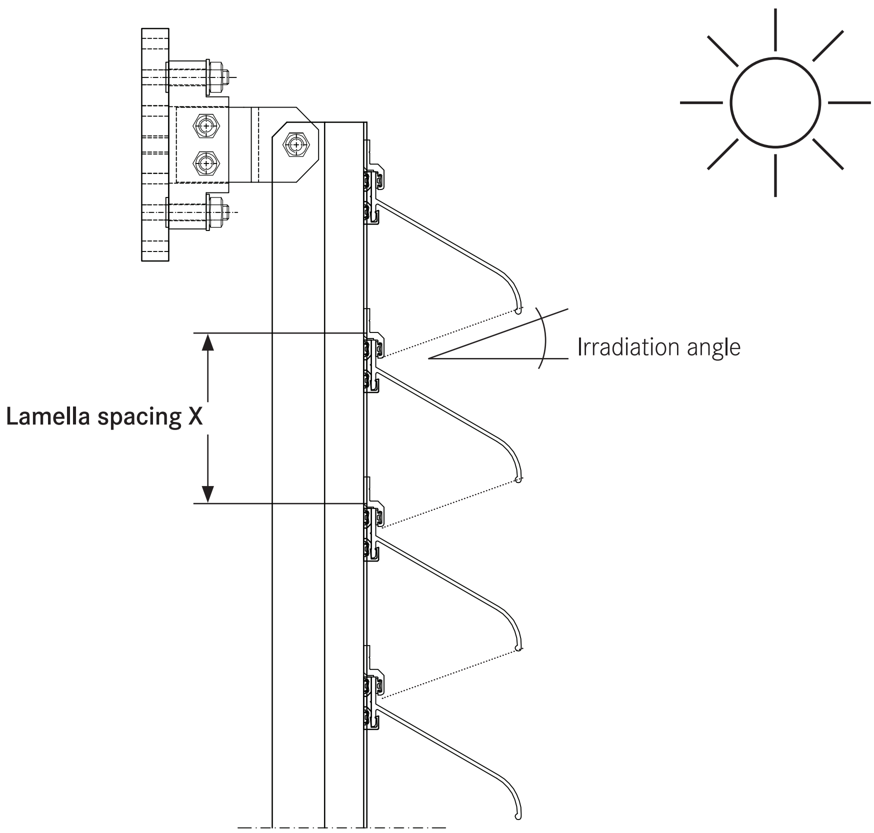
We use IT-assisted sun position calculations to optimise the sun protection systems that we manufacture. The following spacing tables will help you draw up your own plans.
We have considered and weighted two key sun irradiation factors in order to define the lamella spacing. Weak irradiation for a low position of the sun and the corresponding anti-glare effects, as well as the high position of the sun with its more substantial energy irradiation, equivalent to the unwanted thermal load during summer. In our tables, we have compromised between transparency and anti-glare, as additional energy caused by solar irradiation is considered a more positive effect in the cold months of the year. This may lead to glare over the course of the day.

Spacing between the sun protection and the glazing

Various clamping plates can be used to influence the spacing between the sun protection lamellae and the glass. Kindly refer to the table on the following page.

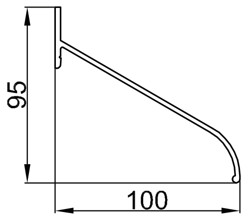
Lamella length

The lamellae can be provided in lengths of up to 6 m. The lamellae are fixed in place with sufficient dilation clearance along their clamped axis. A special double lamella fork and the pairwise arrangement of the lamella carrier rails enable these butt joints. A dual-zone system ensures a favourable lamella sag ratio. Example (SL 5001): Span 2 m → 1.2 mm and 2.8 m → 4.6 mm.



SOL_4.1_004.dwg

Lamella forms and lamella spacing



Lamella SL 5001

Lamella form	Span		Proportion of unobstructed view	Depth of the clamping plate	Spacing between cover strip and lamella
	Installation height /m	Free span			
SL 5001	0 - 10 10 - 100	2.8 m 2.3 m	38 - 40%	40 mm 100 mm 150 mm	approx. 135 mm approx. 195 mm approx. 245 mm

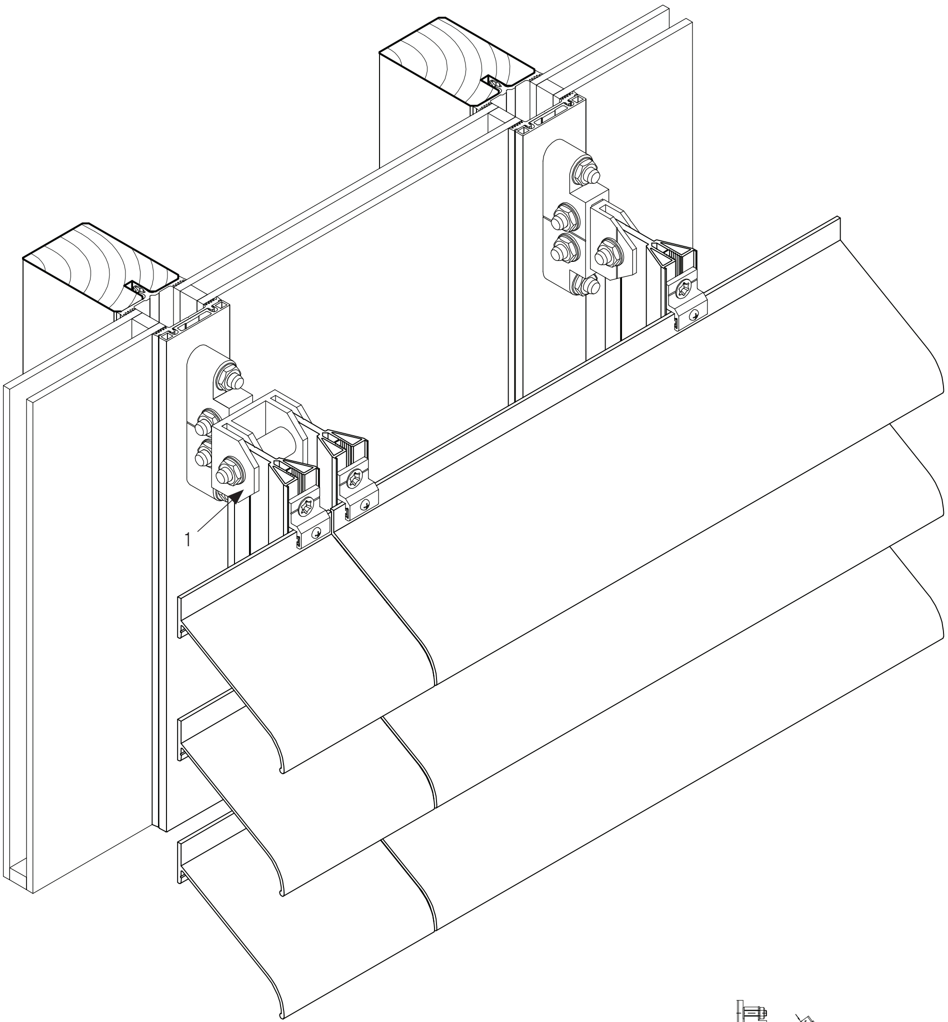
	Lamella spacing for SL 5001		
Installation site	**East**	**South**	**West**
Berlin	160	155	155
Bochum	155	161	164
Bremen	154	161	161
Frankfurt/M.	159	161	161
Hamburg	155	159	159
Hannover	156	160	160
Leipzig	161	156	156
Munich	166	157	157
Stuttgart	161	161	161

Table with values for lamella spacing X in millimetres

Clamping plate spacing

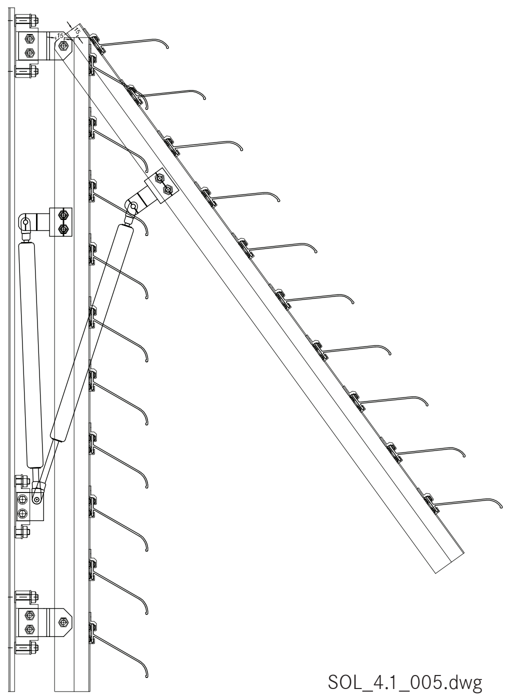
The vertical spacing between the sun protection attachment points on the mullion, i.e. rafters, must not be greater than 2 m.

Cleaning function



Movable lamella zone

It is advantageous to raise the sun protection in zones in order to clean the glass surface located underneath. The lamella carrier rails must be arranged pairwise for this purpose. Here, a special double lamella fork (1) is used to support the lamella carrier rails. When necessary, the corresponding screw fittings are loosened and the sun protection zone can be raised or folded down by hand. Gas springs increase the ease of use.



SOL_4.1_005.dwg

Project planning with Stabalux SOL

The facade alignment and the passage of the sun at times of the day and the year must be considered when preparing the sun protection project. The first hour after sunrise and the final two hours before sunset can be disregarded in calculating the daily passage of the sun. In our latitudes, the sun is never higher than 15° relative to the horizon during these times. There will be no nuisance caused by energy irradiation in these hours.

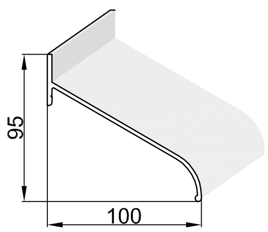
Enquiries concerning Stabalux SOL sun protection

We require the following information from you in order to compile all of the necessary system components correctly:

For BV _ **Pos:** _

1) Lamella type

SL 5001 [...]



2) Property location

Post code: _ _ _ _ _ _ _ _ Town/city: _ _ _ _ _ _ _ _ _ _ _ _ Country: _ _ _ _ _ _ _ _ _ _ _ _ _ _

Latitude: _ _ _ _ _ _ _° Longitude: _ _ _ _ _ _ _°

3) Installation height of the sun protection

[...] < 5 m [...] > 5 m [...] > 10 m [...] > 20 m [...] > 100 m

4) Alignment of the sun protection (facing the sky)

[...] North [...] East [...] South [...] West

[...] Northeast [...] Southeast [...] Southwest [...] Northwest

5) Inclination of the sun protection surface relative to the perpendicular

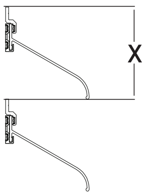
_ _ _ _ _ _ _°

Project planning with Stabalux SOL

6) Desired active times for the sun protection system

from _ _ _ _ _ _ _ _ _ ... _ _ _ _ _ _ _ _ _ _ until from month _ _ _ _ _ _ _ _ _ to month _ _ _ _ _ _ _ _ _ _

7) Lamella spacing [in mm]



[...] Lamella spacing defined by the customer → **Unit "X" = _ _ _ _ _ _ _ _ _ mm**

or

[...] Defined by Stabalux based on a local and in-house calculation of the sun's position

8) Lamella installation alignment

[...] vertical  [...] inclined *Degree of incline* _ _ _ _ _  [...] horizontal 

9) Size of the overall sun protection surface (overall)

(Height x width in mm) _ _ _ _ _ _ _ _ _ _ _ _ x _ _ _ _ _ _ _ _ _ _ _ _

Number of sun protection zones _ _ _ _ _ _ _ _ _ _ _ _

10) Mullion/rafter spacing

_ _ _ _ _ _ _ _ _ _ _ _ mm

(Kindly submit any sketches and planning documents).

11) Depth of the clamping plates
Defined by the distance between the cover strip and the lamella

[...] 40 mm [...] 100 mm [...] 150 mm

Project planning with Stabalux SOL

12) Cleaning function
Easy cleaning of the glass surfaces thanks to zonal folding down of the sun protection system

[...] Yes [...] No

13) Attachment of the sun protection

[...] Stabalux system

[...] Stabalux H [...] Stabalux ZL

[...] Stabalux SR [...] Stabalux AK

[...] alternative facade system

[...] directly on the masonry

Each attachment point will require 2 pcs. M10 threaded bars with at least 35 mm free threaded length to make the attachment. Stabalux defines the positions of the attachment points.
We also supply the sun protection anchors for the Stabalux glazing systems.

14) Surfaces
The screw fittings are made of rustproof materials.
By standard, we deliver aluminium fasteners as 'mill-finished' or 'anodized E6EV1'

[...] all fasteners mill-finished

[...] all fasteners in E6EV1

[...] all fasteners in RAL _ _ _ _ _ _ _ _

[...] Lamellae mill-finished

[...] Lamellae in E6EV1

[...] Lamellae in RAL _ _ _ _ _ _ _ _

15) Sketches/diagrams

Things to Know

General Processing Guidelines

Miscellaneous

In addition to the processing instructions for the respective Stabalux systems, it is also important to consider the regulations in place for the steel and glass-processing industries. We also refer to the importance of adhering to the applicable standards. Neither the standards and rules listed in the following nor the index of addresses make any claim to completeness. European standards have been and will continue to be introduced within the process of European harmonisation. In places they will replace national standards. We make efforts to ensure that our processors are up-to-date with standards. It is nevertheless the responsibility of the user to obtain information on the latest standards and rules that are important to their work.

Technical advice, support in planning and quotations

All suggestions, tender, design and installation proposals, material calculations, static calculations and such like provided by Stabalux employees in the course of consultancy, correspondence or the preparation of documents are submitted in good faith and to the best of their knowledge. Processors must review such ancillary services critically and seek approval from the principal or architect if necessary.

Requirements in regard to operation, storage, processing and training

Companies must possess equipment designed for the processing of steel and aluminium in order to manufacture flawless components. This equipment must be designed in such a way that any damage to the profiles during processing, storage and removal is avoided. All components must be stored dry; in particular, they must be kept away from building detritus, acids, lime, mortar, steel shavings and such like. In order to be satisfy the requirements of the latest technology, employees must be enabled to acquire the necessary training through literature, courses or seminars.
The processing company is solely responsible for calculating all dimensions. It is also necessary to carry out and commission the review of static calculations of the load-bearing profiles and anchoring and to validate details, connections and such like in diagrams.

Glass

The glass types is selected based on the mandatory requirements of structural engineering. The glass thicknesses must be defined according to the “Technical rules for linearly mounted glazing wind”, with due consideration of the wind loads.
Glazing must be installed in a materially and technically correct manner in accordance with the relevant standards.

Cleaning / maintenance

Although cleaning of the glass surfaces themselves is not part of their maintenance, it is nevertheless essential to ensure the good working order and service life of the products.

Cleaning and protection during the building phase

- The contractor is responsible for cleaning during the building phase. The mounted elements should be cleaned thoroughly before acceptance.
- Coarse dirt must be cleaned off immediately using sufficient water.
- Any cleaning performed must be compatible with the materials.
- Standard solvents such as methylated spirits or isopropanol can be used to remove sealant residue.
- Anodized aluminium parts must be protected before non-hardened plaster, mortar or cement are applied, i.e. any residue must be removed immediately, as the alkali reactions they cause may otherwise cause irremovable staining.
- Mechanical damage to the anodised surface cannot be repaired. You are therefore advised to handle the aluminium parts with care.
- For this reason, we recommend you take suitable precautionary measures. Adhesive plastic foil, peelable lacquer or self-weathering clear varnish provide a degree of protection. Any adhesive tape applied must be compatible with the surfaces; particular care must be taken with painted surfaces in this respect.

General Processing Guidelines

Cleaning after acceptance and during permanent use

The client is responsible for proper cleaning after acceptance, i.e. after partial acceptance already; it is important to clean all accessible components at this point.

- Clean, warm water should be used for cleaning in order to prevent any scratching by the dirt particles.
- Removal of adhesive labels and spacers
- Neutral (pH values between 5 and 8) household and glass detergents also help. Alkali and acidic chemical detergents and any containing fluoride must not be used. It is imperative to avoid destroying the corrosion protection on the components.
- Grease and sealant residue ca be removed using standard solvents (methylated spirits, isopropanol). The use of benzene and other thinners is not permitted, as they may cause irreparable damage.
- Use of clean and soft cleaning sponges, cloths, leather cloths or squeegees. All scouring materials and abrasive detergents are unsuitable ad cause permanent damage.
- The manufacturer's instructions must be adhered to on all accounts in the handling of coated glass and single-pane security glass.
- It is permitted to use neutral detergents with added polish on painted surfaces (e.g. car polish). These agents must be silicone-free; test them first on a concealed surface.
- The seals are essentially maintenance-free. Their durability can be ensured by the use of special cleaning lotion to prevent the material from becoming brittle.
- The manufacturer's instructions must be adhered to in particular for all fitted parts such as timber and aluminium windows and doors. The rebates must be cleaned on all accounts and spaces must be left to allow water to run off.

Cleaning intervals

Cleaning should be performed regularly, depending on the level of environmental pollution. Basic cleaning must be performed at least once annually. Stabalux recommends 6-monthly cleaning in order to preserve the attractive appearance of painted surfaces, i.e. the structure as a whole.

Maintenance

Facades and their fitted parts such as windows and doors must remain in permanent good working order. Mandatory measures to preserve good working order and to prevent material and personal damage are defined in the national construction codes and construction product ordinances.

The generic term 'maintenance' describes the areas of servicing/care, inspection, repair and improvements. The following addresses the topics of servicing/care and inspection in greater detail. These factors are essential to guarantee fitness for purpose and secure use and hence to ensure sustainable preservation of value. Accessibility for subsequent maintenance must be included in the planning of a construction project or refurbishment.

Particular reference is made at this point to VFF the leaflets WP.1 – WP.5 by Verband der Fenster- und Fassadenhersteller e.V. They contain information for windows / doors and other installations, as well as templates for contracts and correspondence. Information and templates can also be obtained from ift – Institut für Fenstertechnik Rosenheim. The contact details are listed in the address section.

General Processing Guidelines

Servicing/care and inspection obligations

The facade manufacturer (contractor) accepts the warranty for the supplied and installed products after acceptance as defined in the contractual undertakings. The warranty will be void in the event that a failure to perform servicing and care properly or at all leads to defects and damage. This applies also to the improper use of a component.

The contractor is not automatically obliged to provide servicing/care and inspection if there is no specific contractual agreement to do so. The national construction codes make it the duty of the principal/owner to maintain the construction products and components. The client must inform the principal/owner in this respect if they are not the same person/entity. The contractor deals at all times only with the client.

However, the contractor is obliged to make the client aware of maintenance issues. It i advisable to fulfil this duty in writing before the contracts are signed and to submit more detailed updates as the building work progresses. All documents on this issue must be submitted no later than upon presentation of the final invoice. Alternatively, the contractor can offer a maintenance contract and therein accept contractually defined servicing/care and inspection duties. The obligation to perform maintenance begins with the acceptance.

Maintenance measures

All components must be checked to ensure their fitness for purpose, as well as for deformation and damage. All facilities relevant to safety must be checked. Damage must be repaired immediately.

Fixed glazing on facades

- Material-specific examination of the supporting profiles for damage and deformation. e.g.: Metal: Weld seams, open joints, cracks, mechanical strength.
- Timber: Timber flaws (loose knots and protruding knot plugs); moisture damage, fungus and/or insect infestation, open joints, cracks, mechanical strength.
- Check of component connections (e.g. mullion/transom connections), reinforcements and structural attachments (e.g. connection plates, assuming they are accessible when installed).
- Check of structural attachment joints and seals.
- Assessment of the filling elements (panes, panels) to ensure proper mounting and absence of damage.
- Check of seals for proper mounting, sealant properties and ageing caused by brittleness.
- Test of the clamp connection to hold the filling elements. They include the screw fittings and clip strips.
- Visual inspection of the surface of the structure (coatings, corrosion).
- Good working order of all drainage systems, component ventilation systems and pressure equalisation openings.

General Processing Guidelines

Movable facade components

Roller blinds, ventilation, movable and rigid solar shading are fitted to facades in addition to doors and windows. These components must be checked in the same way as the fixed glazing elements. Moreover, all parts with relevance to safety and moving parts must be assessed to ensure they are mounted properly, are in good working order and do not exhibit wear. They include:

- Drive units (manual, electric)
- Fittings
- Door hinges
- Locking parts and latches
- Screw fittings
- Lubrication/greasing to ensure smooth operation of movable parts

The manufacturer's instructions must be adhered to in particular for all fitted parts.

Inspection intervals

The following table contains recommended inspection intervals, published as an assistance by ift Rosenheim. The distinction between "safety-relevant" and "general" inspections refers to fittings.

Stabalux recommends an interval of one year for fixed glazing.
The manufacturer's instructions are authoritative for installed parts. VFF leaflet WP.03 provides form templates for components requiring maintenance and intervals for the materials used.

Recommended inspection intervals		
	Safety-relevant inspection	**General inspection**
School or hotel buildings	6-monthly	6-monthly / yearly
Office and public buildings	6-monthly / yearly	yearly
Residential buildings	yearly / every 2 years	yearly / every 2 years / measures as stipulated by the client

Maintenance protocol

A protocol must be kept of the findings of the inspection, the implementation of servicing and care and the necessary repairs. It must list all checked parts/components and contain specific and general comments. Information on the property, the component and its precise location in the building must be recorded in order to ensure clear allocation.
VFF leaflet WP.03 also has form templates designed for this purpose.

Product documents

You will find all of the information you require on Stabalux systems in our catalogue documents. The sections "System" and "Processing Instructions" contain important information in particular.

The product information, operating instructions, servicing/care instructions and cleaning recommendations published by the respective manufacturer must be adhered to for other components.

Addresses

Verband der Fenster- und Fassadenhersteller e.V.
Walter-Kolb-Straße 1-7
60594 Frankfurt am Main
www.window.de

Informationsstelle Edelstahl Rostfrei
Sohnstr. 65
40237 Düsseldorf
www.edelstahl-rostfrei.de

DIN Deutsches Institut für Normung e.V.
Burggrafenstraße 6
10787 Berlin
www.din.de

Institut für Fenstertechnik e.V. (ift)
Theodor-Gietl-Straße 7-9
83026 Rosenheim
www.ift-rosenheim.de

DIN standards, available from Beuth-Verlag GmbH
Burggrafenstraße 6
10787 Berlin
www.beuth.de

Bundesverband Metall-Vereinigung
Deutscher Metallhandwerke
Ruhrallee 12
45138 Essen
www.metallhandwerk.de

DIN Deutsches Institut für Normung e.V.
Kolonnenstraße 30 L
10829 Berlin
www.dibt.de

GDA, Gesamtverband der Aluminiumindustrie e.V.
Am Bonneshof 5
40474 Düsseldorf
www.aluinfo.de

Bundesinnungsverband des Glaserhandwerks
An der Glasfachschule 6
65589 Hadamar
www.glaserhandwerk.de

Deutsche Forschungsgesellschaft für
Oberflächenbehandlung e.V.
Arnulfstr. 25
40545 Düsseldorf
www.dfo-online.de

Deutscher Schraubenverband e.V
Goldene Pforte 1
58093 Hagen
www.schraubenverband.de

Passivhaus Institut
Dr. Wolfgang Feist
Rheinstr. 44/46
64283 Darmstadt
www.passiv.de

Standards

Index of applicable standards and regulations

DIN EN 1993	Design of steel structures
DIN EN 1995	Design of timber structures
DIN EN 1991	Actions on structures
DIN EN 572	Glass in building
DIN EN 576	Aluminium and aluminium alloys
DIN EN 573	Aluminium and aluminium alloys (wrought and cast alloys)
DIN EN 485	Aluminium and aluminium alloys - Sheet, strip and plate
DIN EN 755	Extruded aluminium profiles and wrought aluminium profiles
DIN 1960	German construction contract procedures (VOB) - Part A
DIN 1961	German construction contract procedures (VOB) - Part B
DIN 4102	Fire behaviour of building materials and building components
DIN 4108	Thermal insulation and energy economy in buildings
DIN 4109	Sound insulation in buildings
DIN EN 1999	Design of aluminium structures
DIN EN 12831	Heating systems in buildings — Method for calculation of the design heat load
DIN 7863	Elastomor glazing and panel gaskets for windows and claddings
DIN 16726	Plastic sheets - Testing
DIN EN 10025	Hot rolled products of structural steels
DIN EN 10250	Open die steel forgings for general engineering purposes
DIN 17611	Anodized products of aluminium and wrought aluminium alloys
DIN EN 12020	Aluminium and aluminium alloys - Extruded precision profiles in alloys EN AW-6060 and EN AW-6063
DIN 18055	Window joint permeability, watertightness and mechanical load
DIN 18273	Building hardware - Lever handle units for fire doors and smoke control doors - Terms and definitions, dimensions, requirements, testing and marking
DIN 18095	Smoke control doors
DIN EN 1627-1630	Pedestrian doorsets, windows, curtain walling, grilles and shutters - Burglar resistance - Requirements and classification
DIN 18195 T9	Waterproofing of buildings, penetration, transitions, barriers
DIN 18202	Tolerances in building construction - Buildings
DIN 18203	Tolerances in building construction
DIN 18335	German construction contract procedures (VOB) - Part C - General technical specifications for steel construction works
DIN 18336	German construction contract procedures (VOB) - Part C - Sealing work
DIN 18357	German construction contract procedures (VOB) - Part C - Fittings work
DIN 18360	German construction contract procedures (VOB) - Part C - Metal work, fitter work
DIN 18361	German construction contract procedures (VOB) - Part C - Glazing work
DIN 18364	German construction contract procedures (VOB) - Part C - Corrosion protection on steel and aluminium structures
DIN 18421	German construction contract procedures (VOB) - Part C - Insulation and fire protection work on technical systems
DIN 18451	German construction contract procedures (VOB) - Part C - Scaffolding work
DIN 18516	Cladding for external walls
DIN 18540	Sealing of exterior wall joints in building using joint sealants
DIN 18545	Sealing of glazing with sealants

Standards

Index of applicable standards and regulations

DIN EN ISO 1461	Hot dip galvanized coatings
DIN EN 12487	Corrosion protection of metals - Rinsed and non-rinsed chromate conversion coatings on aluminium and aluminium alloys
DIN EN ISO 10140	Acoustics - Laboratory measurement of sound insulation of building elements
DIN EN 356	Glass in building - Security glazing - Testing and classification of resistance against manual attack
DIN EN 1063	Glass in building - Security glazing - Testing and classification of resistance against bullet attack
DIN EN 13541	Testing and - Security glazing - classification of resistance against explosion pressure
DIN 52460	Sealing and glazing
DIN EN ISO 12567	Thermal performance of windows and doors - Determination of thermal transmittance by the hot-box method
DIN EN ISO 12944	Corrosion protection of steel structures by protective paint systems
DIN 55634	Paints, varnishes and coatings - Corrosion protection of steel structures
DIN EN 107	Test procedures for windows: mechanical test
DIN EN 573-1-4	Aluminium and aluminium alloys - Chemical composition and form of wrought products
DIN EN 755-1-2	Aluminium and aluminium alloys - Extruded rod/bar, tube and profiles
DIN EN 1026	Windows and doors - Air permeability - Test method
DIN EN 1027	Windows and doors – Watertightness - Test method
DIN EN 10162	Cold-rolled steel sections - Technical delivery conditions - Dimensional and cross-sectional tolerances
DIN EN 949	Windows and curtain walling, doors, blinds and shutters - Determination of the resistance to soft and heavy body impact for doors
DIN EN 1363-1	Fire resistance tests for non-loadbearing elements
DIN EN 1364-1	Fire resistance glazing, requirements and classification
DIN EN ISO 1461	Hot dip galvanized coatings on steel; requirements and testing
DIN EN 1522	Bullet resistance for windows, doors and barriers (requirements and classification)
DIN EN 1523	Bullet resistance for windows, doors and barriers (requirements and test methods)
DIN EN 1627	Burglar resistance for windows, doors and barriers (requirements and classification)
DIN EN 1628	Burglar resistance for windows, doors and barriers (test method for determination of resistance under dynamic loading)
DIN EN 1629	Burglar resistance for windows, doors and barriers (test method for determination of resistance under static loading)
DIN EN 1630	Burglar resistance for windows, doors and barriers (test method for determination resistance to manual burglary attempts)
DIN EN 1991-1-1	Eurocode 1, Actions on structures
DIN EN 1993-1-1	Eurocode 3, Design of steel structures
DIN EN 1995-1-1	Eurocode 5, Design of timber structures
DIN EN 10346	Continuously hot-dip coated steel flat products for cold forming
DIN EN 10143	Continuously hot-dip coated steel sheet and strip Tolerances on dimensions and shape
DIN EN 12152	Curtain walling - Air permeability - Performance requirements and classification
DIN EN 12153	Curtain walling - Air permeability - Test methods

Standards

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DIN EN 12154	Curtain walling - Watertightness - Performance requirements and classification
DIN EN 12155	Curtain walling - Watertightness - Laboratory test under static pressure
DIN EN 12179	Curtain walls – Resistance to wind load - Test methods
DIN EN 12207	Window und doors – Air permeability – Classification
DIN EN 12208	Window und doors – Watertightness – Classification
DIN EN 12210	Window und doors – Resistance to wind load – Classification
DIN EN 12211	Windows and doors – Resistance to wind load – Test methods
DIN EN 13116	Curtain walls – Resistance to wind load - Performance requirements
DIN EN 13830	Curtain walls – Product standard
DIN EN 14019	Curtain walls – Impact resistance
DIN EN ISO 12631 12631- 01.2013	Thermal performance of windows and doors - Determination of thermal transmittance - Simplified procedure
DIN 18200	Assessment of conformity for construction products - Initial type testing and factory production control, Certification of construction products by certification body
DIN 18008	Glass in Building - Design and construction rules for the use of fall-secured glazings
DIN 18008	Construction rules for linearly supported glazings
EnEV	Energy Saving Ordinance

Guidelines for the Design and Application of Roof Waterproofing

Guideline for GSB Steel Coating

Bundesinnungsverband des Glaserhandwerks

Leaflets by Stahl-Informations-Zentrum, Düsseldorf

Glass supports

Miscellaneous

- Glass supports are used to transfer the self-weight loads exerted by the glazing into the transom of a facade system.
- Fitness for purpose is usually authoritative in the selection of a glass support; it is usually defined by a limit value of glass support deflection.
- The load-bearing capacity is frequently several times the load defined as limit value for deflection.
- Therefore, a failure of the facade structure and a risk of personal injury are excluded under normal circumstances. This is why the building inspectorate has not defined any particular requirements for the use of glass supports and their connections.

The glass supports and glazing are positioned according to glass industry guidelines and guidelines of ift Rosenheim. The reference value for attaching the glass support is approx. **100 mm** from the end of the transom. The additional information contained in Section 1.2.7 – Processing information must be observed.

The glass supports that Stabalux can deliver are component tested for load-bearing capacity and fitness for purpose. These tests were conducted by the firm Feldmann + Weynand GmbH in Aachen. The tests were performed in the experiments hall for steel and
lightweight metal structures at RWTH Aachen.

The measured deflection of $\mathbf{f_{max} = 2\ mm}$ below the theoretical point of attack exerted by the consequent pane weight was applied as the limit value for glass support deflection. The location of the point of attack is identified using eccentricity “e“.

Glass support types und timber types

The Stabalux H and Stabalux ZL systems distinguish between two different types and techniques for attaching glass supports:

- Glass support GH 5053 and GH 5055 with hanger bolts.
- Glass support GH 5053 and GH 5055 with hardwood cylinders and bolts.

Solid timber (VH) or laminated timber (BSH) made of softwood (NH) can be used as profiles. The following strength classes are tested according to DIN 1052:

- VH (NH) strength class C24 (minimum rated value or pressure at right angles to the fibre = 2.50 N/mm²),
- BSH (NH) strength class GL24h (minimum rated value or pressure at right angles to the fibre = 2.70 N/mm²),

Eccentricity “e“

The height of the inner seal and the glass structure, i.e. the centre of gravity of the glass pane is determined by the eccentricity “e”. The unit “e” describes the distance between the front edge of the timber transom and the theoretical load transfer line.

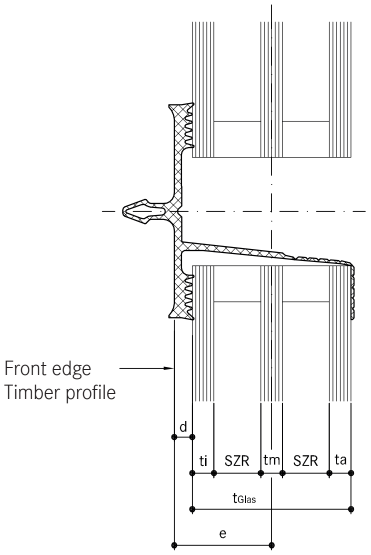
STABALUX

Glass supports

9.2
1

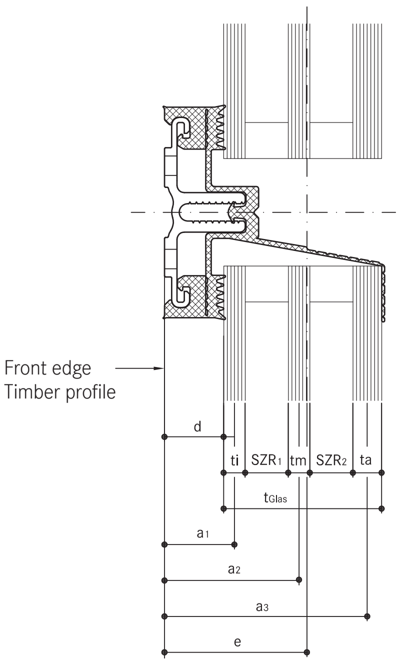
Diagram of the glass structure / Abbreviations used

Symmetrical glass structure
Example of System H

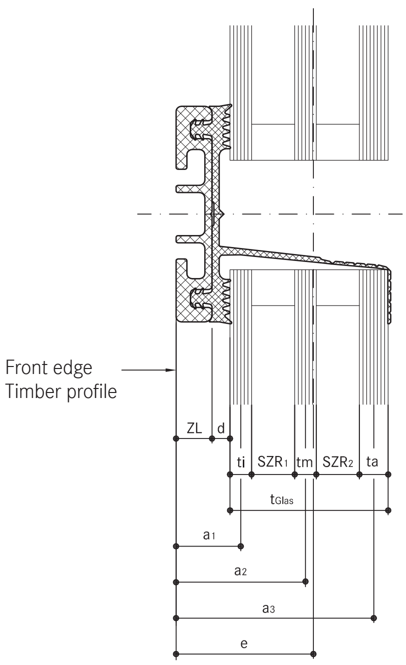


d = Height of the inner seal
ZL = Height of the spacer strip (10 mm)
t_{Glass} = Total glass thickness
ti = Thickness of the inner pane
tm = Thickness of the middle pane
ta = Thickness of the outer pane
SZR_1 = Space between panes 1
SZR_2 = Space between panes 2
a_1 = Distance from the front edge of the timber profile to the centre of the inner pane
a_2 = Distance from the front edge of the timber profile to the centre of the middle pane
a_3 = Distance from the front edge of the timber profile to the centre of the outer pane
G = Pane weight
G_L = Load share

Asymmetrical glass structure
Example AK-H system



Asymmetrical glass structure
Example ZL-H system



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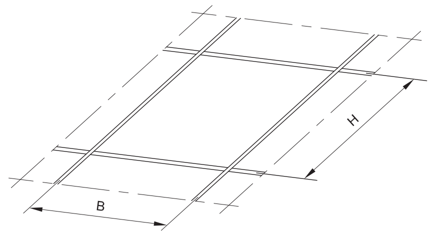
Glass supports

Identification of the permitted pane weight

1. Calculation of the pane weight



Surface of the pane = W x H in [m²]
Aggregate glass thickness = ti + tm + ta [m]
Specific glass weight = $\gamma \approx 25.0$ [kN/m³]

→ Pane weight [kg] = (W x H) x (ti + tm + ta) x γ x 100

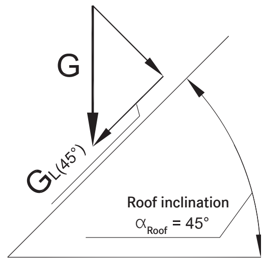
2. Calculation of the load share on the glass support

The load share of the glass weight in vertical glazing is 100%.
The load share of inclined glazing is reduced, depending on the angle.

→ Pane weight [kg] x sin(α)

Table 8 states the sine value for known inclination angles.

Table 9 states the sine value for known percentage inclination.



3. Calculation of eccentricity

System H / System AK-H

Symmetrical glass structure

e = d + (ti + SZR + tm + SZR + ta)/2

Asymmetrical glass structure

a1 = d + ti/2
a2 = d + ti + SZR1 +tm/2
a3 = d + ti + SZR1 +tm + SZR2 + ta/2
e = (ti x a1 +tm x a2 + ta x a3)/(ti +tm + ta)

System ZL-H

Symmetrical glass structure

e = d + ZL + (ti + SZR + tm + SZR + ta)/2

Asymmetrical glass structure

a1 = d + ZL + ti/2
a2 = d + ZL + ti + SZR1 +tm/2
a3 = d + ZL + ti + SZR1 +tm + SZR2 + ta/2
e = (ti x a1 +tm x a2 + ta x a3)/(ti +tm + ta)

4. Test

Tables 1 - 7 state the permitted pane weight based on the calculated eccentricity “e”.

Note:

Tables 1 - 7 enable calculation of eccentricity for symmetrical glass structures.

Glass supports

Permitted pane weights, depending on the total glass thickness, i.e. the eccentricity “e”

The mullion-transom connections are produced and validated on the building site. The statement of permissible glass weights refers to the “rigid” mullion-transom connections. Deformations from these connections do not lead to any noteworthy sag in the glass supports.

The permissible total weight can be determined using the overall glass thickness t_{Glass} if the glass structure is symmetrical.

The eccentricity column “e” must be used to calculate the permitted total weight if the glass structure is asymmetrical.

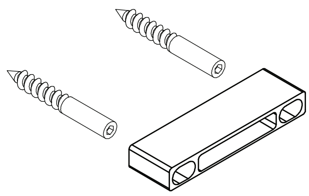


Table 1:
GH 5053 with 2 hanger bolts, System 60 / System 80

Row	Total glass thickness t_{Glass} for single glazing or symmetrical glass structure					Eccentricity “e”	Permitted pane weight G (kg)	
	Stabalux H			Stabalux ZL-H				
	Inner seal height			Inner seal height			VH(NH) Performance class 2	BSH(NH) Performance class 2
	5 mm	10 mm [1]	12 mm	5 mm	10 mm [2]	mm	kg	kg
1	≤ 20	≤ 10	≤ 6	-	-	15	**168**	**173**
2	22	12	8	-	-	16	**157**	**152**
3	24	14	10	4	-	17	**148**	**134**
4	26	16	12	6	-	18	**133**	**129**
5	28	18	14	8	-	19	**119**	**129**
6	30	20	16	10	-	20	**108**	**129**
7	32	22	18	12	-	21	**98**	**123**
8	34	24	20	14	4	22	**89**	**119**
9	36	26	22	16	6	23	**84**	**119**
10	38	28	24	18	8	24	**84**	**119**
11	40	30	26	20	10	25	**84**	**119**
12	42	32	28	22	12	26	**84**	**119**
13	44	34	30	24	14	27	**84**	**119**
14	46	36	32	26	16	28	**84**	**119**
15	48	38	34	28	18	29	**84**	**119**
16	50	40	36	30	20	30	**84**	**119**
17	52	42	38	32	22	31	**78**	**115**
18	54	44	40	34	24	32	**73**	**111**
19	56	46	42	36	26	33	**69**	**107**
20	58	48	44	38	28	34	**65**	**101**
21	60	50	46	40	30	35	**61**	**95**
22	62	52	48	42	32	36	**58**	**90**
23	64	54	50	44	34	37	**55**	**85**

[1] Panes must have a total glass thickness of at least 16 mm in inclined glazing

[2] Panes must have a total glass thickness of at least 24 mm in inclined glazing

Glass supports

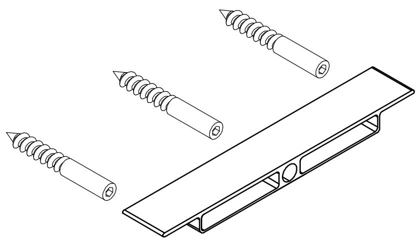


Table 2:
GH 5055 with 3 hanger bolts, System 60 / System 80

Row	Total glass thickness t_{Glass} for single glazing or symmetrical glass structure					Eccentricity "e"	Permitted pane weight G (kg)	
	Stabalux H			Stabalux ZL-H				
	Inner seal height			Inner seal height			VH(NH) Performance class 2	BSH(NH) Performance class 2
	5 mm	10 mm [1]	12 mm	5 mm	10 mm [2]	mm	kg	kg
1	≤ 20	≤ 10	≤ 6	-	-	15	**181**	**186**
2	22	12	8	-	-	16	**170**	**164**
3	24	14	10	4	-	17	**160**	**145**
4	26	16	12	6	-	18	**144**	**139**
5	28	18	14	8	-	19	**129**	**139**
6	30	20	16	10	-	20	**116**	**139**
7	32	22	18	12	-	21	**106**	**133**
8	34	24	20	14	4	22	**96**	**129**
9	36	26	22	16	6	23	**91**	**129**
10	38	28	24	18	8	24	**91**	**129**
11	40	30	26	20	10	25	**91**	**129**
12	42	32	28	22	12	26	**91**	**129**
13	44	34	30	24	14	27	**91**	**129**
14	46	36	32	26	16	28	**91**	**129**
15	48	38	34	28	18	29	**91**	**129**
16	50	40	36	30	20	30	**91**	**129**
17	52	42	38	32	22	31	**85**	**124**
18	54	44	40	34	24	32	**79**	**120**
19	56	46	42	36	26	33	**75**	**116**
20	58	48	44	38	28	34	**70**	**109**
21	60	50	46	40	30	35	**66**	**103**
22	62	52	48	42	32	36	**63**	**97**
23	64	54	50	44	34	37	**59**	**92**

[1] Panes must have a total glass thickness of at least 16 mm in inclined glazing

[2] Panes must have a total glass thickness of at least 24 mm in inclined glazing

Glass supports

9.2
1

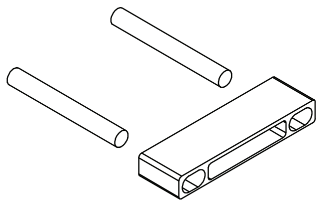


Table 3:
GH 5053 with 2 bolts / hardwood cylinder, System 60 / System 80

Row	Total glass thickness t_{Glass} for single glazing or symmetrical glass structure					Eccentricity "e"	Permitted pane weight G (kg)	
	Stabalux H			Stabalux ZL-H				
	Inner seal height			Inner seal height			VH(NH) Performance class 2	BSH(NH) Performance class 2
	5 mm	10 mm [1]	12 mm	5 mm	10 mm [1]	mm	kg	kg
1	≤ 20	≤ 10	-	-	-	15	**476**	**473**
2	22	12	8	-	-	16	**446**	**444**
3	24	14	10	4	-	17	**420**	**418**
4	26	16	12	6	-	18	**397**	**394**
5	28	18	14	8	-	19	**376**	**374**
6	30	20	16	10	-	20	**357**	**355**
7	32	22	18	12	-	21	**329**	**338**
8	34	24	20	14	-	22	**329**	**323**
9	36	26	22	16	-	23	**329**	**312**
10	38	28	24	18	-	24	**329**	**312**
11	40	30	26	20	10	25	**329**	**312**
12	42	32	28	22	12	26	**329**	**312**
13	44	34	30	24	14	27	**329**	**312**
14	46	36	32	26	16	28	**329**	**312**
15	48	38	34	28	18	29	**329**	**312**
16	50	40	36	30	20	30	**329**	**312**
17	52	42	38	32	22	31	**329**	**312**
18	54	44	40	34	24	32	**329**	**312**
19	56	46	42	36	26	33	**319**	**302**
20	58	48	44	38	28	34	**309**	**293**
21	60	50	46	40	30	35	**300**	**285**
22	62	52	48	42	32	36	**292**	**277**
23	64	54	50	44	34	37	**284**	**269**

[1] Panes must have a total glass thickness of at least 20 mm in inclined glazing

Glass supports

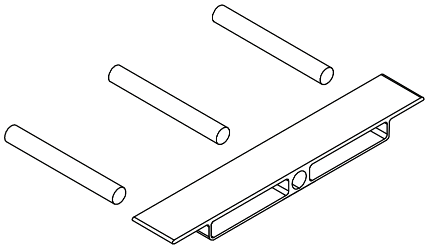


Table 4:
GH 5055 with 3 bolts / hardwood cylinder, System 60 / System 80

Row	Total glass thickness t_{Glass} for single glazing or symmetrical glass structure					Eccentricity "e"	Permitted pane weight G (kg)	
	Stabalux H			Stabalux ZL-H				
	Inner seal height			Inner seal height			VH(NH) Performance class 2	BSH(NH) Performance class 2
	5 mm	10 mm [1]	12 mm	5 mm	10 mm [1]	mm	kg	kg
1	≤ 20	≤ 10	-	-	-	15	**602**	**674**
2	22	12	8	-	-	16	**529**	**606**
3	24	14	10	4	-	17	**494**	**595**
4	26	16	12	6	-	18	**494**	**562**
5	28	18	14	8	-	19	**494**	**532**
6	30	20	16	10	-	20	**494**	**505**
7	32	22	18	12	-	21	**494**	**481**
8	34	24	20	14	-	22	**494**	**460**
9	36	26	22	16	-	23	**477**	**442**
10	38	28	24	18	-	24	**458**	**442**
11	40	30	26	20	10	25	**458**	**442**
12	42	32	28	22	12	26	**458**	**442**
13	44	34	30	24	14	27	**458**	**442**
14	46	36	32	26	16	28	**458**	**442**
15	48	38	34	28	18	29	**458**	**442**
16	50	40	36	30	20	30	**458**	**442**
17	52	42	38	32	22	31	**458**	**442**
18	54	44	40	34	24	32	**458**	**442**
19	56	46	42	36	26	33	**444**	**428**
20	58	48	44	38	28	34	**431**	**416**
21	60	50	46	40	30	35	**412**	**404**
22	62	52	48	42	32	36	**390**	**392**
23	64	54	50	44	34	37	**369**	**382**

[1] Panes must have a total glass thickness of at least 20 mm in inclined glazing

STABALUX

Glass supports

9.2
1

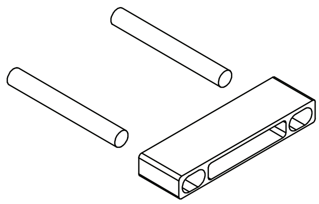


Table 5:
GH 5053 with 2 bolts / hardwood cylinder, System 50

Row	Total glass thickness t_{Glass} for single glazing or symmetrical glass structure					Eccentricity "e"	Permitted pane weight G (kg)	
	Stabalux H			Stabalux ZL-H				
	Inner seal height			Inner seal height			VH(NH) Performance class 2	BSH(NH) Performance class 2
	5 mm	10 mm [1)]	12 mm	5 mm	10 mm [1)]	mm	kg	kg
1	≤ 20	≤ 10	-	-	-	15	**500**	
2	22	12	8	-	-	16	**456**	
3	24	14	10	4	-	17	**404**	
4	26	16	12	6	-	18	**360**	
5	28	18	14	8	-	19	**323**	
6	30	20	16	10	-	20	**292**	
7	32	22	18	12	-	21	**283**	
8	34	24	20	14	-	22	**283**	
9	36	26	22	16	-	23	**283**	
10	38	28	24	18	-	24	**283**	
11	40	30	26	20	10	25	**283**	
12	42	32	28	22	12	26	**283**	
13	44	34	30	24	14	27	**283**	
14	46	36	32	26	16	28	**283**	
15	48	38	34	28	18	29	**283**	
16	50	40	36	30	20	30	**283**	
17	52	42	38	32	22	31	**283**	
18	54	44	40	34	24	32	**283**	
19	56	46	42	36	26	33	**266**	
20	58	48	44	38	28	34	**251**	
21	60	50	46	40	30	35	**236**	
22	62	52	48	42	32	36	**223**	
23	64	54	50	44	34	37	**212**	

[1)] Panes must have a total glass thickness of at least 20 mm in inclined glazing

Glass supports

9.2
1

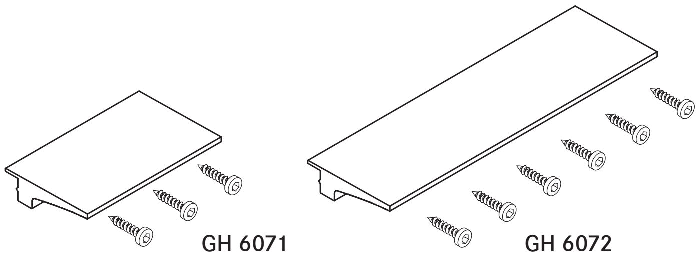
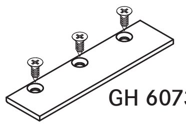


Table 6:
GH 6071 & GH 6072, AK 5010/ AK 6010 screwed on to the timber

Row	Total glass thickness t_{Glass} for single glazing or symmetrical glass structure / Inner seal height	Eccentricity „e“	Permitted pane weight G (kg) AK 5010		AK 6010	
			Glass support GH 6071 Width 100 mm	Glass support GH 6072 Width 200 mm	Glass support GH 6071 Width 100 mm	Glass support GH 6072 Width 200 mm
	16,5 mm	mm	kg	kg	kg	kg
1	≤ 24	28,5	**487**	**546**	**576**	**1030**
2	26	29,5	**477**	**538**	**572**	**1001**
3	28	30,5	**468**	**529**	**567**	**973**
4	30	31,5	**458**	**521**	**563**	**945**
5	32	32,5	**449**	**513**	**557**	**917**
6	34	33,5	**439**	**505**	**553**	**890**
7	36	34,5	**430**	**496**	**548**	**862**
8	38	35,5	**420**	**488**	**542**	**834**
9	40	36,6	**411**	**480**	**529**	**806**
10	42	37,5	**401**	**472**	**513**	**777**
11	44	38,5	**392**	**463**	**497**	**751**
12	46	39,5	**382**	**455**	**481**	**722**
13	48	40,5	**373**	**447**	**465**	**695**
14	50	41,5	**363**	**438**	**449**	**667**
15	52	42,5	**354**	**430**	**432**	**640**
16	54	43,5	**344**	**422**	**413**	**608**
17	56	44,5	**335**	**414**	**387**	**553**
18	58	45,5	**325**	**405**	**360**	**497**
19	60	46,5	**316**	**397**	**333**	**442**

The eccentricity column “e” must be used to calculate the permitted pane weight if the glass structure is asymmetrical.

Glass supports



GH 6073

Table 7:
GH 6073, AK 5010/ AK 6010 screwed on to the timber

Row	Total glass thickness t_{Glass} for single glazing or symmetrical glass structure	Eccentricity „e“	Permitted pane weight G (kg)	
			AK 5010	AK 6010
	Inner seal height		VH(NH) and BSH(NH) Performance class 2	
			Glass support GH 6073 Width 100 mm	Glass support GH 6073 Width 100 mm
	16,5 mm	mm	kg	kg
1	≤ 18	25,5	**510**	**589**

The eccentricity column “e” must be used to calculate the permitted pane weight if the glass structure is asymmetrical.

Glass supports

Table 8:
Sine values

Angle (in °)	Sine	Angle (in °)	Sine	Angle (in °)	Sine	Angle (in °)	Sine	Angle (in °)	Sine
1	0.017	21	0.358	41	0.656	61	0.875	81	0.988
2	0.035	22	0.375	42	0.669	62	0.883	82	0.990
3	0.052	23	0.391	43	0.682	63	0.891	83	0.993
4	0.070	24	0.407	44	0.695	64	0.899	84	0.995
5	0.087	25	0.423	45	0.707	65	0.906	85	0.996
6	0.105	26	0.438	46	0.719	66	0.914	86	0.998
7	0.122	27	0.454	47	0.731	67	0.921	87	0.999
8	0.139	28	0.469	48	0.743	68	0.927	88	0.999
9	0.156	29	0.485	49	0.755	69	0.934	89	1.000
10	0.174	30	0.500	50	0.766	70	0.940	90	1.000
11	0.191	31	0.515	51	0.777	71	0.946		
12	0.208	32	0.530	52	0.788	72	0.951		
13	0.225	33	0.545	53	0.799	73	0.956		
14	0.242	34	0.559	54	0.809	74	0.961		
15	0.259	35	0.574	55	0.819	75	0.966		
16	0.276	36	0.588	56	0.829	76	0.970		
17	0.292	37	0.602	57	0.839	77	0.974		
18	0.309	38	0.616	58	0.848	78	0.978		
19	0.326	39	0.629	59	0.857	79	0.982		
20	0.342	40	0.643	60	0.866	80	0.985		

Table 9:
% inclination relative to the angle in °

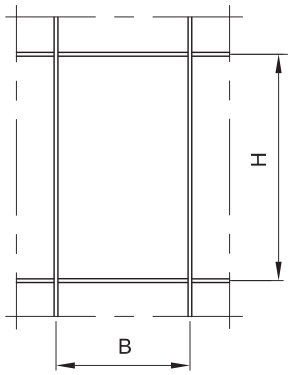
%	Inclination (in °)	%	Inclination (in °)	%	Inclination (in °)	%	Inclination (in °)	%	Inclination (in °)
1	0.57	21	11.86	41	22.29	61	31.38	81	39.01
2	1.15	22	12.41	42	22.78	62	31.80	82	39.35
3	1.72	23	12.95	43	23.27	63	32.21	83	39.69
4	2.29	24	13.50	44	23.75	64	32.62	84	40.03
5	2.86	25	14.04	45	24.23	65	33.02	85	40.36
6	3.43	26	14.57	46	24.70	66	33.42	86	40.70
7	4.00	27	15.11	47	25.17	67	33.82	87	41.02
8	4.57	28	15.64	48	25.64	68	34.22	88	41.35
9	5.14	29	16.17	49	26.10	69	34.61	89	41.67
10	5.71	30	16.70	50	26.57	70	34.99	90	41.99
11	6.28	31	17.22	51	27.02	71	35.37	91	42.30
12	6.84	32	17.74	52	27.47	72	35.75	92	42.61
13	7.41	33	18.26	53	27.92	73	36.13	93	42.92
14	7.97	34	18.78	54	28.37	74	36.50	94	43.23
15	8.53	35	19.29	55	28.81	75	36.87	95	43.53
16	9.09	36	19.80	56	29.25	76	37.23	96	43.83
17	9.65	37	20.30	57	29.68	77	37.60	97	44.13
18	10.20	38	20.81	58	30.11	78	37.95	98	44.42
19	10.76	39	21.31	59	30.54	79	38.31	99	44.71
20	11.31	40	21.80	60	30.96	80	38.66	100	45.00

STABALUX

Glass supports

9.2
1

Example for the calculation of vertical glazing with an asymmetrical glass structure



The following examples merely possible uses of the glass supports, without validating the other components used in the system.

Specifications:

Transom profile: BSH(NH)

Glass pane format:		B x H	= 1.15 m x 2.00 m = 2.30 m²
Glass structure:	ti / SZR_1 / tm / SZR_2 / ta		= 6 mm / 12 mm / 6 mm / 12 mm / 8 mm
	ti + tm + ta		= 20 mm = 0.020 m
		t_{Glass}	**= 44 mm**

Calculation of the pane weight:

Specific weight of the glass:	γ	≈ 25.0 kN/m³
Pane weight:	**G**	= 2.30 x 25.0 x 0.020 = 1.15 kN ≈ **115 kg**

Calculation of eccentricity “e”:

Height of the inner seal:	d	= 5 mm
	a1 = 5 + 6/2	= 8 mm
	a2 = 5 + 6 + 12 + 6/2	= 26 mm
	a3 = 5 + 6 + 12 + 6 + 12 + 8/2	= 45 mm
	e = (6 x 8 + 6 x 26 + 8 x 45)/20	**= 28.2 ≈ 29 mm**

The following options are therefore possible:

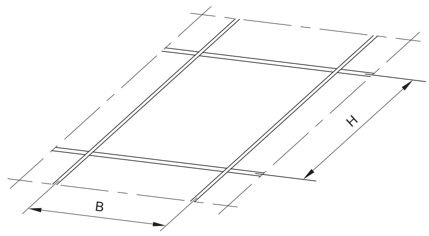
based on Table 1, row 15: per. G ≤ 119 kg > G ≤ 115 kg	GH 5053 with 2 hanger b olts | System H & ZL-H
based on Table 2, row 15: per. G = 129 kg > G = 115 kg	GH 5055 with 3 hanger bolts | System H & ZL-H
based on Table 3, row 15: per. G = 312 kg > G = 115 kg	GH 5053 with 2 bolts/hardwood cylinders | System H & ZL-H
based on Table 4, row 15: per. G = 442 kg > G = 115 kg	GH 5053 with 3 bolts/hardwood cylinders | System H & ZL-H

STABALUX

Glass supports

9.2
1

Example for the calculation of vertical glazing with a symmetrical glass structure



Specifications:

Inclination of the roof surface: α_{Roof} = 45°

Transom profile: System 60; timber VH(NH)

Glass pane format: W x H = 2.50 m x 4.00 m = 10.00 m²

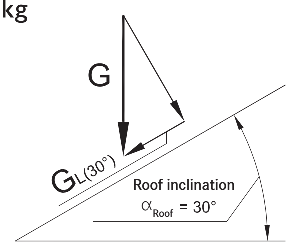
Glass structure: ti / SZR / ta = 12 mm / 16 mm / 12 mm
ti + ta = 24 mm = 0.024 m
t_{Glass} **= 40 mm**

Calculation of the pane weight:

Specific weight of the glass: γ **≈ 25.0 kN/m³**

Pane weight: G = 10.00 x 25.0 x 0.024 = 6.00 kN **≈ 600 kg**

The roof inclination exerts the following load share on the glass support: GL(45°) = 600 x sin 45° = 424.3 **≈ 425 kg**



Calculation of eccentricity "e":

Height of the inner seal: d = 10 mm

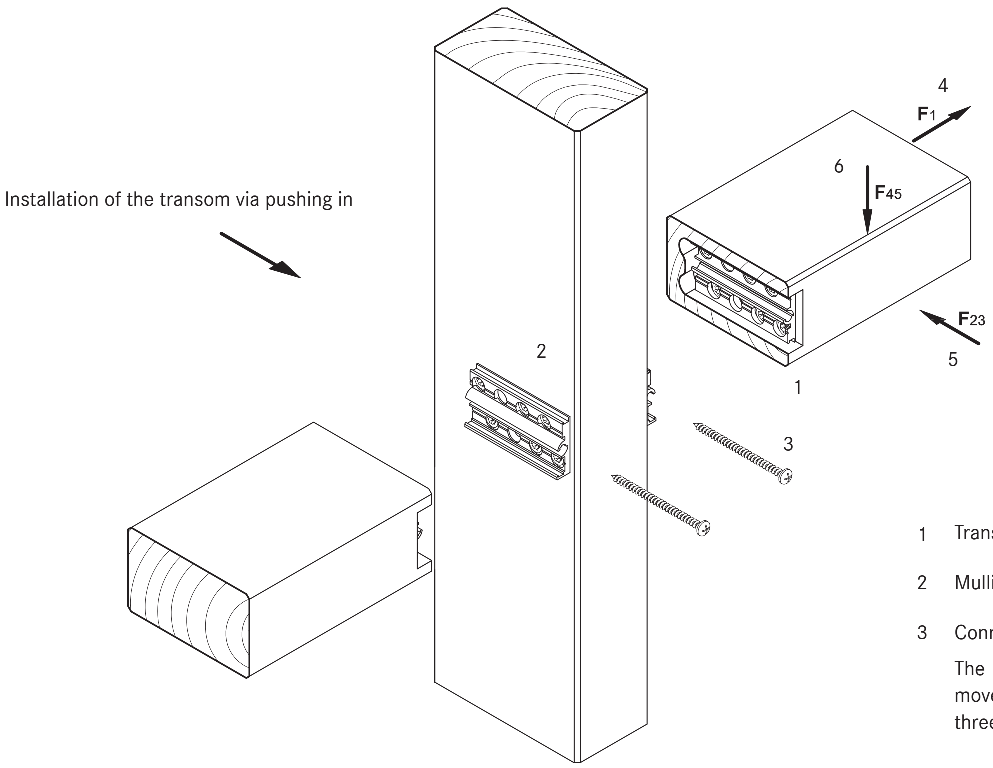
e = 10 + 40/2 = **30 mm**

The results confirm the following option:

based on Table 4, row 16: **per. G = 458 kg > GL (45°) = 425 kg** GH 5055 with 3 bolts/hardwood cylinders | System H

Transom connector

9.2
2



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1 Transom installation

2 Mullion installation

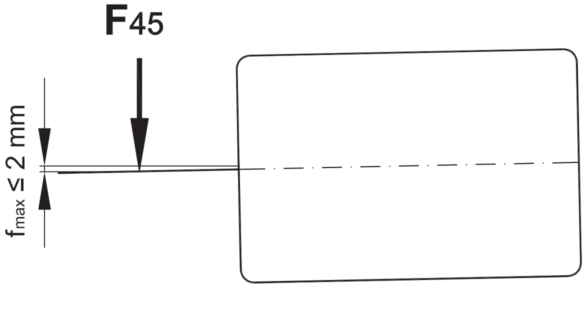
3 Connecting screw

The connecting screw locks the movement of the connector in all three directions

4 F_1 = Axial load of the transom

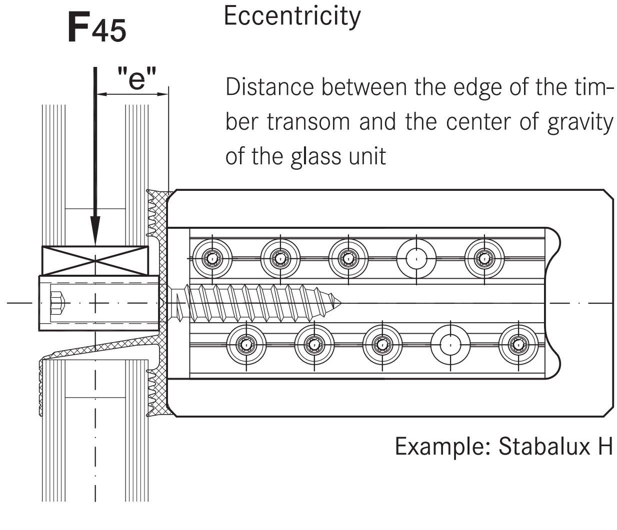
5 F_{23} = Windload perpendicular to the curtain wall

6 F_{45} = Weight of the glass unit



Eccentricity

Distance between the edge of the timber transom and the center of gravity of the glass unit



Example: Stabalux H

Transom connector

Miscellaneous

The glass supports that Stabalux supplies are thoroughly tested for load-bearing capacity and fitness for purpose. For this purpose Professor H.J. Blaß from Kalsruhe Institute for Thechnology was engaged. The tests were carried out at the Karlsruhe Institute for Timber and Buliding Construction. During the system tests, the load bearing and deformation behavior of the mullion and transom connection was examined for the following load cases:

- Weight of the glass unit (F_{45})
- Windload perpendicular to the curtain wall (F_{23})
- Normal force in the transom (F_1)

Both calculations and tests were carried out as part of the certification. Thanks to the very good correlation between the test results and the calculated values, equations were evaluated for the calculation of the load bearing capacity and fitness for use. These equations are part of the ETA 170165 of March 28, 2017, which serves as the basis for the proof of the load bearing capacity of the mullion-transom connectors.
The measured deflection **f_{max} = 2 mm** below the theoretical point of application of the resulting weight of the window was used as the limit of usability (transom deflection). The location of the point of application is identified using eccentricity “**e**“.

Eccentricity “e“

The height of the inner seal and the glass structure, i.e. the centre of gravity of the glass pane is determined by the eccentricity “e“. The unit “e” describes the distance between the front edge of the timber transom and the theoretical load transfer line.

Allowed glass weight F_{45}

The charts 9-15 show the allowed glass weight in kgs. The loads are per complete transom, with two connectors on both sides. *The load bearing capacities of the glass supports were not taken into account in the tables.*

The permissible glass weights are influenced by the system width, the height of the inner seal, the glass construction / glass thickness and the number of screws (screw variants "V"). *The number of screws in the transom and the mullion has to be equal.*

The calculations include the following coefficients:

k_{mod}	= 0,6	coefficient for permanent load
γ_M	= 1,3	Partial safety coefficient for the properties of the materials
γ_G	= 1,35	Partial safety coefficient for the permanent load

- For the highest possible glass load, as a rule either the limiting condition of the load bearing capacity or the limit state of the usability **f_{max} = 2 mm** is governing.
- The table values describe the limit state of the bearing capacity with deformation less than **f_{max} < 2 mm**. The limit state of the bearing capacity is therefore decisive.

The determined table values refer to a mullion-transom construction made of solid timber of strength class C24 with a characteristic wood mass density of ρ_k =350 kg/m^3. For the application of a different type of wood with a higher strength class and higher wood mass density, the values can be multiplied by factor "R" from the following table:

Timber classes			Mass density ρ_k kg/m^3	Factor **R**
C24	GL24c		350	**1,00**
C27			370	**1,03**
C30	GL28c	GL24h	380	**1,04**
	GL32c		410	**1,09**
		GL32h	430	**1,12**
C50			460	**1,16**
D30			530	**1,27**
D40			590	**1,36**
D50			650	**1,44**

Transom connector

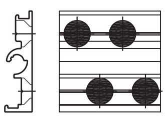
Table 9:
RHT 8040 Mullion-transom connector for timber for the transom depth 55 - 73 mm

Row	Total glass thickness t_{Glass} for single glazing or symmetrical glass structure					Eccentricity „e“	RHT 8040	
	System and the thickness of the inner gasket						System width 50 / 60 mm	System width 80 mm
	Stabalux H			ZL-H	AK-H		Screwing option	Screwing option
	5	10	12	15	16,5		V1	V1
	mm	mm	mm	mm	mm	mm	kg	kg
1	≤24	≤14	≤10			**17**	62	83
2	26	16	12	≤6		**18**	61	81
3	28	18	14	8		**19**	60	80
4	30	20	16	10	≤6	**20**	59	79
5	32	22	18	12	8	**21**	58	77
6	34	24	20	14	10	**22**	57	76
7	36	26	22	16	12	**23**	56	75
8	38	28	24	18	14	**24**	55	74
9	40	30	26	20	16	**25**	54	72
10	42	32	28	22	18	**26**	54	71
11	44	34	30	24	20	**27**	53	70
12	46	36	32	26	22	**28**	52	69
13	48	38	34	28	24	**29**	51	68
14	50	40	36	30	26	**30**	50	67
15	52	42	38	32	28	**31**	50	66
16	54	44	40	34	30	**32**	49	65
17	56	46	42	36	32	**33**	48	64
18	58	48	44	38	34	**34**	48	63
19	60	50	46	40	36	**35**	47	62
20	62	52	48	42	38	**36**	46	62
21	64	54	50	44	40	**37**	46	61
22	66	56	52	46	42	**38**	45	60
23	68	58	54	48	44	**39**	44	59
24	70	60	56	50	46	**40**	44	58
25	72	62	58	52	48	**41**	43	58
26	74	64	60	54	50	**42**	43	57
27	76	66	62	56	52	**43**	42	56
28	78	68	64	58	54	**44**	42	56
29	80	70	66	60	56	**45**	41	55
30	82	72	68	62	58	**46**	41	54
31	84	74	70	64	60	**47**	40	54

Values refer to timber mass densities of ρ_k =350 kg/m^3

Screwing options:

RHT 8040 V1



Transom connector

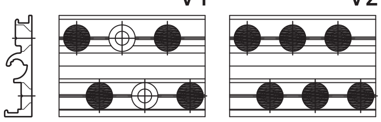
Table 10:
RHT 8058 Mullion-transom connector for timber for the transom depth 74 - 91 mm

Row	Total glass thickness t_{Glass} for single glazing or symmetrical glass structure					Eccentricity „e“	RHT 8058			
	System and the thickness of the inner gasket						System width 50 / 60 mm		System width 80 mm	
	Stabalux H			ZL-H	AK-H		Screwing option		Screwing option	
	5	10	12	15	16,5		V1	V2	V1	V2
	mm	mm	mm	mm	mm	mm	kg	kg	kg	kg
1	≤24	≤14	≤10			**17**	70	86	93	114
2	26	16	12	≤6		**18**	69	84	91	112
3	28	18	14	8		**19**	68	83	90	110
4	30	20	16	10	≤6	**20**	67	82	89	109
5	32	22	18	12	8	**21**	66	81	88	107
6	34	24	20	14	10	**22**	65	79	86	106
7	36	26	22	16	12	**23**	64	78	85	104
8	38	28	24	18	14	**24**	63	77	84	103
9	40	30	26	20	16	**25**	62	76	83	101
10	42	32	28	22	18	**26**	62	75	82	100
11	44	34	30	24	20	**27**	61	74	81	99
12	46	36	32	26	22	**28**	60	73	80	97
13	48	38	34	28	24	**29**	59	72	79	96
14	50	40	36	30	26	**30**	59	71	78	95
15	52	42	38	32	28	**31**	58	71	77	94
16	54	44	40	34	30	**32**	57	70	76	93
17	56	46	42	36	32	**33**	57	69	75	92
18	58	48	44	38	34	**34**	56	68	74	90
19	60	50	46	40	36	**35**	55	67	74	89
20	62	52	48	42	38	**36**	55	66	73	88
21	64	54	50	44	40	**37**	54	66	72	87
22	66	56	52	46	42	**38**	54	65	71	86
23	68	58	54	48	44	**39**	53	64	70	85
24	70	60	56	50	46	**40**	52	63	70	84
25	72	62	58	52	48	**41**	52	63	69	83
26	74	64	60	54	50	**42**	51	62	68	82
27	76	66	62	56	52	**43**	51	61	68	82
28	78	68	64	58	54	**44**	50	61	67	81
29	80	70	66	60	56	**45**	50	60	66	80
30	82	72	68	62	58	**46**	49	59	65	79
31	84	74	70	64	60	**47**	49	59	65	78

Values refer to timber mass densities of ρ_k =350 kg/m³

Screwing options:

RHT 8058 V1 V2



STABALUX

Transom connector

9.2
2

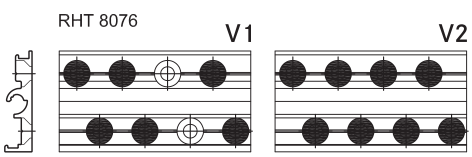
Table 11:

RHT 8076 Mullion-transom connector for timber for the transom depth 92 - 109 mm

Row	Total glass thickness t_{Glass} for single glazing or symmetrical glass structure					Eccentricity „e"	RHT 8076			
	System and the thickness of the inner gasket						System width 50 / 60 mm		System width 80 mm	
	Stabalux H			ZL-H	AK-H		Screwing option		Screwing option	
	5	10	12	15	16,5		V1	V2	V1	V2
	mm	mm	mm	mm	mm	mm	kg	kg	kg	kg
1	≤24	≤14	≤10			**17**	105	111	140	147
2	26	16	12	≤6		**18**	104	109	138	145
3	28	18	14	8		**19**	102	108	136	144
4	30	20	16	10	≤6	**20**	101	107	134	142
5	32	22	18	12	8	**21**	100	105	133	140
6	34	24	20	14	10	**22**	99	104	131	138
7	36	26	22	16	12	**23**	98	103	130	137
8	38	28	24	18	14	**24**	96	102	128	135
9	40	30	26	20	16	**25**	95	100	127	134
10	42	32	28	22	18	**26**	94	99	125	132
11	44	34	30	24	20	**27**	93	98	124	130
12	46	36	32	26	22	**28**	92	97	123	129
13	48	38	34	28	24	**29**	91	96	121	128
14	50	40	36	30	26	**30**	90	95	120	126
15	52	42	38	32	28	**31**	89	94	119	125
16	54	44	40	34	30	**32**	88	93	117	123
17	56	46	42	36	32	**33**	87	92	116	122
18	58	48	44	38	34	**34**	86	91	115	121
19	60	50	46	40	36	**35**	85	90	114	120
20	62	52	48	42	38	**36**	85	89	113	118
21	64	54	50	44	40	**37**	84	88	111	117
22	66	56	52	46	42	**38**	83	87	110	116
23	68	58	54	48	44	**39**	82	86	109	115
24	70	60	56	50	46	**40**	81	85	108	114
25	72	62	58	52	48	**41**	80	85	107	113
26	74	64	60	54	50	**42**	80	84	106	111
27	76	66	62	56	52	**43**	79	83	105	110
28	78	68	64	58	54	**44**	78	82	104	109
29	80	70	66	60	56	**45**	77	81	103	108
30	82	72	68	62	58	**46**	77	81	102	107
31	84	74	70	64	60	**47**	76	80	101	106

Values refer to timber mass densities of ρ_k =350 kg/m^3

Screwing options:



Things to Know
Preliminary static design

Transom connector

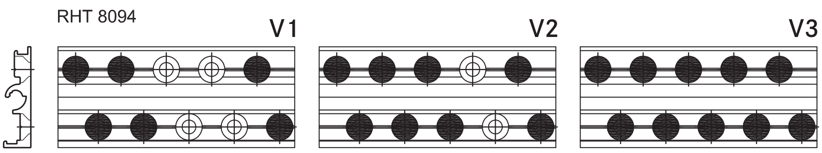
9.2
2

Table 12:
RHT 8094 Mullion-transom connector for timber for the transom depth 110 - 145 mm

Row	Total glass thickness t_{Glass} for single glazing or symmetrical glass structure					Eccentricity „e“	RHT 8094					
	System and the thickness of the inner gasket						System width 50 / 60 mm			System width 80 mm		
	Stabalux H			ZL-H	AK-H		Screwing option			Screwing option		
	5	10	12	15	16,5		V1	V2	V3	V1	V2	V3
	mm	mm	mm	mm	mm	mm	kg	kg	kg	kg	kg	kg
1	≤24	≤14	≤10			**17**	124	134	138	165	178	183
2	26	16	12	≤6		**18**	123	132	136	163	176	181
3	28	18	14	8		**19**	121	131	135	162	174	179
4	30	20	16	10	≤6	**20**	120	129	133	160	172	177
5	32	22	18	12	8	**21**	119	128	132	158	170	175
6	34	24	20	14	10	**22**	118	126	130	157	168	174
7	36	26	22	16	12	**23**	117	125	129	155	166	172
8	38	28	24	18	14	**24**	115	124	128	154	165	170
9	40	30	26	20	16	**25**	114	122	126	152	163	168
10	42	32	28	22	18	**26**	113	121	125	151	161	166
11	44	34	30	24	20	**27**	112	120	124	149	160	165
12	46	36	32	26	22	**28**	111	119	123	148	158	163
13	48	38	34	28	24	**29**	110	118	121	146	156	162
14	50	40	36	30	26	**30**	109	116	120	145	155	160
15	52	42	38	32	28	**31**	108	115	119	144	153	158
16	54	44	40	34	30	**32**	107	114	118	142	152	157
17	56	46	42	36	32	**33**	106	113	117	141	150	155
18	58	48	44	38	34	**34**	105	112	116	140	149	154
19	60	50	46	40	36	**35**	104	111	115	138	148	152
20	62	52	48	42	38	**36**	103	110	114	137	146	151
21	64	54	50	44	40	**37**	102	109	113	136	145	150
22	66	56	52	46	42	**38**	101	108	111	135	144	148
23	68	58	54	48	44	**39**	100	107	110	134	142	147
24	70	60	56	50	46	**40**	100	106	109	133	141	146
25	72	62	58	52	48	**41**	99	105	109	131	140	144
26	74	64	60	54	50	**42**	98	104	108	130	138	143
27	76	66	62	56	52	**43**	97	103	107	129	137	142
28	78	68	64	58	54	**44**	96	102	106	128	136	141
29	80	70	66	60	56	**45**	96	101	105	127	135	139
30	82	72	68	62	58	**46**	95	101	104	126	134	138
31	84	74	70	64	60	**47**	94	100	103	125	133	137

Values refer to timber mass densities of ρ_k =350 kg/m³

Screwing options:



Transom connector

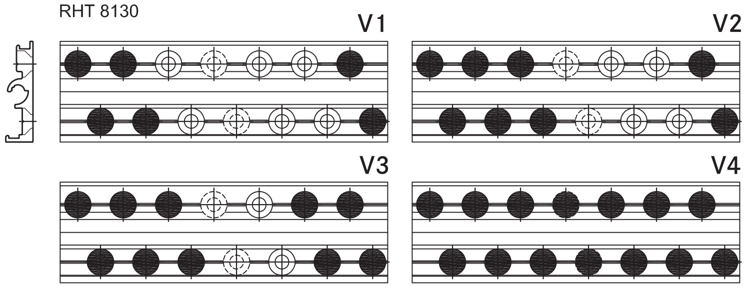
9.2
2

Table 13:
RHT 8130 Mullion-transom connector for timber for the transom depth 146 - 181 mm

Row	Total glass thickness t_{Glass} for single glazing or symmetrical glass structure					Eccentricity „e“	RHT 8130							
	System and the thickness of the inner gasket						System width 50 / 60 mm				System width 80 mm			
	Stabalux H			ZL-H	AK-H		Screwing option				Screwing option			
	5	10	12	15	16,5		V1	V2	V3	V4	V1	V2	V3	V4
	mm	mm	mm	mm	mm	mm	kg	kg	kg	kg	kg	kg	kg	kg
1	≤24	≤14	≤10			**17**	154	179	184	195	205	238	245	260
2	26	16	12	≤6		**18**	153	178	183	193	203	236	243	257
3	28	18	14	8		**19**	151	176	181	192	201	234	241	255
4	30	20	16	10	≤6	**20**	150	175	180	190	200	232	239	253
5	32	22	18	12	8	**21**	149	173	178	188	198	230	237	251
6	34	24	20	14	10	**22**	148	172	177	187	197	228	235	249
7	36	26	22	16	12	**23**	147	170	175	185	195	227	233	247
8	38	28	24	18	14	**24**	146	169	174	184	194	225	231	244
9	40	30	26	20	16	**25**	145	168	172	182	192	223	229	242
10	42	32	28	22	18	**26**	143	166	171	181	191	221	228	240
11	44	34	30	24	20	**27**	142	165	170	179	189	219	226	238
12	46	36	32	26	22	**28**	141	164	168	178	188	218	224	236
13	48	38	34	28	24	**29**	140	162	167	176	187	216	222	235
14	50	40	36	30	26	**30**	139	161	166	175	185	214	221	233
15	52	42	38	32	28	**31**	138	160	165	174	184	212	219	231
16	54	44	40	34	30	**32**	137	158	163	172	183	211	217	229
17	56	46	42	36	32	**33**	136	157	162	171	181	209	216	227
18	58	48	44	38	34	**34**	135	156	161	170	180	208	214	226
19	60	50	46	40	36	**35**	135	155	160	168	179	206	213	224
20	62	52	48	42	38	**36**	134	154	159	167	178	204	211	222
21	64	54	50	44	40	**37**	133	153	157	166	176	203	209	220
22	66	56	52	46	42	**38**	132	151	156	164	175	201	208	219
23	68	58	54	48	44	**39**	131	150	155	163	174	200	206	217
24	70	60	56	50	46	**40**	130	149	154	162	173	198	205	216
25	72	62	58	52	48	**41**	129	148	153	161	172	197	204	214
26	74	64	60	54	50	**42**	128	147	152	160	171	196	202	212
27	76	66	62	56	52	**43**	127	146	151	159	170	194	201	211
28	78	68	64	58	54	**44**	127	145	150	157	168	193	199	209
29	80	70	66	60	56	**45**	126	144	149	156	167	191	198	208
30	82	72	68	62	58	**46**	125	143	148	155	166	190	197	206
31	84	74	70	64	60	**47**	124	142	147	154	165	189	195	205

Values refer to timber mass densities of ρ_k =350 kg/m³

Screwing options:



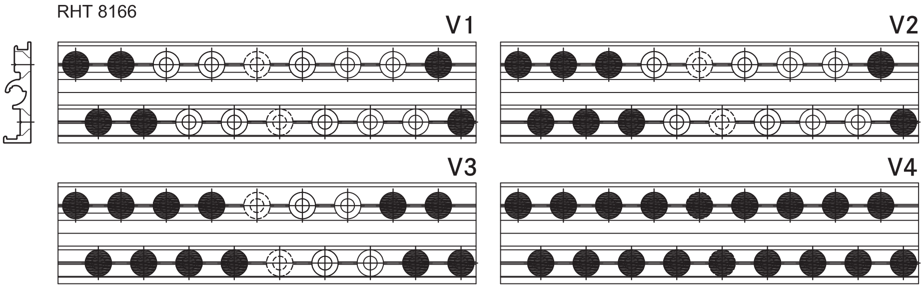
Transom connector

Table 14:
RHT 8166 Mullion-transom connector for timber for the transom depth 182 - 235 mm

Row	Total glass thickness t_{Glass} for single glazing or symmetrical glass structure					Eccentricity „e“	RHT 8166							
	System and the thickness of the inner gasket						System width 50 / 60 mm				System width 80 mm			
	Stabalux H			ZL-H	AK-H		Screwing option				Screwing option			
	5	10	12	15	16,5		V1	V2	V3	V4	V1	V2	V3	V4
	mm	mm	mm	mm	mm	mm	kg	kg	kg	kg	kg	kg	kg	kg
1	≤24	≤14	≤10			**17**	174	216	243	255	231	287	324	340
2	26	16	12	≤6		**18**	173	214	242	253	230	285	321	337
3	28	18	14	8		**19**	172	213	240	251	228	283	319	334
4	30	20	16	10	≤6	**20**	171	211	238	250	227	281	317	332
5	32	22	18	12	8	**21**	170	210	237	248	226	279	315	330
6	34	24	20	14	10	**22**	169	208	235	246	224	277	312	327
7	36	26	22	16	12	**23**	167	207	233	244	223	275	310	325
8	38	28	24	18	14	**24**	166	206	232	243	221	273	308	323
9	40	30	26	20	16	**25**	165	204	230	241	220	272	306	320
10	42	32	28	22	18	**26**	165	203	229	239	219	270	304	318
11	44	34	30	24	20	**27**	164	201	227	238	218	268	302	316
12	46	36	32	26	22	**28**	163	200	226	236	216	266	300	314
13	48	38	34	28	24	**29**	162	199	224	234	215	265	298	312
14	50	40	36	30	26	**30**	161	198	223	233	214	263	296	310
15	52	42	38	32	28	**31**	160	196	221	231	213	261	294	308
16	54	44	40	34	30	**32**	159	195	220	230	211	260	293	306
17	56	46	42	36	32	**33**	158	194	219	228	210	258	291	304
18	58	48	44	38	34	**34**	157	193	217	227	209	256	289	302
19	60	50	46	40	36	**35**	156	192	216	225	208	255	287	300
20	62	52	48	42	38	**36**	155	190	214	224	207	253	285	298
21	64	54	50	44	40	**37**	154	189	213	222	205	252	283	296
22	66	56	52	46	42	**38**	154	188	212	221	204	250	282	294
23	68	58	54	48	44	**39**	153	187	211	220	203	249	280	292
24	70	60	56	50	46	**40**	152	186	209	218	202	247	278	290
25	72	62	58	52	48	**41**	151	185	208	217	201	246	277	288
26	74	64	60	54	50	**42**	150	184	207	216	200	244	275	287
27	76	66	62	56	52	**43**	149	182	205	214	199	243	273	285
28	78	68	64	58	54	**44**	149	181	204	213	198	241	272	283
29	80	70	66	60	56	**45**	148	180	203	212	197	240	270	281
30	82	72	68	62	58	**46**	147	179	202	210	196	238	269	280
31	84	74	70	64	60	**47**	146	178	201	209	195	237	267	278

Values refer to timber mass densities of ρ_k =350 kg/m³

Screwing options:



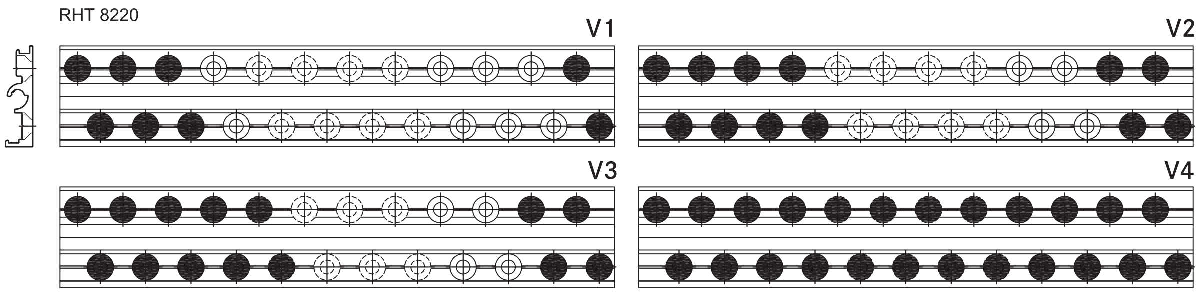
Transom connector

Table 15:
RHT 8220 Mullion-transom connector for timber for the transom depth 236 - 300 mm

Row	Total glass thickness t_{Glass} for single glazing or symmetrical glass structure					Eccentricity „e“	RHT 8220							
	System and the thickness of the inner gasket						System width 50 / 60 mm				System width 80 mm			
	Stabalux H			ZL-H	AK-H		Screwing option				Screwing option			
	5	10	12	15	16,5		V1	V2	V3	V4	V1	V2	V3	V4
	mm	mm	mm	mm	mm	mm	kg	kg	kg	kg	kg	kg	kg	kg
1	≤24	≤14	≤10			**17**	254	300	325	348	337	399	432	462
2	26	16	12	≤6		**18**	252	299	323	346	336	387	429	460
3	28	18	14	8		**19**	251	297	321	344	334	395	427	457
4	30	20	16	10	≤6	**20**	250	295	319	342	332	393	424	454
5	32	22	18	12	8	**21**	248	294	317	340	330	391	422	452
6	34	24	20	14	10	**22**	247	292	316	338	329	389	420	449
7	36	26	22	16	12	**23**	246	291	314	336	327	387	417	447
8	38	28	24	18	14	**24**	245	289	312	334	325	385	415	444
9	40	30	26	20	16	**25**	243	288	311	332	324	383	413	442
10	42	32	28	22	18	**26**	242	287	309	330	322	381	411	440
11	44	34	30	24	20	**27**	241	285	307	328	320	379	409	437
12	46	36	32	26	22	**28**	240	285	306	327	319	377	406	434
13	48	38	34	28	24	**29**	239	282	304	325	317	375	404	432
14	50	40	36	30	26	**30**	237	281	302	323	316	374	402	430
15	52	42	38	32	28	**31**	236	281	301	321	314	372	400	427
16	54	44	40	34	30	**32**	235	280	299	320	313	370	398	425
17	56	46	42	36	32	**33**	234	278	298	318	311	368	396	423
18	58	48	44	38	34	**34**	233	277	296	316	310	366	394	421
19	60	50	46	40	36	**35**	232	275	295	315	308	365	392	418
20	62	52	48	42	38	**36**	231	274	293	313	307	363	390	416
21	64	54	50	44	40	**37**	229	273	292	311	305	361	388	414
22	66	56	52	46	42	**38**	228	271	290	310	304	359	386	412
23	68	58	54	48	44	**39**	227	270	289	308	302	358	384	410
24	70	60	56	50	46	**40**	226	268	287	307	301	356	382	408
25	72	62	58	52	48	**41**	225	267	286	305	300	354	380	406
26	74	64	60	54	50	**42**	224	266	284	303	298	353	378	404
27	76	66	62	56	52	**43**	223	264	283	302	297	351	376	402
28	78	68	64	58	54	**44**	222	263	282	300	295	349	375	400
29	80	70	66	60	56	**45**	221	261	280	299	294	348	373	398
30	82	72	68	62	58	**46**	220	260	279	297	293	346	371	396
31	84	74	70	64	60	**47**	219	259	278	296	291	344	369	394

Values refer to timber mass densities of ρ_k =350 kg/m³

Screwing options:



Demand for tested and approved products

Introduction

Principals, planners and processors demand the use of tested and approved products. Construction laws also demand that the building products satisfy the requirements of the Construction Products List (BRL). Glass facades and glass are defined under technical regulations, including for:

- Stability
- Fitness for purpose
- Thermal insulation
- Fire protection
- Sound insulation

These proofs have been provided for Stabalux facades and roofs. Our production sites and suppliers are quality-certified and guarantee excellent product quality. Moreover, Stabalux GmbH continuously monitors its products and provides additional validation of the properties and special functions of its facade systems. Prestigious test centres and institutes support the company in its quality assurance.

- Institut für Fenstertechnik, Rosenheim
- Institut für Stahlbau, Leipzig
- Materialprüfungsamt NRW, Dortmund
- Materialprüfanstalt für, Braunschweig
- Materials Testing Institute, University of Stuttgart, Stuttgart
- Beschussamt Ulm
- KIT Steel & Lightweight Structures Research Center for Steel, Timber & Masonry, Karlsruhe
- Institut für Energieberatung, Tübingen
- Institut für Wärmeschutz, Munich
- and many more in Europe and overseas.

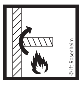
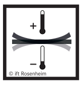
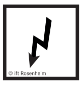
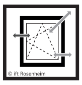
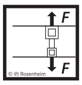
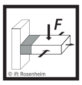
Overview of all tests and approvals

Introduction

The tests we perform help the processor gain access to the market and form the basis for the certifications required by the manufacturer/processor. Their use is only permitted if you have accepted our Terms and Conditions for the Use of Test Reports and Test Certificates. Stabalux will provide these terms and conditions and other templates on request, e.g. declarations of conformity.

Ift Icon	Requirements according to EN 13830	CE	Info
	Air permeability	CE	See product passport
	Watertightness	CE	See product passport
	Resistance to wind load	CE	See product passport
	Impact resistance if explicitly required in the CE mark	CE	See product passport
	Airborne sound insulation if explicitly required in the CE mark	CE	Refer to Sec. 9
	Heat transition Details for U_{cw} value; from the system provider, in-house calculation of U_f values	CE	on request (refer to Sec. 9)
	Self-weight according to EN 1991-1-1; must be determined by the manufacturer	CE	by static validation (refer to Sec. 9)
	Resistance to horizontal loads The curtain facade must withstand dynamic horizontal loads according to EN 1991-1-1; must be determined by the manufacturer	CE	by static validation
	Water vapour permeability	CE	Validation may be necessary in individual cases
	Durability no test needed	CE	Information on proper maintenance of the facade
	Fire resistance if explicitly required in the CE mark, classification according to EN 13501-2; The European regulations have equal standing and apply in addition to the national regulations (e.g. DIN 4102). Fitness for purpose is still determined based on national regulations. Hence there is no declaration on the CE mark; use general building authorisation as necessary.	CE	
	Fire behaviour if explicitly required in the CE mark Validation for all installed materials according to EN 13501-1	CE	

Overview of all tests and approvals

Ift Icon	Requirements according to EN 13830	CE	Info
	**Fire spread** if explicitly required in the CE mark Validation in expert assessments		
	**Thermal shock resistance** if explicitly required in the CE mark Validation by the manufacturer/glass supplier		
	**Potential equalisation** if specifically required in the CE mark (for metal-based curtain walls when mounted on buildings with a height in excess of 25 m)		
	**Seismic safety** If specifically required in the CE mark Validation by the manufacturer		
	**Building and thermal movement** The party organising the tender must specify the building movements, including the movement of the building joints, that the curtain wall will have to carry.		
Ift Icon	**Other requirements**	**CE**	**Info**
	**Dynamic driving rain test** According to ENV 13050		see product passport
	**Proof of fitness for purpose of mechanical connections** **Clamp connection for attachment** Stabalux timber		Controlled connection or regulated nationally in general building authorisations (abZ); abZ available on request
	**Proof of fitness for purpose of mechanical connection** T-connection mullion/transom Stabalux Threaded tube		Controlled connection or regulated nationally in general building authorisations (abZ); abZ available on request
	**Burglary-resistant facades** **Resistance class RC2** according to DIN EN1627		Test reports and expert assessments on request
Ift Icon	**Miscellaneous**	**CE**	**Info**
	Steel profiles for use in indoor swimming pools		
	other statements with tests completed (material testing / stress testing / compatibility testing)		
Ift Icon	**Fire resistance requirements / national regulations**	**CE**	**Info**
	Fire protection facade Stabalux System H (timber with central groove) → G30 / F30		regulated nationally in general building authorisations (abZ); abZ available on request

Overview of all tests and approvals

Example of a declaration of conformity for fire protection glazing abZ 19.14-xxxx

Declaration of conformity

- Name and address of the company that produced the **fire protection glazing** (object of the approval):

____
____
____
____

- Building site, i.e. building:

____
____
____
____

- Date of production: ____

- Required fire resistance class for the fire protection glazing: ____F30____

This is to confirm that

- the **fire protection glazing** and all of its components were manufactured, installed and labelled professionally and with adherence to all provisions of the general building authorisation no.: **Z-19.14-xxxx** by DIBt dated ____________ (and any provisions contained in the notifications of changes and additions dated ____),
and

- that construction products used for the manufacture of the object of this authorisation (e.g. frames, panes) satisfy the provisions of this general building authorisation and are labelled as required. This applies equally to parts of the object of this approval for which the authorisation may have imposed conditions.

__________________________ ______________________________
(Place, date) (Company / signature)

(This certification must be submitted to the principal for forwarding to the competent construction supervision authorities as required.)

Overview of all tests and approvals

9.3
2

Example of an assembly certificate “burglar-resistant facades”

Assembly certificate
according to DIN EN 1627

Company: ....

Address: ....

....

certifies that the burglar-resistant components listed hereafter were installed
according to the specification of the assembly instructions (appended with the test report)

in the property: ....

Address: ....

....

.

Part	Location in the property:	Resistance class	Particulars

....
Date Stamp Signature

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Construction Products Regulation (BauPV)

Regulation (EU) No 305/2011 regarding the harmonisation of construction products was introduced on 1 July 2013, replacing Regulation No 89/106/EEC, which had applied until then.

Regulation 305/2011 defines the terms under which construction products may be "placed on the market" in all European member states. Its ratification in national law is therefore not necessary. The purpose of Regulation 305/2011 is to ensure the safety of structures for humans, animals and the environment. The harmonised standard provides precise definitions of essential performance characteristics, as well as product and test standards for construction products. This ensures largely comparable performance characteristics throughout Europe.

The harmonised standard EN 13830 applies to curtain walls.

Regulation No 89/106 was mainly used to demonstrate to customers that a product conformed to the harmonised European standard. In contrast, Regulation No 305/2011 demands the issue of a Declaration of Performance, which the manufacturer must submit to the customer as assurance of the essential performance characteristics.

Besides the declaration of performance, Regulation No 305/2011 continues to demand, in line with Regulation No 89/106:

- an initial type test (ITT) of the products
- a factory production control (FPC) by the manufacturer
- a CE mark

Declaration of Performance

The declaration of performance (LE, i.e. DoP = **D**eclaration **o**f **P**erformance) under Regulation No 305/2011 replaces the declaration of conformity used until now according to Regulation No 89/106. It is the central document with which the manufacturer of the curtain wall accepts responsibility and provides assurances for the conformity of declared performances.

The manufacturer must use this declaration of performance to obtain CE labelling for the facade before it is entitled to place the construction product on the market. The CE mark confirms that a declaration of performance exists. Described properties of the curtain wall are stated in both of these documents, the declaration of performance and the CE mark. The declaration of performance and the CE mark must be unequivocally associated.

Only the manufacturer of the facade is entitled to submit the declaration of performance.

At least one essential characteristic must be stated in the declaration of performance. A dash is added to the corresponding field if one essential characteristic does not apply, but is defined by a limit value. The entry "**npd**" (**n**o **p**erformance **d**etermined) is not permitted in these cases.

It is advisable to state the performances as listed in the property's individual requirement specifications.

A declaration of performance under Regulation No 305/2011 can only be issued once the product has been manufactured, and not during the bidding phase. The declaration of performance must be presented in the language of the member state to which the construction product will be delivered.

The declaration of performance is handed over to the customer.

Declarations of performance must be archived for at least **10 years**.

The requirements placed in curtain walls are defined in the harmonised standard EN 13830. All performances relating to the characteristics addressed in this standard must be determined if the manufacturer intends their declaration. This does not apply if the standard contains instructions for the statement of performances without testing (e.g. for the use of existing data, for classification without further testing and for the use of generally acknowledged performance values).

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Manufacturers are entitled to group their products as families for the purpose of assessment. But this applies only if the findings in regard to one or more characteristic/s of a given product within a family can be considered representative of the same characteristic/s of all products within the same family. Hence, the essential characteristics can be determined using representative test specimens in what is known as the (ITT = Initial Type Test); this is then used as a reference base.

Insofar as the manufacturers procures construction products from a system provider (often called the system distributor), and provided this entity has suitable legal authorisation, the system provider may accept responsibility for the determination of the product type in regard to one or several essential characteristics of an end product that is subsequently manufactured and/or assembled by the processors in their plants. This is predicated on an agreement between the parties. This agreement may be a contract, a license or any other form of written accord that provides an unequivocal assignment of the component manufacturer's responsibility and liability (the system distributor on the one hand, and the company assembling the end product on the other). In this case, the system distributor must subject the "assembled product", consisting of components that it or another party has manufactured, to a determination of product type and must thereafter present the test report to the manufacturer of the product that is actually placed on the market.

The findings of the determination of product type must be documented in test reports. The manufacturer must keep all test reports for at least 10 years following the data of final manufacture of the curtain wall kit to which the report refers.

[**I**nitial **T**ype **T**est = **ITT**]

An initial type test (ITT) involves the determination of product characteristics according to the European product standard for curtain walls, EN 13830. The initial type test can be performed on representative test specimens by means of measurement, calculation or another method described in the product standard. It is usually acceptable in this respect to perform the initial type test on a representative element of the product family to determine one or more performance characteristics. The manufacturer must commission accredited test institutes to conduct initial type tests. The details are defined in the product standard EN 13830. Any deviations from the tested element are the responsibility of the manufacturer and must not lead to a deterioration of the performance characteristics.

The European Commission allows the system providers to perform this initial type test on their own systems as a service, and to submit the findings to their customers for use in the declaration of performance and in the CE mark.
Initial type tests have been performed on the individual Stabalux systems to determine the product characteristics.

The manufacturer (e.g. metal worker) is entitled, under certain conditions (e.g. use of the same components, incorporation of the processing guidelines in the factory production control, etc.), to use the initial type test made available by the system provider.

The following conditions are defined for the submission of test certificates to the processor:

- The product is manufactured using the same components with identical characteristics as the test specimen presented in the initial type test.
- The processor carries the full responsibility for conformity with the system provider's processing guidelines and for the correct manufacture of the construction product placed on the market.
- The system provider's processing guidelines are integral elements of the factory production control applied by the processor (manufacturer).
- The manufacturer is in possession of the test reports with which it carries out CE marking of its products, and is entitled to use these reports.
- The manufacturer must commission a notified body with the testing insofar as the tested product is not representative of the product that is placed on the market.

The processor may only use the test certificates if it has entered into an agreement with the system provider, in which the processor undertakes to use the elements in

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accordance with the processing instructions and only in connection with the articles defined by the system provider (e.g. material, geometry).

Factory production control

[**F**actory **P**roduction **C**ontrol = **FPC**]

The manufacturer/processor is obliged to establish a system of factory production control (FPC) in its plants in order to ensure that the identified performance characteristics stated in the test reports in reference to the products are adhered to.

It must install operating procedures and work instructions that systematically define all data, requirements and regulations that concern the products. Moreover, a responsible person must be appointed for the production facility, and this person must be suitably qualified to check and the confirm the conformity of the manufactured products.

The manufacturer/processor must provide suitable test equipment and/or devices for this purpose.

The manufacturer/processor must perform the following steps in the factory production control (FPC) for curtain walls (without fire and smoke resistance requirements) in accordance with EN 13830:

Establishment of a documented production control system that is suitable for the product type and the production conditions

- Review that all necessary technical documents and processing instructions are available
- Definition and validation of raw materials and components
- In-process control and examinations in the frequency defined by the manufacturer
- Review and examinations of finished products/components in the frequency defined by the manufacturer
- Description of measures to be undertaken in the event of non-conformity (corrective measures)

The results of the factory production control (FPC) must be documented, assessed and archived, and must contain the following data:

- Product designation (e.g. construction project, precise specification of the curtain facade)
- Documents or references to technical records and processing guidelines as required
- Test methods (e.g. statement of the work stages and test criteria, documents and samples)
- Test findings and comparison with the requirements as necessary
- Measures to be undertaken in the event of non-conformity as necessary
- Date of product completion and date of product testing
- Signature of the investigator and the person responsible for factory production control

The records must be kept for a period of 5 years.

The following applies to companies certified according to DIN EN ISO 9001: this standard will only be recognised as an FPC system if it is adjusted to satisfy the requirements of the product standard EN 13830.

CE mark

A CE mark may only be awarded if there is a declaration of performance. The CE mark may only list performances that were also declared in the declaration of performance. Any characteristics declared as “npd” or “–” in the declaration of performance must not be listed on the CE mark.

The product standard does not require that all components of the curtain wall are designated and marked individually. The CE mark must be easily legible, of a sufficient size and attached to the facade permanently. Alternatively, the mark can be attached to the accompanying documents.

Only the manufacturer of the facade is entitled to issue the CE mark.

Note:
The statements above only apply to glazing without fire-resistance properties.
The manufacturer must submit an EU Declaration of Conformity issued by an external certification body for fire-resistant glazing.

BauPV / DOP / ITT / FPC / CE

CE mark template

<table>
<tr><td colspan="2">CE</td><td>CE mark, comprising the “CE” logo</td></tr>
<tr><td colspan="2">Facade Construction John Doe
John Doe Street 1
12345 John Doe City</td><td>Name and registered address of the manufacturer or logo
(DoP item 4)</td></tr>
<tr><td colspan="2">13</td><td>The last two numerals of the year in which the mark was first attached</td></tr>
<tr><td colspan="2">Germany</td><td></td></tr>
<tr><td colspan="2">Stabalux system</td><td>Product’s clear identification code
(DoP item 1)</td></tr>
<tr><td colspan="2">LE/DoP no.: 001/CPR/01.07.2013</td><td>Reference number of the declaration of performance</td></tr>
<tr><td colspan="2">EN 13830</td><td>Number of the applied European standard as stated in the EU Official Journal
(DoP item 7)</td></tr>
<tr><td colspan="2">Assembly set for curtain facades for use outdoors</td><td>Intended purpose of the product as stated in the European standard
(DoP item 3)</td></tr>
<tr><td>Fire behaviour</td><td>npd</td><td rowspan="12">Level or class of stated performance
(Do not declare higher performance characteristics
than required in the specifications!)
(DoP item 9)</td></tr>
<tr><td>Fire resistance</td><td>npd</td></tr>
<tr><td>Fire spread</td><td>npd</td></tr>
<tr><td>Watertightness</td><td>RE 1650 Pa</td></tr>
<tr><td>Resistance to self-weight</td><td>000kN</td></tr>
<tr><td>Resistance to wind load</td><td>2.0 kN/m²</td></tr>
<tr><td>Impact resistance</td><td>E5/I5</td></tr>
<tr><td>Thermal shock resistance</td><td>ESG</td></tr>
<tr><td>Resistance to horizontal loads</td><td>000kN</td></tr>
<tr><td>Air permeability</td><td>AE</td></tr>
<tr><td>Heat transfer coefficient</td><td>0.0 W/(m²K)</td></tr>
<tr><td>Airborne sound insulation</td><td>0.0 dB</td></tr>
<tr><td colspan="2">First tests conducted and classification reports prepared by:
ift Rosenheim NB no. 0757</td><td>Identification number of the certified test laboratory (DoP item 8)</td></tr>
</table>

BauPV / DOP / ITT / FPC / CE

Declaration of performance template

a Declaration of Performance		
LE/DoP no.: 021/CPR/01.07.2013		
1. Product's identification code:		Stabalux system
2.		from the manufacturer
3. Intended purpose:		Assembly set for curtain facades for use outdoors
4. Manufacturer		Facade Construction John Doe John Doe Street 1 12345 John Doe City
5. Authorised person:		./.
6. System or system requiring assessment of constancy of performance:		3
7. Harmonised standard:		EN 13830:2003
8. Notified body:		Ift Rosenheim NB no. 0757 conducted the first tests as notified test laboratory in conformity system 3 and thereupon issued the test and classification reports.
9. Essential characteristics:		
Essential characteristic: (Section EN 13830)	**Performance**	**Harmonised technical specification**
9.1 Fire behaviour (Sec. 4.9)	npd	EN 13830:2003
9.2 Fire resistance (Sec. 4.8)	npd	
9.3 Spread of fire (Sec. 4.10)	npd	
9.4 Driving rain resistance (Sec. 4.5)	RE 1650 Pa	
9.5 Resistance to self-weight (Sec. 4.2)	npd	
9.6 Resistance to wind load (Sec. 4.1)	2.0 kN/m²	
9.7 Impact resistance	E5/I5	
9.8 Thermal shock resistance	npd	
9.9 Resistance to horizontal loads	npd	
9.10 Air permeability	AE	
9.11 Heat transition	$U_f \leq 0.0$ W/m²K	
9.12 Airborne sound insulation	0.0 dB	
10. The performance of the product according to Numbers 1 and 2 corresponds to the declared performance according to Number 9.		

Exclusively the manufacturer according to number 4 is responsible for preparing the Declaration of Performance.
Signed for and on behalf of the manufacturer by:

John Doe City, 01/07/2013 ppa. Joh Doe, Management

DIN EN 13830 / Explanations

Definition of a curtain wall

EN 13830 defines the “curtain wall” to mean:

“[...] usually consists of vertical and horizontal structural members, connected together and anchored to the supporting structure of the building and infilled, to form a lightweight, space enclosing continuous skin, which provides, by itself or in conjunction with the building construction, all the normal functions of an external wall, but does not take on any of the load bearing characteristics of the building structure.”

The standard applies to curtain facades that are parallel to the vertical structure of the building surface, to those that deviate from the vertical by up to 15°. Inclined glazing elements included in the curtain facade may be enclosed.

Curtain facades (mullion-transom constructions) are comprised of a number of components and/or prefab units that are not assembled to create a finished product until they reach the building site.

Properties, i.e. controlled characteristics in EN 13830

The purpose of the CE mark is to ensure adherence to basic safety requirements placed in the facade and to enable free traffic of goods in Europe. The product standard EN 13830 defines and regulates the essential characteristics of these basic safety requirements as mandated properties:

- Resistance to wind load
- Self-weight
- Impact resistance
- Air permeability
- Watertightness
- Airborne sound insulation
- Heat transition
- Fire resistance
- Fire behaviour
- Fire spread
- Durability
- Water vapour permeability
- Potential equalisation
- Seismic safety
- Thermal shock resistance
- Building and thermal movement
- Resistance to dynamic horizontal loads

So-called initial type testing must be performed in order to validate the essential characteristics. They are performed either by the notified body (e.g. ift Rosenheim) or by the manufacturer (processor), depending on the specific characteristic type. Other requirements may apply to characteristics in specific properties, which then must be validated also.

The method applied to perform the testing and the type of classification are defined in product standard EN 13830, which makes frequent references to European standards. In some case the product standard itself defines the test methods.

The characteristics and their significance

The requirements are defined in the product standard DIN EN 13830. The following contains excerpts or summaries.

The excerpts are taken from the German version of the currently valid standard, DIN EN 13830-2003-11. The draft standard prEN 13830 was published in its German version in June 2013. Besides editing, the document was revised thoroughly from a technical perspective as well, which means that the following passages will need to be checked and may require revision once the standard has been introduced.

Resistance to wind load
“Curtain walls must be sufficiently stable to withstand the positive and negative wind loads applied during a test according to DIN E 12179 and upon which planning for the fitness for purpose is based. They must safely transmit the wind loads underlying the planning to the building structure by way of the fastening elements installed for this purpose. The wind loads underlying the planning are stated in the test according to EN 12179.
During exposure to the wind loads underlying the plan-

DIN EN 13830 / Explanations

ning, the maximum frontal deflection of the individual parts of the curtain wall frame between the support, i.e. anchor points, must not exceed L/200, i.e. 15, during a measurement according to EN 13116, depending on which is the smaller value."

The rated value for the CE mark is expressed in the unit [kN/m²].

We would like to point out that static validation for the specific property must be provided for each curtain wall system, regardless of the initial type testing.
It is also important to point out that the new draft standard intends to introduce an entirely new provision in regard to fitness for purpose, which will affect the dimensioning of the mullion-transom construction significantly.

f ≤ L/200;	if L ≤ 3000 mm
f ≤ 5 mm + L/300;	if 3000 mm < L < 7500 mm
f ≤ L/250;	if L ≥ 7500 mm

This change in deformation limitation means that there may be different limits applicable to an infill (e.g. glass, composite insulation, etc.) and greater utilisation of the profile in terms of loadbearing capacity.

Self-weight
"Curtain walls must carry their own weight and all other connected pieces included in the original planning. They must safely transmit the weight to the building structure by way of the fastening elements installed for this purpose.

Self-weight must be determined according to EN 1991-1-1.

The maximum deflection of any horizontal primary beam due to vertical loads must not exceed L/500, i.e. 3 mm, depending on which is the smaller value."

The rated value for the CE mark is expressed in the unit [kN/m²].

We would like to point out that static validation for the specific property must be provided for each curtain wall system, regardless of the initial type testing.

The 3mm limit is deleted from the draft standard. It is nevertheless necessary to guarantee that any contact between the frame and the infill element is prevented in order to provide sufficient ventilation as necessary. Moreover, the required inset depth of the infill must also be guaranteed.

Impact resistance
"If demanded explicitly, tests must be performed according to EN 12600:2002, Part 5. The findings must be classified according to prEN 14019. The glass products must correspond to EN 12600."

The impact resistance class is determined internally and externally for the CE mark. The head in [mm] of the pendulum is used to define the class (e.g. class I4 for internal, class E4 for external).

A pendulum is caused to impact with critical points of the facade construction (central mullion, central transom, intersection between mullion/transom, etc.) from a certain height for the purpose of this test. Permanent deformation of the facade is permitted. But falling parts, holes or cracks are prohibited.

Air permeability
"Air permeability must be tested according to DIN EN 12153. The findings must be presented according to EN 12152."

The air permeability class is determined using the test pressure in [Pa] for the CE mark (e.g. class A4).

Watertightness
"Watertightness must be tested according to DIN EN 12155. The findings must be presented according to EN 12154."

The watertightness class is determined using the test pressure in [Pa] for the CE mark (e.g. class R7).

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Airborne sound insulation $R_w(C; C_{tr})$
"If demanded explicitly, the sound insulation level must be determined according to EN ISO 140-3. The findings must be presented according to EN ISO 717-1."

The rated value for the CE mark is expressed in the unit [dB].

Validation must be provided for each property.

Heat transmittance U_{cw}
"The method of assessing/calculating the heat transmittance of curtain walls and the suitable test methods are defined in prEN 12631 - 01.2013."

The rated value for the CE mark is expressed in the unit [W/(m²·K)].

The U_{cw} value is dependent on the heat transfer coefficient U_f of the frame (mullion-transom construction of the facade) on the one hand, and on the heat transfer coefficient of the inset elements, for instance glass and its U_g value, on the other. Other factors also contribute, e.g. the edge bonding of the glass, etc., and the geometry (axis dimensions, number of mullions and transoms in the facade construction). The manufacturer/processor must validate the heat transfer coefficient U_{cw} in calculations or measurements. The system provider can also be requested to submit in-house calculations of the U_f values.

Validation must be provided for each property.

Fire resistance
"If demanded explicitly, the proof of fire resistance according to prEN 13501-2 must be classified."

The class of fire resistance for the CE mark is determined according to the function (E = integrity; EI = integrity and insulation), the direction of fire and the duration of fire resistance in [min] (e.g. class EI 60, i ↔ o).

However, there is no harmonised standard currently available, and it is therefore not possible to make a declaration in the CE
mark ("npd" = no performance determined).

The national system of "general building authorisation for fire resistance glazing" will therefore remain in this case, although it is not declared in the CE mark.

Fire spread
"If demanded explicitly, the curtain wall must include suitable devices that inhibit the spread of fire and smoke through openings in the curtain wall construction by means of the installation of structural base plates on the connections in all levels."

Validation must be provided for each property, for instance in the form of an expert assessment.

Durability
"The permanence and performance characteristics of the curtain wall are not tested; instead the testing refers to the level of correspondence between the materials and surfaces with what is considered state-of-the-art, or with European specifications for the materials or surfaces, insofar as they have been published."

The user must maintain and service the individual components of the facade in response to the natural ageing process. The manufacturer/processor must provide the user with suitable instructions for professional implementation (e.g., the facade should be cleaned regularly in order to safeguard its designated service life, etc.). It appears sensible in this respect for the manufacturer and user to conclude a maintenance contract.
Product instructions or relevant leaflets, e.g. published by VFF, must be observed in this respect.

Water vapour permeability
"Vapour barriers according to the relevant European standards must be included in order to control the defined and ascertained hydrothermal conditions in the building."

Validation must be provided for each property. There is no specific description of performance for this feature; hence, no accompanying information on the CE mark is necessary.

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Potential equalisation
"Watertightness must be tested according to DIN EN 12155. The findings must be presented according to EN 12154."

Validation must be provided for each property; it is declared in SI units [Ω].

Seismic safety
"If necessary in the specific case, the seismic safety mist be determined according to the Technical Specifications or other requirements defined for the location of use."

Validation must be provided for each property.

Thermal shock resistance
"A suitable glass, e.g. hardened or pre-tensioned glass according to European standards, must be used insofar as the glass is required to exhibit resilience to temperature fluctuation."

Validation must be provided for each property and refers exclusively to the glass installed in the property.

Building and thermal movement
"The design of the curtain wall must be capable of absorbing thermal movements and movements of the structure in such a way that destruction of facade elements or impairment of the performance characteristics do not occur. The party organising the tender must specify the building movements, including the movement of the building joints, that the curtain wall will have to carry."

Validation must be provided for each property.

Resistance to dynamic horizontal loads
The curtain wall must withstand dynamic horizontal loads at the level of the sillpiece according to EN 1991-1-1."

Validation must be provided for each property, and can be verified by way of static validation produced by calculation. It is important to consider in this respect that the height of the sillpiece will vary under national regulations. The value is expressed in [kN] at height (H in [m]) of the sillpiece.

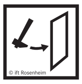
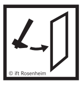
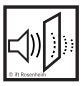
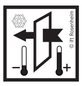
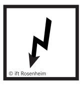
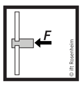
DIN EN 13830 / Explanations

Classification matrix

The following table contains the classification of characteristics for curtain walls according to EN 13830, Part 6:

Note
It is not necessary to determine the performance of a component if this performance is irrelevant to its use. In this respect, the manufacturer/processor merely adds “npd – no performance determined” in the accompanying papers; alternatively, the characteristics can also be omitted. This option does not apply to limit values.

The classification of characteristics for the curtain wall according to the aforementioned specifications must take place for each structure individually, irrespective of whether the system is standard or was produced specifically for the project.

No.	Ift Icon	Designation	Units		Class or rated value
1		**Resistance to wind load**	kN/m²	npd	Rated value
2		**Self-weight**	kN/m²	npd	Rated value
3		**Impact resistance** Inside with head in mm	(mm)	npd	I0: –; I1: 200; I2: 300; I3: 450; I4: 700; I5: 950
4		**Impact resistance** Outside with head in mm	(mm)	npd	E0: –; E1: 200; E2: 300; E3: 450; E4: 700; E5: 950
5		**Air permeability** with test pressure Pa	(Pa)	npd	A1: 150; A2: 300; A3: 450; A4: 600; AE: > 600
6		**Watertightness** with test pressure Pa	(Pa)	npd	R4: 150; R5: 300; R6: 450; R7: 600; RE: > 600
7		**Airborne sound insulation** Rw (C; Ctr)	dB	npd	Rated value
8		**Heat transition U_{cw}**	W / m²k	npd	Rated value
9		**Fire resistance** Integrity (E)	(min)	npd	E: 15; E: 30; E: 60; E: 90
10		**Integrity and insulation (EI)**	(min)	npd	EI: 15; EI: 30; EI: 60; EI: 90
11		**Potential equalisation**	Ω	npd	Rated value
12		**Resistance to lateral wind load**	kN at m height of the parapet bar	npd	Rated value

Introduction

Miscellaneous

The facade is an interface between inside and outside. It is frequently compared with the human skin that possesses the ability to respond spontaneously to external influences. A facade works in a similar way: it guarantees a comfortable environment for users inside the building, while positively influencing the building's energy management. The climactic conditions are crucial in this respect. The selection and design of a facade is therefore strongly dependent on its geographic location.

A planned facade must satisfy minimum heat insulation requirements according to the generally acknowledged rules of engineering if it is to be erected in line with the Energy Saving Ordinance (EnEV) and DIN 4108 Thermal insulation and energy economy in buildings. This is because heat insulation affects the building and its users:

- the health of its users, e.g. by providing a hygienic atmosphere
- protection of the structural integrity against the climate-related effects of humidity and its follow-on damage
- energy consumption for heating and cooling
- and therefore the costs and climate protection

Particularly strict requirements are defined for heat insulation installed on facades in today's age of climate change. As a rule: A building will consume less energy and will therefore cause less environmental pollution due to CO_2 emissions if it possesses better structural heat insulation.

The entire facade and all of its components must be optimised in order to achieve ideal heat insulation, with low heat losses in winter and a salubrious room climate in the summer. This involves, for example, the use of suitable materials to reduce heat transmittance, the mounting of heat-insulated frame constructions or the installation of insulating glass. Important criteria in the planning phase therefore include the overall energy transmittance of glazing, depending on the size and orientation of the windows, the heat storage capacity of individual components and sun protection measures.

Stabalux timber facades offer outstanding U_f values. The certificate 'Mullion and transom facade components to passive house standard' was issued for the Stabalux H system widths 50 and 60 mm.

Standards

Index of applicable standards and regulations

EnEV	Ordinance for energy-saving thermal insulation and energy-saving systems in buildings (Energy Saving Ordinance EnEV) dated 01.10.2009.
DIN 4108-2:	2001-07, Thermal protection and energy economy in buildings - Part 2: Minimum requirements to thermal insulation
DIN 4108-3:	2001-07, Thermal protection and energy economy in buildings - Part 3: Protection against moisture subject to climate conditions; Requirements and directions for design and construction
DIN 4108	Annex 2:2006-03, Thermal insulation and energy economy in buildings - Thermal bridges - Examples for planning and performance
DIN V 4108-4:	2007,06, Thermal protection and energy economy in buildings - Protection against heat and moisture, technical parameters
DIN EN ISO 10077-1:	2010-05, Thermal performance of windows, doors and shutters - Calculation of thermal transmittance - Part 1: Miscellaneous
DIN EN ISO 10077-2:	2012-06, Thermal performance of windows, doors and shutters - Calculation of thermal transmittance - Part 2: Numerical methods for frames
DIN EN ISO	2007-07, Thermal performance of curtain walls, determination of the 12631 - 01.2013: thermal transmittance coefficient Ucw
DIN EN 673:	2011-04, Glass in building - Determination of thermal transmittance U_g
DIN EN ISO 10211-1:	2008-04, Thermal bridges in building construction - Heat flows and surface temperatures - Part 1: Detailed calculations (ISO 10211_2007); German version of EN ISO 10211:2007
DIN EN ISO 6946:	2008-04, Thermal resistance and thermal transmittance - Calculation method
DIN 18516-1:	2010-06, Cladding for external walls, ventilated at rear - Part 1: Requirements, principles of testing

Basis of the calculation

Definitions:

U - The heat transfer coefficient

(also known as the thermal insulation value, U value, previously the k value) is a unit describing the transmittance of thermal energy through a single or multi-layer material when different temperatures prevail on either side. It states the power (so the volume of energy per time unit) that passes through a surface of 1 m² if the stationary air temperature on both sides differs by 1 K. Its SI unit is therefore:

W/(m²·K) (watts per square metre and kelvin).

The heat transfer coefficient is a specific parameter relating to a component. It is determined largely by the thermal conductivity and thickness of the material in use, but also by the heat radiation and convection on the surfaces.
Note: Measurement of the thermal transfer coefficient requires stationary temperatures to prevent any falsification of the measurement findings by the heat storage capacity of the material.

- The higher the heat transfer coefficient, the worse the heat insulation properties of the material.

λ -

Thermal conductivity of a material

U_f value

the U_f value is the heat transfer coefficient of the frame. The f stands for frame. To calculate the U_f value, the window pane is replaced with a panel exhibiting:
λ=0.035 W/mK replaced.

U_g value

the U_g value is the heat transfer coefficient of the glazing.

U_p value

the U_p value is the heat transfer coefficient of the panel.

U_w value

the U_w value is the heat transfer coefficient of the window, comprising the $U_f$value of the frame and the U_g value of the glazing.

U_{cw} value

the U_{cw} value is the heat transfer coefficient of a curtain wall.

$\Psi_{f,g}$ value

Length-based heat transfer coefficient of the edge bonding (combination of frame and glazing).

Rs -

The heat transfer resistance Rs (previously: 1/α) describes the resistance with which the border layer opposes the medium (usually air) surrounding the component to prevent the flow of heat.

Basis of the calculation

Definitions:

Rsi

Heat transfer resistance inside

Rse

Heat transfer resistance outside

Tmin

Minimum inside surface temperature to determine the absence of condensation on window connections. The Tmin of a component must be greater than the component's dew point.

f_{Rsi}

Used to determine the freedom of fungal growth on window connections.
The temperature factor f_{Rsi} is the difference between the temperature of the inside surface θsi of a component and the outside air temperature θe, relative to the temperature difference between the inside θi and outside air θe.

A variety of requirements must be adhered to in order to introduce design measures to reduce the risk of fungal growth.

For instance, for all constructive, shape-related and material-related thermal bridges that deviate from DIN 4108-2, the temperature factor f Rsi at the least favourable point must satisfy the minimum requirement:
$f_{Rsi} \geq 0.70$.

Basis of the calculation

Calculated according to DIN EN ISO 12631 - 01.2013

- Simplified assessment procedure
- Assessment of the individual components

Symbol	Size	Unit
A	Surface	m^2
T	Thermodynamic temperature	K
U	Heat transfer coefficient	$W/(m^2 \cdot K)$
l	Length	m
d	Depth	m
Φ	Heat flow	W
ψ	Length-based heat transfer coefficient	$W/(m \cdot K)$
Δ	Difference	
Σ	Sum	
ε	Emission level	
λ	Thermal conductivity	$W/(m \cdot K)$
Indices		
g	Glazing	
p	Panel	
f	Frame	
m	Mullion	
t	Transom	
w	Window	
cw	Curtain wall	
Caption		
U_g, U_p	Heat transfer coefficient of filling	$W/(m^2 \cdot K)$
U_f, U_t, U_m	Heat transfer coefficient of frame, mullion, transom	$W/(m^2 \cdot K)$
A_g, A_p	Surface proportion of filling	m^2
A_f, A_t, A_m	Surface proportions of frame, mullion, transom	
$\Psi_{f,g}$, $\Psi_{m,g}$, $\Psi_{t,g}$, Ψ_p	Length-based heat transfer coefficient based on the combined thermal effects between the glazing, panels and frames - mullion/transom	$W/(m \cdot K)$
$\Psi_{m,f}$, $\Psi_{t,f}$	Length-based heat transfer coefficient based on the combined thermal effects between the frames - mullion/transom	$W/(m \cdot K)$

Basis of the calculation

Assessment of the individual components

The method to assess the individual components involves dividing a representative element into surfaces with different thermal properties, e.g. glazing, opaque panels and frames. (...) This method can be applied to curtain facades, e.g. element facades, mullion-transom facades and dry glazing. The method with assessment of the individual components is not suitable for SG glazing with silicone joints, rear-ventilated facades and SG glazing.

Formula

$$U_{cw} = \frac{\Sigma A_g U_g + \Sigma A_p U_p + \Sigma A_m U_m + \Sigma A_t U_t + \Sigma l_{fg} \psi_{fg} + \Sigma l_{mg} \psi_{mg} + \Sigma l_{tg} \psi_{tg} + \Sigma l_p \psi_p + \Sigma l_{mf} \psi_{mf} + \Sigma l_{tf} \psi_{tf}}{A_{cw}}$$

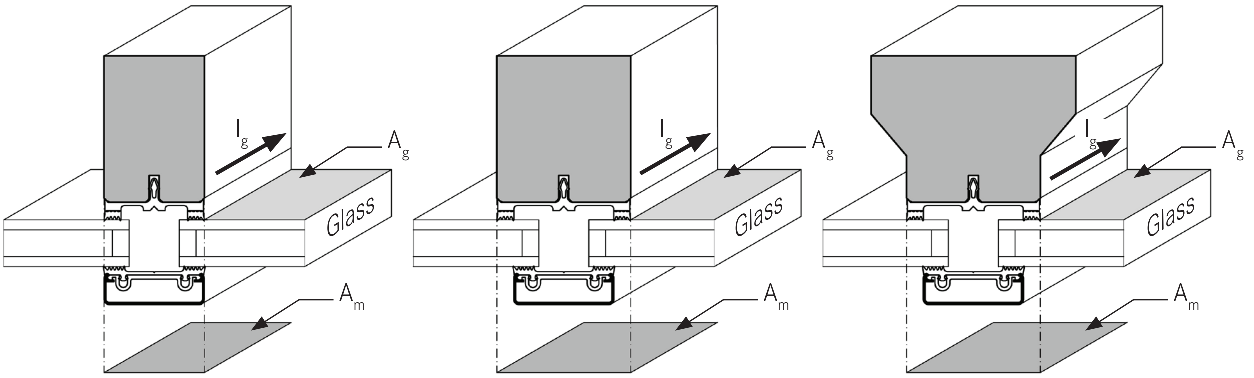
Calculation of the facade surface:

$$A_{cw} = A_g + A_p + A_f + A_m + A_t$$

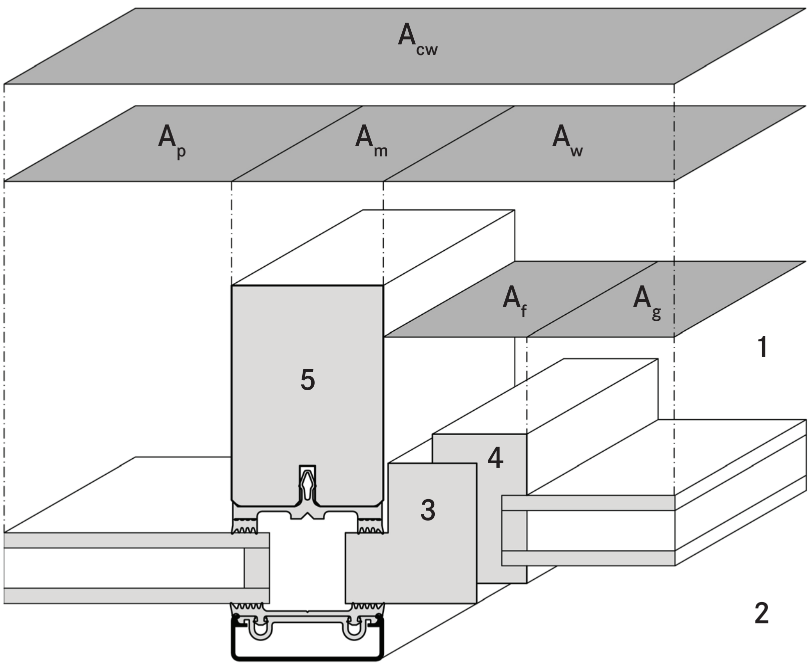
Basis of the calculation

Glazed surfaces

The glazed surface A_g, i.e. the surface of the opaque panel A_p on a component, is the smaller of the surfaces visible on both sides. The areas in which the sealant overlaps the glazed surfaces is not considered.



Surface proportion of the frame, mullion and transom



Caption

1 Room-side
2 Outer side
3 Fixed frame
4 Movable frame
5 Mullion/transom

A_{cw} Surface of the curtain wall
A_p Surface of the panel
A_m Surface of the mullion
A_f Surface of the window frame
A_g Surface of the window glazing
A_w Surface of the complete window

TI-H_9.4_001.dwg

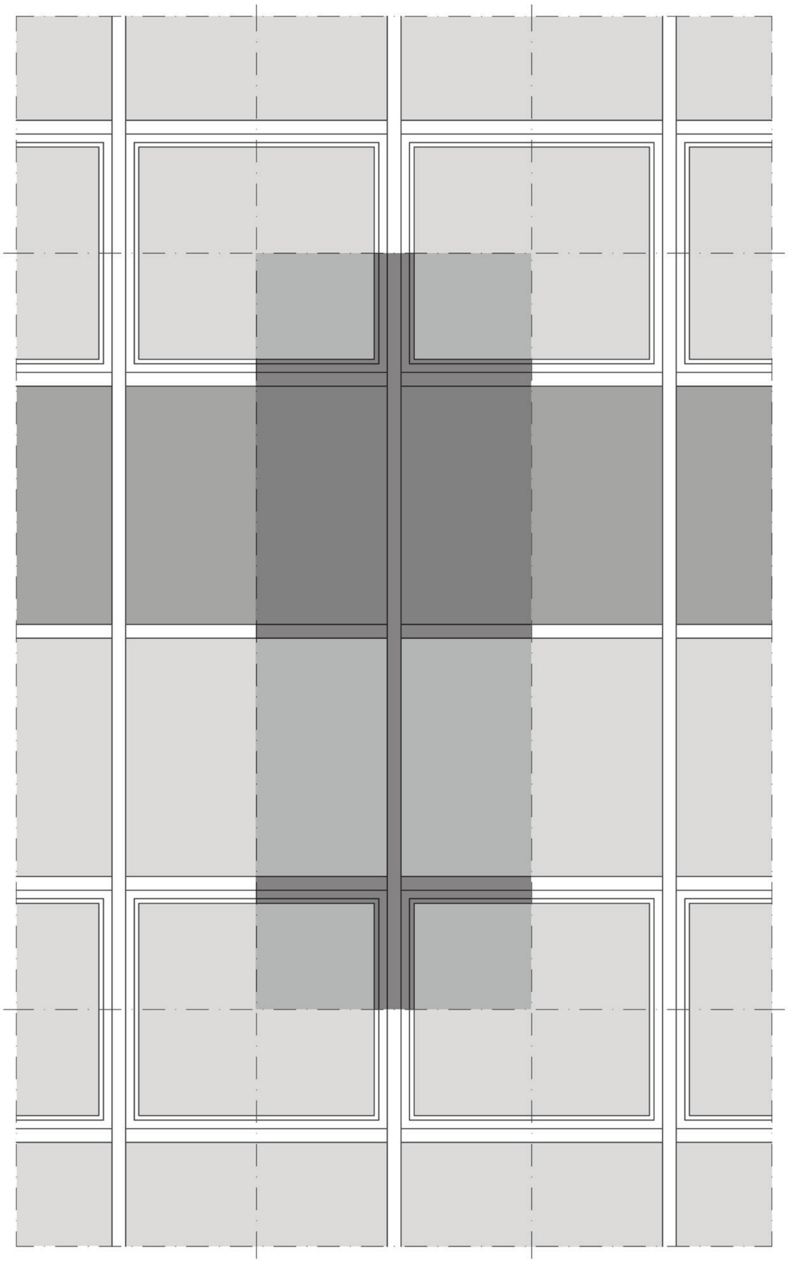
Basis of the calculation

Planes in the geometric model (U)

A representative facade element is selected in order to calculate the heat transfer coefficient **U** for each area. This section must include all of the elements with varying thermal properties that are present in the facade. They include glazing, panels, parapets and their connections, as well as mullions, transoms and silicone joints.

The planes must have adiabatic borders. They may be:

- Symmetrical planes or
- planes in which the thermal flow passes at right angles to the level of the curtain facade, i.e. where there are no edge influences (e.g. at an interval of 190 mm to the edge of a double-glazed window).



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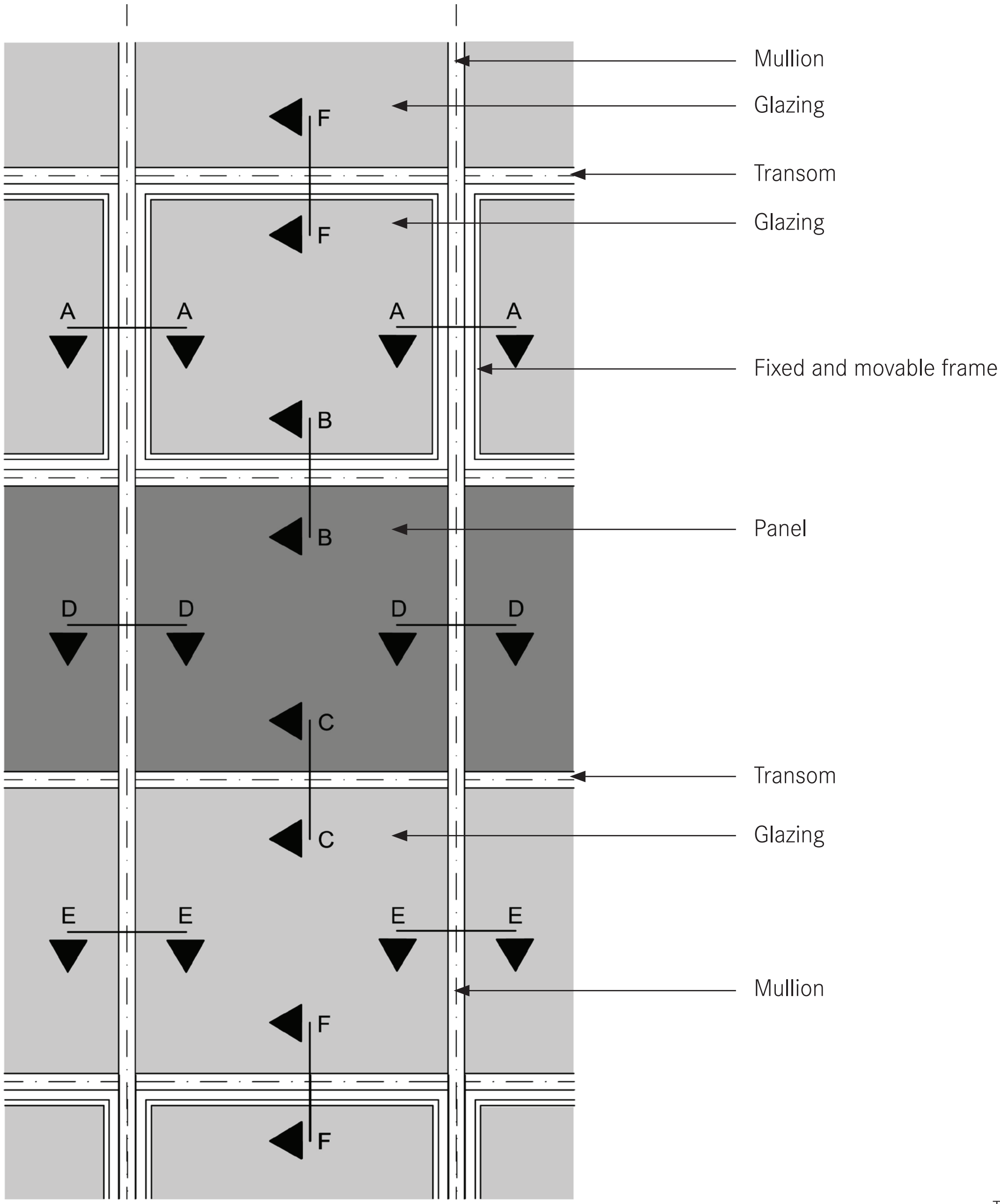
Basis of the calculation

Limits of a representative reference part in a facade (U_{cw})

The representative reference element is divided into surfaces with different thermal properties in order to calculate the U_{cw}.



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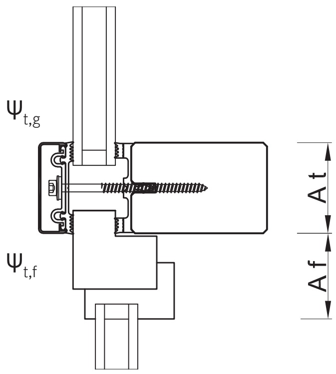
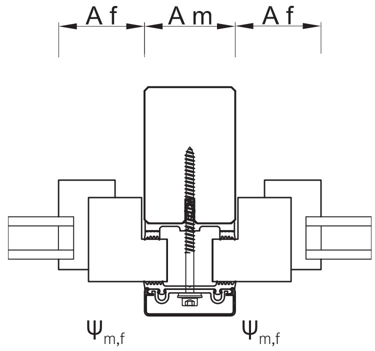
Basis of the calculation

Cuts

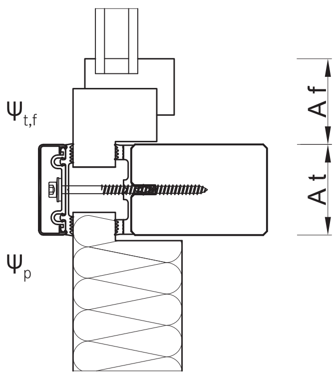
F - F



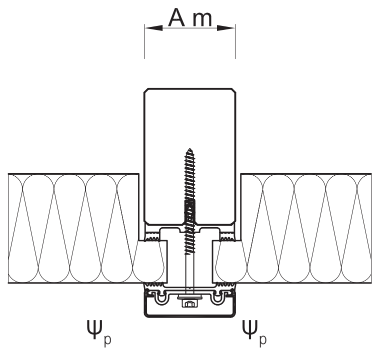
A - A



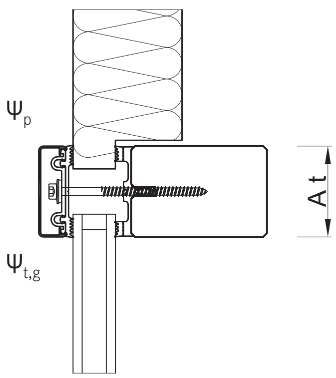
B - B



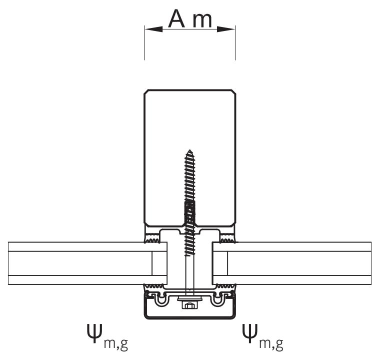
D - D



C - C



E - E



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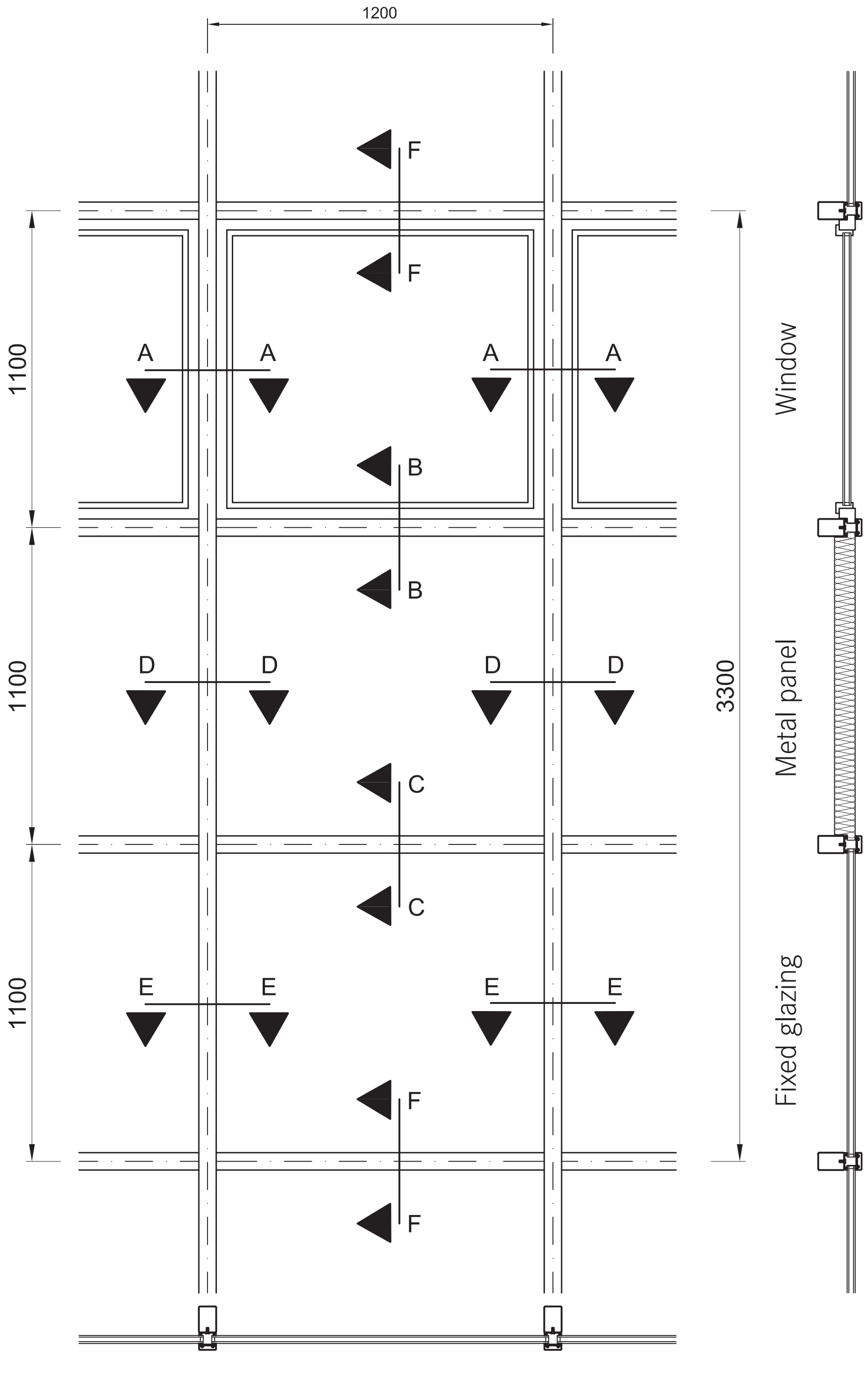
Basis of the calculation

Calculation example

Facade section



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Basis of the calculation

Calculation example

Calculation of surfaces and lengths

Mullion, transom and frame:

Width of mullion (m)	50 mm
Width of transom (t)	50 mm
Width of window frame (f)	80 mm

$A_m = 2 \cdot 3.30 \cdot 0.025 = 0.1650\ m^2$

$A_t = 3 \cdot (1.2 - 2 \cdot 0.025) \cdot 0.025 = 0.1725\ m^2$

$A_f = 2 \cdot 0.08 \cdot (1.20 + 1.10 - 4 \cdot 0.025 - 2 \cdot 0.08) = 0.1650\ m^2$

Panel surface element

$b = 1.20 - 2 \cdot 0.025 = 1.15\ m$

$h = 1.10 - 2 \cdot 0.025 = 1.05\ m$

$A_p = 1.15 \cdot 1.05 = 1.2075\ m^2$

$l_p = 2 \cdot 1.15 + 2 \cdot 1.05 = 4.40\ m$

Glass surface element - movable part:

$b = 1.20 - 2 \cdot (0.025 + 0.08) = 0.99\ m$

$h = 1.10 - 2 \cdot (0.025 + 0.08) = 0.89\ m$

$A_{g1} = 0.89 \cdot 0.99 = 0.8811\ m^2$

$l_{g1} = 2 \cdot (0.99 + 0.89) = 3.76\ m$

Glass surface element - fixed part:

$b = 1.20 - 2 \cdot 0.025 = 1.15\ m$

$h = 1.10 - 2 \cdot 0.025 = 1.05\ m$

$A_p = 1.15 \cdot 1.05 = 1.2075\ m^2$

$l_p = 2 \cdot 1.15 + 2 \cdot 1.05 = 4.40\ m$

Calculation of the U_i values: example

U values	Determined based on the	Calculation value U_i [W/(m²·K)]
U_g (glazing)	DIN EN 673[1] / 674[2] / 675[2]	1.20
U_p (Panel)	DIN EN ISO 6946[1]	0.46
U_m (mullion)	DIN EN 12412-2[2] / DIN EN ISO 10077-2[1]	2.20
U_t (transom)	DIN EN 12412-2[2] / DIN EN ISO 10077-2[1]	1.90
U_f (frame)	DIN EN 12412-2[2] / DIN EN ISO 10077-2[1]	2.40
$\Psi_{f,g}$	DIN EN ISO 10077-2[1] / DIN EN ISO 12631 - 01.2013 Annex B	0.11
Ψ_p		0.18
$\Psi_{m,g}$ / $\Psi_{t,g}$		0.17
$\Psi_{m,f}$ / $\Psi_{t,f}$		0.07 - Type D2

[1] Calculation, [2] Measurement

Basis of the calculation

Calculation example

Results

	A [m²]	U_i [W/(m²·K)]	l [m]	ψ [W/(m·K)]	A · U [W/K]	ψ · l [W/K]
Mullion Transom Frame	$A_m = 0.1650$ $A_t = 0.1725$ $A_f = 0.3264$	$U_m = 2.20$ $U_t = 1.90$ $U_f = 2.40$			0.363 0.328 0.783	
Mullion-frame Transom-frame			$l_{m,f} = 2.20$ $l_{t,f} = 2.20$	$\psi_{m,f} = 0.07$ $\psi_{t,f} = 0.07$		0.154 0.154
Glazing: - movable - fixed	$A_{g,1} = 0.8811$ $A_{g,2} = 1.2075$	$U_{g,1} = 1.20$ $U_{g,2} = 1.20$	$l_{f,g} = 3.76$ $l_{m,g} = 4.40$	$\psi_{g,1} = 0.11$ $\psi_{g,2} = 0.17$	1.057 1.449	0.414 0.784
Panel	$A_p = 1.2705$	$U_p = 0.46$	$l_p = 4.40$	$\psi_p = 0.18$	0.556	0.792
Sum	**$A_{cw} = 3.96$**				**4.536**	**2.262**

$$U_{cw} = \frac{\Sigma A \cdot U + \Sigma \psi \cdot l}{A_{cw}} = \frac{4.536 + 2.626}{3.96} = 1.72\ \mathrm{W/(m^2{\cdot}K)}$$

Basis of the calculation

Calculation of the ψ - values according to DIN EN ISO 12631 - 01.2013 - Annex B - Glazing

Type of mullion/transom	Type of glazing: Double or triple glazing (6mm glass), • uncoated glass • with air or gas gap	Type of glazing: Double or triple glazing (6mm glass), • Glass with low emission level • Single coating with double glazing • Single coating with double glazing • with air or gas gap
	ψ [W/(m·K)]	ψ [W/(m·K)]
Table B.1	**Aluminium and steel spacers in mullion or transom profiles $\psi_{m,g}$, $\psi_{t,g}$**	
Timber-aluminium	0.08	0.08
Metal frame with thermal separation	d_i ≤ 100 mm: 0.13 d_i ≤ 200 mm: 0.15	d_i ≤ 100 mm: 0.17 d_i ≤ 200 mm: 0.19
Table B.2	**Spacer with improved thermal properties in the mullion or transom profiles $\psi_{m,g}$, $\psi_{t,g}$**	
Timber-aluminium	0.06	0.08
Metal frame with thermal separation	d_i ≤ 100 mm: 0.09 d_i ≤ 200 mm: 0.10	d_i ≤ 100 mm: 0.11 d_i ≤ 200 mm: 0.12
Table B.3 Table based on DIN EN 10077-1	**Aluminium and steel spacers in window frames $\psi_{f,g}$ (also insert elements in facades)**	
Timber-aluminium	0.06	0.08
Metal frame with thermal separation	0.08	0.11
Metal frame without thermal separation	0.02	0.05
Table B.4 Table based on DIN EN 10077-1	**Spacer with improved thermal properties in the window frame $\psi_{f,g}$ (also insert elements in facades)**	
Timber-aluminium	0.05	0.06
Metal frame with thermal separation	0.06	0.08
Metal frame without thermal separation	0.01	0.04

d_i room-side depth of the mullion/transom

Basis of the calculation

Data sheet “Warm edge” (spacer with improved thermal properties) Psi values for windows*

Product name	Metal with thermal separation		Plastic		Timber		Timber/metal	
	V¹ Ug =1.1	V² Ug =0.7	V¹ Ug =1.1	V² Ug =0.7	V¹ Ug =1.1	V² Ug =0.7	V¹ Ug =1.1	V² Ug =0.7
Chromatech Plus (stainless steel)	0.067	0.063	0.051	0.048	0.052	0.052	0.058	0.057
Chromatech (stainless steel)	0.069	0.065	0.051	0.048	0.053	0.053	0.059	0.059
GTS (stainless steel)	0.069	0.061	0.049	0.046	0.051	0.051	0.056	0.056
Chromatech Ultra (stainless steel/polycar-bonate)	0.051	0.045	0.041	0.038	0.041	0.040	0.045	0.043
WEB premium (stainless steel)	0.068	0.063	0.051	0.048	0.053	0.052	0.058	0.058
WEB classic (stainless steel)	0.071	0.067	0.052	0.049	0.054	0.055	0.060	0.061
TPS (polyisobutylene)	0.047	0.042	0.039	0.037	0.038	0.037	0.042	0.040
Thermix TX.N (stainless steel/plastic)	0.051	0.045	0.041	0.038	0.041	0.039	0.044	0.042
TGI Spacer (stainless steel/plastic)	0.056	0.051	0.044	0.041	0.044	0.043	0.049	0.047
Swisspacer V (stainless steel/plastic)	0.039	0.034	0.034	0.032	0.032	0.031	0.035	0.033
Swisspacer (stainless steel/plastic)	0.060	0.056	0.045	0.042	0.047	0.046	0.052	0.051
Super Spacer TriSeal (mylar foil/silicone foam)	0.041	0.036	0.035	0.033	0.034	0.032	0.037	0.035
Nirotec 015 (stainless steel)	0.066	0.061	0.050	0.047	0.051	0.051	0.057	0.056
Nirotec 017 (stainless steel)	0.068	0.063	0.051	0.048	0.053	0.053	0.058	0.058

V¹ - Double pane insulating glass Ug 1.1 W/(m²K)
V² - Triple pane insulating glass Ug 0.7 W/(m²K)

* Values calculated by University of Applied Sciences Rosenheim and **ift Rosenheim**

Basis of the calculation

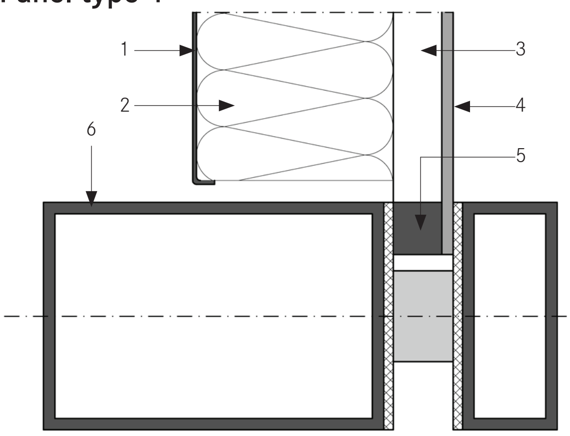
Calculation of the ψ - values according to DIN EN ISO 12631 - 1.2013 - Annex B - Panels

Table B.5 — Values of the length-based heat transfer coefficient for the panel spacers ψ_p

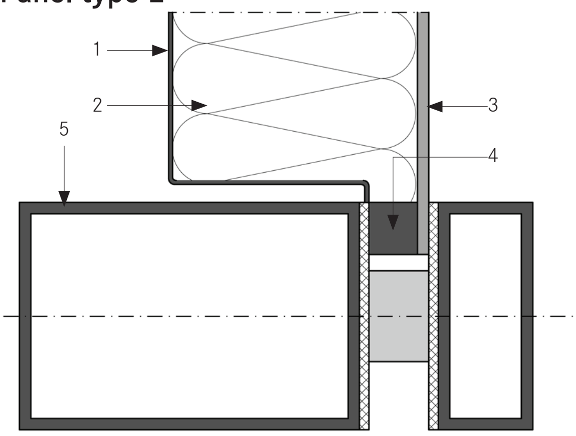
Type of filling Inside, i.e. outside panelling	Thermal conductivity of the spacer λ [W/(m·K)]	length-based heat transfer coefficient* ψ [W/(m·K)]
Panel type 1 with panelling:	-	0.13
Aluminium/aluminium Aluminium/glass Steel/glass		
Panel type 2 with panelling:		
Aluminium/aluminium	0.2 0.4	0.20 0.29
Aluminium/glass	0.2 0.4	0.18 0.20
Steel/glass	0.2 0.4	0.14 0.18

*It is permitted to use this value if no data is available from measurements or detailed calculations.

Panel type 1



Panel type 2



Caption

1 Aluminium 2.5 mm/Steel 2.0 mm
2 Insulation λ= 0.025 to 0.04 W/(m·K)
3 Air-filled gap 0 to 20 mm
4 Aluminium 2.5 mm/Glass 6 mm
5 Spacer λ= 0.2 to 0.4 W/(m·K)
6 Aluminium

Caption

1 Aluminium 2.5 mm/Steel 2.0 mm
2 Insulation λ= 0.025 to 0.04 W/(m·K)
3 Aluminium 2.5 mm/Glass 6 mm
4 Spacer λ= 0.2 to 0.4 W/(m·K)
5 Aluminium

TI-H_9.4_001.dwg

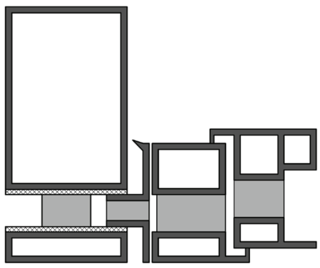
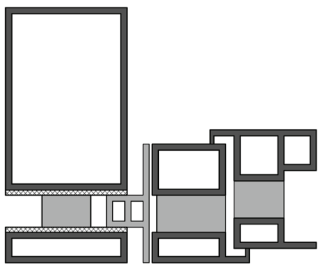
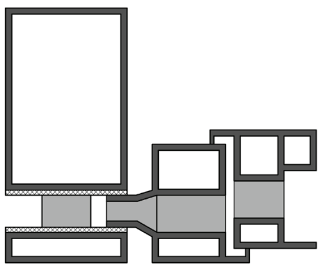
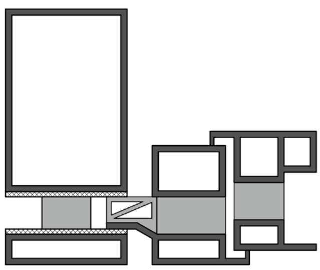
STABALUX

Basis of the calculation

9.4
3

Calculation of the ψ - values according to DIN EN ISO 12631 - 1.2013 - Annex B - Insert elements

Table B.6 — Values of the length-based heat transfer coefficient for the connecting area of mullions/transoms and alu/steel frames $\psi_{m/t,f}$

Types of connection areas	Diagram	Description	Length-based heat transfer coefficient* $\psi_{m,f}$ or $\psi_{t,f}$ [W/(m·K)]
A		Installation of the frame in the mullion with an additional aluminium profile with thermal separation zone	0.11
B		Installation of the frame in the mullion with an additional profile with low thermal conductivity (e.g. polyamide 6.6 with a glass fibre content of 25%)	0.05
C1		Installation of the frame in the mullion with extension of the thermal separation of the frame	0.07
C2		Installation of the frame in the mullion with extension of the thermal separation of the frame (e.g. polyamide 6.6 with a glass fibre content of 25%)	0.07

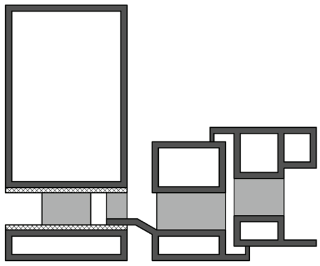
Values for ψ not included in the table can be determined by numerical calculation according to EN ISO 10077-2.

TI-H_9.4_001.dwg

Basis of the calculation

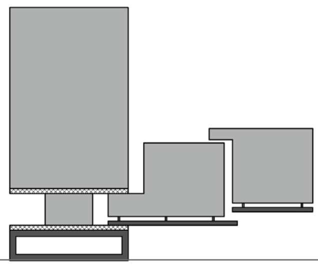
Calculation of the ψ - values according to DIN EN ISO 12631 - 1.2013 - Annex B - Insert elements

Table B.6 Values of the length-based heat transfer coefficient for the connecting area of mullions/transoms and alu/steel frames $\psi_{m/t,f}$

Types of connection areas	Diagram	Description	Length-based heat transfer coefficient* $\psi_{m,f}$ or $\psi_{t,f}$ [W/(m·K)]
D		Installation of the frame in the mullion with extension of the external aluminium profile. Filling material for the attachment with low thermal conductivity λ = 0.3 W/(m·K)	0.07

*It is permitted to use this value if no data is available from measurements or detailed calculations. These values only apply if the mullion/transom and the frame possess thermal zones and no other part of the frame without a thermal separation zone interrupts a thermal separation zone.

Table B.7 Values of the length-based heat transfer coefficient for the connecting area of mullions/transoms and timber/aluminium frames $\psi_{m/t,f}$

Types of connection areas	Diagram	Description	Length-based heat transfer coefficient* $\psi_{m,f}$ or $\psi_{t,f}$ [W/(m·K)]
A		U_m > 2.0 W/(m²·K)	0.02
B		$U_m \leq$ 2.0 W/(m²·K)	0.04

TI-H_9.4_001.dwg

Basis of the calculation

Heat transfer coefficient of glass (U_g) according to DIN EN 10077-1 - Annex C

Table C.2 Heat transfer coefficient of double and triple-pane insulating glazing with various gas fillings for glazing mounted vertically U_g

Glazing				Heat transition coefficient for various types of gas gaps* U_g [W/(m²·K)]		
Type	Glass	Standard emission level	Dimensions mm	Air	Argon	Krypton
Double pane insulating glazing	uncoated glass (Normal glass)	0.89	4-6-4	3.3	3.0	2.8
			4-8-4	3.1	2.9	2.7
			4-12-4	2.8	2.7	2.6
			4-16-4	2.7	2.6	2.6
			4-20-4	2.7	2.6	2.6
	One pane of coated glass	≤ 0.20	4-6-4	2.7	2.3	1.9
			4-8-4	2.4	2.1	1.7
			4-12-4	2.0	1.8	1.6
			4-16-4	1.8	1.6	1.6
			4-20-4	1.8	1.7	1.6
	One pane of coated glass	≤ 0.15	4-6-4	2.6	2.3	1.8
			4-8-4	2.3	2.0	1.6
			4-12-4	1.9	1.6	1.5
			4-16-4	1.7	1.5	1.5
			4-20-4	1.7	1.5	1.5
	One pane of coated glass	≤ 0.10	4-6-4	2.6	2.2	1.7
			4-8-4	2.2	1.9	1.4
			4-12-4	1.8	1.5	1.3
			4-16-4	1.6	1.4	1.3
			4-20-4	1.6	1.4	1.4
	One pane of coated glass	≤ 0.05	4-6-4	2.5	2.1	1.5
			4-8-4	2.1	1.7	1.3
			4-12-4	1.7	1.3	1.1
			4-16-4	1.4	1.2	1.2
			4-20-4	1.5	1.2	1.2
Triple pane insulating glazing	uncoated glass (Normal glass)	0.89	4-6-4-6-4	2.3	2.1	1.8
			4-8-4-8-4	2.1	1.9	1.7
			4-12-4-12-4	1.9	1.8	1.6
	2 panes coated	≤ 0.20	4-6-4-6-4	1.8	1.5	1.1
			4-8-4-8-4	1.5	1.3	1.0
			4-12-4-12-4	1.2	1.0	0.8
	2 panes coated	≤ 0.15	4-6-4-6-4	1.7	1.4	1.1
			4-8-4-8-4	1.5	1.2	0.9
			4-12-4-12-4	1.2	1.0	0.7
	2 panes coated	≤ 0.10	4-6-4-6-4	1.7	1.3	1.0
			4-8-4-8-4	1.4	1.1	0.8
			4-12-4-12-4	1.1	0.9	0.6
	2 panes coated	≤ 0.05	4-6-4-6-4	1.6	1.2	0.9
			4-8-4-8-4	1.3	1.0	0.7
			4-12-4-12-4	1.0	0.8	0.5

* Gas concentration 90%

Basis of the calculation

9.4
3

Summary

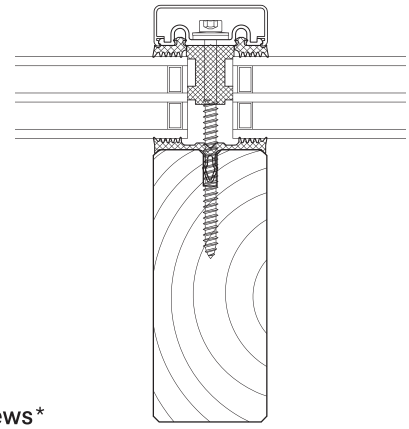
The following information is needed to calculate the U_{cw}:

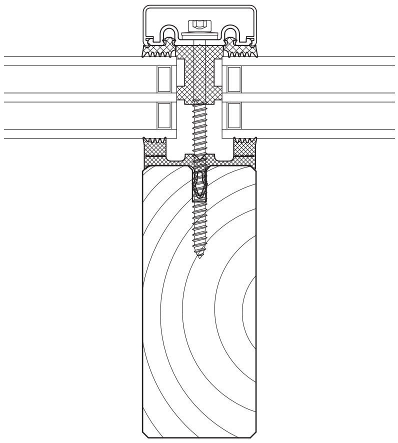
U values	Determined based on the	source
U_g (glazing)	DIN EN 673[1] / 674[2] / 675[2]	Manufacturer's specifications
U_p (panel)	DIN EN ISO 6946[1]	Manufacturer's specifications
U_m (mullion)	DIN EN 12412-2[2] / DIN EN ISO 10077-2[1]	Stabalux documents / or individual calculation*
U_t (transom)	DIN EN 12412-2[2] / DIN EN ISO 10077-2[1]	Stabalux documents / or individual calculation*
U_f (frame/window)	DIN EN 12412-2[2] / DIN EN ISO 10077-2[1]	Manufacturer's specifications
$\Psi_{f,g}$ Ψ_p $\Psi_{m,g}$ / $\Psi_{t,g}$ $\Psi_{m,f}$ / $\Psi_{t,f}$	DIN EN ISO 10077-2[1] / DIN EN ISO 12631 - 01.2013 Annex B	Calculation according to DIN EN 10077-2 if the spacer for the glazing is known, otherwise according to DIN EN ISO 12631 - 01.2013 Annex B or itf table “Warm Edge” Calculation according to DIN EN 10077-2 if the structure is known, otherwise according to DIN EN ISO 12631 - 1.2013 Annex B
Facade geometry or a representative facade section with all dimensions and fillings as in the glass/panel/installation element		Planner's specifications

[1] Calculation, [2] Measurement
* Stabalux Customer Service

U_f values

Determination of the U_f values according to DIN EN 10077-2





Stabalux H

50120
Glass inset 15

Values without effect of screws*

System	5 mm seal				12 mm seal			
	U_f (W/m²K) with isolator		U_f (W/m²K) without isolator		U_f (W/m²K) with isolator		U_f (W/m²K) without isolator	
Outer seal	GD 1934		GD 5024	GD 1934	GD 1934		GD 5024	GD 1934
H-50120-**24**-15	(Z0606)	0.925	1.468	1,241	(Z0606)	0.933	1.574	1,343
H-50120-**26**-15	(Z0606)	0.900	1.454	1,224	(Z0606)	0.911	1.555	1,322
H-50120-**28**-15	(Z0606)	0.868	1.431	1,197	(Z0606)	0.882	1.528	1,293
H-50120-**30**-15	(Z0606)	0.843	1.412	1,174	(Z0606)	0.862	1.505	1,268
H-50120-**32**-15	(Z0606)	0.828	1.402	1,160	(Z0606)	0.850	1.491	1,251
H-50120-**34**-15	(Z0606)	0.807	1.385	1,142	(Z0605)	0.732	1.471	1,231
H-50120-**36**-15	(Z0606)	0.797	1.374	1,128	(Z0605)	0.711	1.456	1,214
H-50120-**38**-15	(Z0605)	0.688	1.361	1,113	(Z0605)	0.689	1.440	1,198
H-50120-**40**-15	(Z0605)	0.663	1.345	1,095	(Z0605)	0.666	1.421	1,177
H-50120-**44**-15	(Z0605)	0.629	1.324	1,070	(Z0605)	0.635	1.393	1,148
H-50120-**48**-15	(Z0605)	0.605	1.306	1,050	(Z0605)	0.615	1.371	1,124
H-50120-**52**-15	(Z0605)	0.587	1.292	1,033	(Z0605)	0.601	1.351	1,104
H-50120-**56**-15	(Z0605)	0.574	1.277	1,015	(Z0605)	0.588	1.332	1,083

Passive house-suitable   Passive house-suitable

* **Effects of screws per piece 0.00322 W/K, for System 50 mm and with screw spacing of 250 mm = + 0.26** W/(m²·K)
Screw effects according to ebök (12.2008)

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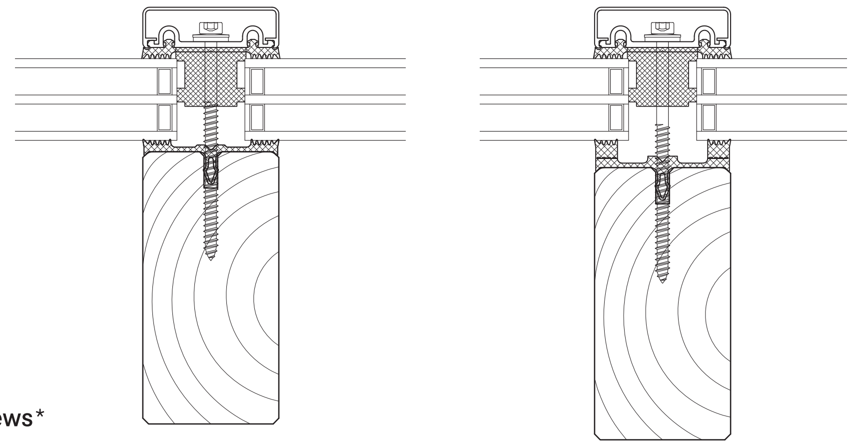
STABALUX

U_f values

9.4
4

Determination of the U_f values according to DIN EN 10077-2



Stabalux H

60120
Glass inset 15

Values without effect of screws*

System	5 mm seal				12 mm seal			
	U_f (W/m²K) with isolator		U_f (W/m²K) without isolator		U_f (W/m²K) with isolator		U_f (W/m²K) without isolator	
Outer seal	GD 1934		GD 6024	GD 1934	GD 1934		GD 6024	GD 1934
H-60120-**24**-15	(Z0608)	0.903	1.561	1,252	(Z0608)	0.916	1.697	1,381
H-60120-**26**-15	(Z0608)	0.881	1.551	1,239	(Z0608)	0.897	1.684	1,365
H-60120-**28**-15	(Z0608)	0.855	1.535	1,218	(Z0608)	0.874	1.664	1,342
H-60120-**30**-15	(Z0608)	0.833	1.520	1,200	(Z0608)	0.856	1.645	1,321
H-60120-**32**-15	(Z0608)	0.820	1.512	1,189	(Z0608)	0.848	1.635	1,309
H-60120-**34**-15	(Z0608)	0.805	1.501	1,175	(Z0607)	0.713	1.620	1,292
H-60120-**36**-15	(Z0608)	0.797	1.492	1,164	(Z0607)	0.693	1.608	1,279
H-60120-**38**-15	(Z0607)	0.669	1.484	1,153	(Z0607)	0.675	1.596	1,264
H-60120-**40**-15	(Z0607)	0.650	1.471	1,138	(Z0607)	0.655	1.581	1,248
H-60120-**44**-15	(Z0607)	0.621	1.455	1,118	(Z0607)	0.630	1.559	1,225
H-60120-**48**-15	(Z0607)	0.600	1.441	1,101	(Z0607)	0.613	1.541	1,205
H-60120-**52**-15	(Z0607)	0.585	1.431	1,088	(Z0607)	0.602	1.526	1,188
H-60120-**56**-15	(Z0607)	0.577	1.420	1,075	(Z0607)	0.593	1.512	1,173
	Passive house-suitable				Passive house-suitable			

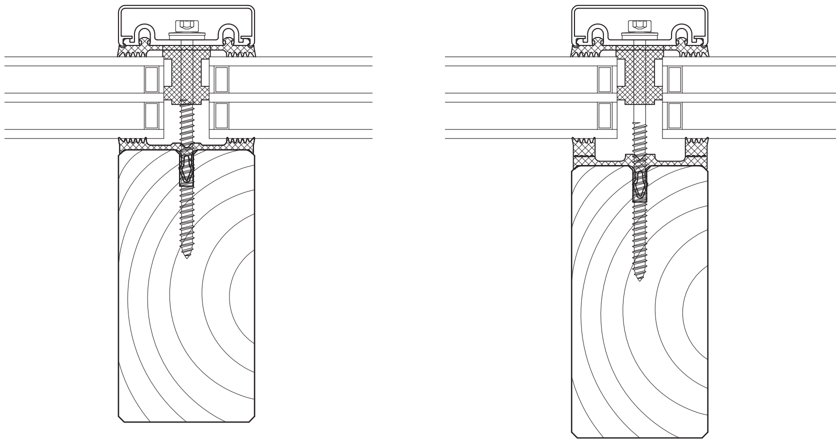
* **Effects of screws per piece 0.00322 W/K, for System 60 mm and with screw spacing of 250 mm = + 0.21** W/(m²·K)
Screw effects according to ebök (12.2008)

TI-H_9.4_002.dwg

U_f values

9.4
4

Determination of the U_f values according to DIN EN 10077-2



Stabalux H

60120
Glass inset 20

Values without effect of screws*

System	5 mm seal				12 mm seal			
	U_f (W/m²K) with isolator		U_f (W/m²K) without isolator		U_f (W/m²K) with isolator		U_f (W/m²K) without isolator	
Outer seal	GD 1934		GD 6024	GD 1934	GD 1934		GD 6024	GD 1934
H-60120-**24**-20	(Z0606)	0.902	1.305	1,164	(Z0606)	0.909	1.413	1,252
H-60120-**26**-20	(Z0606)	0.875	1.285	1,138	(Z0606)	0.885	1.390	1,228
H-60120-**28**-20	(Z0606)	0.843	1.259	1,110	(Z0606)	0.855	1.361	1,198
H-60120-**30**-20	(Z0606)	0.816	1.236	1,084	(Z0606)	0.832	1.334	1,170
H-60120-**32**-20	(Z0606)	0.797	1.221	1,067	(Z0606)	0.817	1.316	1,151
H-60120-**34**-20	(Z0606)	0.776	1.201	1,047	(Z0605)	0.717	1.294	1,128
H-60120-**36**-20	(Z0606)	0.759	1.186	1,029	(Z0605)	0.696	1.276	1,109
H-60120-**38**-20	(Z0605)	0.695	1.161	1,013	(Z0605)	0.675	1.258	1,091
H-60120-**40**-20	(Z0605)	0.650	1.142	0,993	(Z0605)	0.652	1.237	1,069
H-60120-**44**-20	(Z0605)	0.615	1.126	0,965	(Z0605)	0.621	1.206	1,037
H-60120-**48**-20	(Z0605)	0.588	1.103	0,940	(Z0605)	0.597	1.179	1,010
H-60120-**52**-20	(Z0605)	0.566	1.085	0,919	(Z0605)	0.580	1.156	0,986
H-60120-**56**-20	(Z0605)	0.549	1.067	0,899	(Z0605)	0.564	1.135	0,964

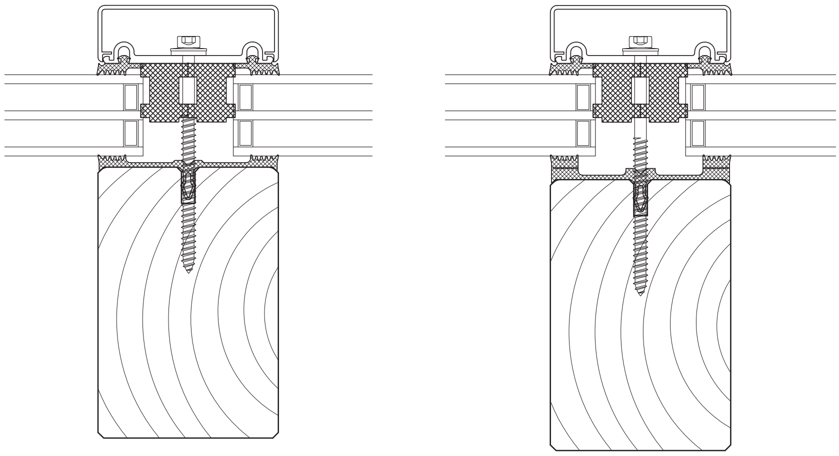
Passive house-suitable   Passive house-suitable

* **Effects of screws per piece 0.00322 W/K, for System 60 mm and with screw spacing of 250 mm = + 0.21** W/(m²·K)
Screw effects according to ebök (12.2008)

TI-H_9.4_002.dwg

U_f values

Determination of the U_f values according to DIN EN 10077-2



Stabalux H

80120
Glass inset 20

Values without effect of screws*

System	5 mm seal				12 mm seal			
	U_f (W/m²K) with isolator		U_f (W/m²K) without isolator		U_f (W/m²K) with isolator		U_f (W/m²K) without isolator	
Outer seal	GD 1934		GD 8024	GD 1934	GD 1934		GD 8024	GD 1934
H-80120-**24**-20	(2xZ0606)	0,880	1,439	1,196	(2xZ0606)	0,873	1,555	1,298
H-80120-**26**-20	(2xZ0606)	0,857	1,426	1,182	(2xZ0606)	0,855	1,541	1,282
H-80120-**28**-20	(2xZ0606)	0,831	1,409	1,163	(2xZ0606)	0,833	1,521	1,262
H-80120-**30**-20	(2xZ0606)	0,809	1,393	1,146	(2xZ0606)	0,816	1,504	1,244
H-80120-**32**-20	(2xZ0606)	0,795	1,383	1,136	(2xZ0606)	0,806	1,493	1,231
H-80120-**34**-20	(2xZ0606)	0,778	1,371	1,122	(2xZ0606)	0,793	1,478	1,216
H-80120-**36**-20	(2xZ0606)	0,767	1,361	1,111	(2xZ0606)	0,784	1,467	1,204
H-80120-**38**-20	(2xZ0606)	0,757	1,350	1,100	(2xZ0605)	0,648	1,455	1,191
H-80120-**40**-20	(2xZ0605)	0,637	1,338	1,086	(2xZ0605)	0,631	1,440	1,179
H-80120-**44**-20	(2xZ0605)	0,608	1,320	1,068	(2xZ0605)	0,607	1,419	1,155
H-80120-**48**-20	(2xZ0605)	0,587	1,305	1,051	(2xZ0605)	0,590	1,401	1,135
H-80120-**52**-20	(2xZ0605)	0,570	1,292	1,038	(2xZ0605)	0,578	1,385	1,120
H-80120-**56**-20	(2xZ0605)	0,560	1,280	1,025	(2xZ0605)	0,568	1,371	1,104

Passive house-suitable   Passive house-suitable

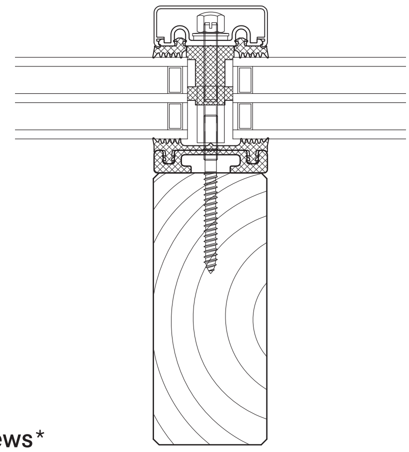
* **Effects of screws per piece 0.00322 W/K, for System 80 mm and with screw spacing of 250 mm = + 0.16** W/(m²·K)
Screw effects according to ebök (12.2008)

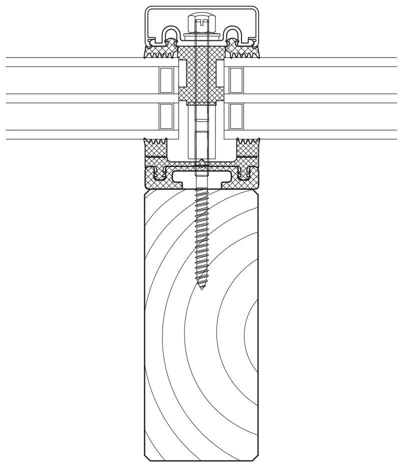
TI-H_9.4_002.dwg

STABALUX

U_f values

Determination of the U_f values according to DIN EN 10077-2





Stabalux ZL-H

50120
Glass inset 15

Values without effect of screws*

System	5 mm seal				12 mm seal			
	U_f (W/m²K) with isolator		U_f (W/m²K) without isolator		U_f (W/m²K) with isolator		U_f (W/m²K) without isolator	
Outer seal	GD 1934		GD 5024	GD 1934	GD 1934		GD 5024	GD 1934
ZL-H-50120-**24**-15	(Z0606)	0.926	1.444	1,244	(Z0606)	0.937	1.579	1,354
ZL-H-50120-**26**-15	(Z0606)	0.900	1.429	1,226	(Z0606)	0.914	1.561	1,333
ZL-H-50120-**28**-15	(Z0606)	0.868	1.406	1,199	(Z0606)	0.886	1.533	1,304
ZL-H-50120-**30**-15	(Z0606)	0.842	1.387	1,176	(Z0606)	0.865	1.509	1,278
ZL-H-50120-**32**-15	(Z0606)	0.826	1.376	1,162	(Z0606)	0.853	1.494	1,262
ZL-H-50120-**34**-15	(Z0606)	0.805	1.360	1,144	(Z0605)	0.733	1.474	1,240
ZL-H-50120-**36**-15	(Z0606)	0,794	1.349	1,129	(Z0605)	0.711	1.459	1,223
ZL-H-50120-**38**-15	(Z0605)	0.688	1.336	1,115	(Z0605)	0.690	1.443	1,207
ZL-H-50120-**40**-15	(Z0605)	0.663	1.319	1,096	(Z0605)	0.667	1.423	1,186
ZL-H-50120-**44**-15	(Z0605)	0.629	1.298	1,070	(Z0605)	0.636	1.395	1,156
ZL-H-50120-**48**-15	(Z0605)	0.604	1.281	1,051	(Z0605)	0.616	1.372	1,132
ZL-H-50120-**52**-15	(Z0605)	0.585	1.266	1,034	(Z0605)	0.602	1.353	1,111
ZL-H-50120-**56**-15	(Z0605)	0.572	1.252	1,017	(Z0605)	0.589	1.333	1,091

Passive house-suitable   Passive house-suitable

* **Effects of screws per piece 0.00083 W/K, for System 50 mm and with screw spacing of 250 mm = + 0.07** W/(m²·K)
Screw effects according to ebök (12.2008)

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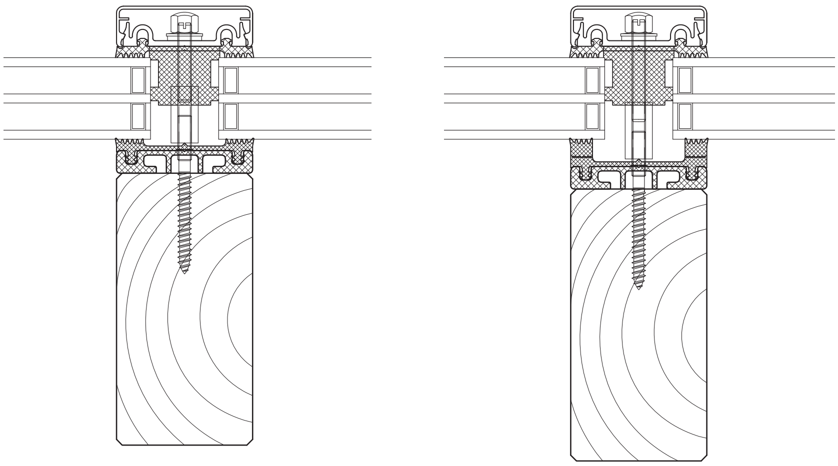
STABALUX

U_f values

Determination of the U_f values according to DIN EN 10077-2



Stabalux ZL-H

60120
Glass inset 15

Values without effect of screws*

System	5 mm seal				12 mm seal			
	U_f (W/m²K) with isolator		U_f (W/m²K) without isolator		U_f (W/m²K) with isolator		U_f (W/m²K) without isolator	
Outer seal	GD 1934		GD 6024	GD 1934	GD 1934		GD 6024	GD 1934
ZL-H-60120-24-15	(Z0608)	0.907	1.527	1,249	(Z0608)	0.912	1.664	1,387
ZL-H-60120-26-15	(Z0608)	0.884	1.517	1,235	(Z0608)	0.892	1.650	1,372
ZL-H-60120-28-15	(Z0608)	0.856	1.498	1,214	(Z0608)	0.871	1.629	1,349
ZL-H-60120-30-15	(Z0608)	0.833	1.482	1,196	(Z0608)	0.853	1.610	1,328
ZL-H-60120-32-15	(Z0608)	0.820	1.473	1,185	(Z0608)	0.844	1.598	1,316
ZL-H-60120-34-15	(Z0608)	0.802	1.460	1,171	(Z0607)	0.711	1.582	1,299
ZL-H-60120-36-15	(Z0608)	0.793	1.451	1,160	(Z0607)	0.690	1.570	1,286
ZL-H-60120-38-15	(Z0607)	0.673	1.441	1,149	(Z0607)	0.672	1.556	1,273
ZL-H-60120-40-15	(Z0607)	0.651	1.427	1,133	(Z0607)	0.653	1.540	1,256
ZL-H-60120-44-15	(Z0607)	0.621	1.410	1,115	(Z0607)	0.626	1.518	1,246
ZL-H-60120-48-15	(Z0607)	0.599	1.396	1,098	(Z0607)	0.609	1.499	1,223
ZL-H-60120-52-15	(Z0607)	0.583	1.383	1,085	(Z0607)	0.599	1.482	1,197
ZL-H-60120-56-15	(Z0607)	0.573	1.372	1,072	(Z0607)	0.589	1.466	1,181

Passive house-suitable Passive house-suitable

* **Effects of screws per piece 0.00083 W/K, for System 60 mm and with screw spacing of 250 mm = + 0.05** W/(m²·K)
Screw effects according to ebök (12.2008)

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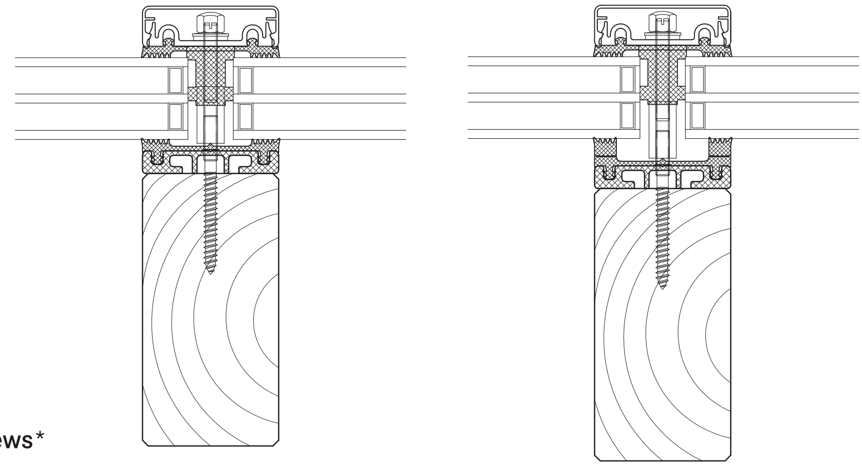
U_f values

Determination of the U_f values according to DIN EN 10077-2



Stabalux ZL-H

60120
Glass inset 20

Values without effect of screws*

System	5 mm seal				12 mm seal			
	U_f (W/m²K) with isolator		U_f (W/m²K) without isolator		U_f (W/m²K) with isolator		U_f (W/m²K) without isolator	
Outer seal	GD 1934		GD 6024	GD 1934	GD 1934		GD 6024	GD 1934
ZL-H-60120-**24**-20	(Z0606)	0.906	1.282	1,154	(Z0606)	0.910	1.394	1,246
ZL-H-60120-**26**-20	(Z0606)	0.878	1.261	1,132	(Z0606)	0.884	1.370	1,221
ZL-H-60120-**28**-20	(Z0606)	0.845	1.234	1,103	(Z0606)	0.855	1.340	1,190
ZL-H-60120-**30**-20	(Z0606)	0.816	1.209	1,078	(Z0606)	0.830	1.312	1,163
ZL-H-60120-**32**-20	(Z0606)	0.797	1.193	1,061	(Z0606)	0.815	1.293	1,144
ZL-H-60120-**34**-20	(Z0606)	0.775	1.173	1,040	(Z0605)	0.716	1.270	1,121
ZL-H-60120-**36**-20	(Z0606)	0.757	1.157	1,024	(Z0605)	0.695	1.251	1,103
ZL-H-60120-**38**-20	(Z0605)	0.675	1.140	1,006	(Z0605)	0.674	1.233	1,084
ZL-H-60120-**40**-20	(Z0605)	0.651	1.122	0,987	(Z0605)	0.651	1.211	1,062
ZL-H-60120-**44**-20	(Z0605)	0.615	1.095	0,958	(Z0605)	0.620	1.179	1,031
ZL-H-60120-**48**-20	(Z0605)	0.587	1.071	0,934	(Z0605)	0.595	1.151	1,003
ZL-H-60120-**52**-20	(Z0605)	0.566	1.051	0,913	(Z0605)	0.578	1.128	0,979
ZL-H-60120-**56**-20	(Z0605)	0.547	1.033	0,894	(Z0605)	0.562	1.105	0,957

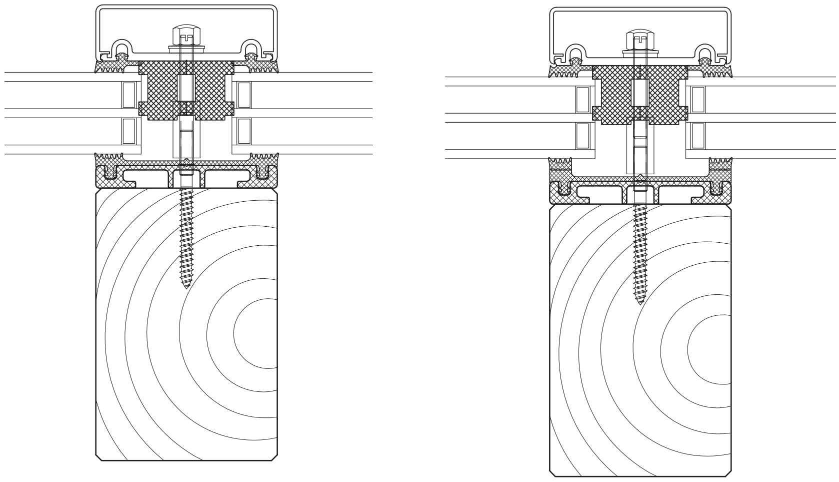
Passive house-suitable (5 mm seal, with isolator, ZL-H-60120-36-20 to -56-20) — Passive house-suitable (12 mm seal, with isolator, ZL-H-60120-36-20 to -56-20)

* **Effects of screws per piece 0.00083 W/K, for System 60 mm and with screw spacing of 250 mm = + 0.05** W/(m²·K)
Screw effects according to ebök (12.2008)

TI-H_9.4_002.dwg

U_f values

Determination of the U_f values according to DIN EN 10077-2



Stabalux ZL-H

80120
Glass inset 20

Values without effect of screws*

System	5 mm seal				12 mm seal			
	U_f (W/m²K) with isolator		U_f (W/m²K) without isolator		U_f (W/m²K) with isolator		U_f (W/m²K) without isolator	
Outer seal	GD 1934		GD 8024	GD 1934	GD 1934		GD 8024	GD 1934
ZL-H-80120-24-20	(Z0606)	0.856	1.385	1,162	(Z0606)	0.867	1.532	1,281
ZL-H-80120-26-20	(Z0606)	0.834	1.374	1,149	(Z0606)	0.849	1.518	1,266
ZL-H-80120-28-20	(Z0606)	0.810	1.358	1,131	(Z0606)	0.828	1.500	1,246
ZL-H-80120-30-20	(Z0606)	0.789	1.344	1,115	(Z0606)	0.810	1.482	1,228
ZL-H-80120-32-20	(Z0606)	0.771	1.335	1,105	(Z0606)	0.801	1.472	1,216
ZL-H-80120-34-20	(Z0606)	0.758	1.324	1,091	(Z0605)	0.679	1.457	1,201
ZL-H-80120-36-20	(Z0606)	0.747	1.316	1,081	(Z0605)	0.661	1.446	1,188
ZL-H-80120-38-20	(Z0605)	0.642	1.306	1,071	(Z0605)	0.645	1.435	1,176
ZL-H-80120-40-20	(Z0605)	0.622	1.294	1,058	(Z0605)	0.627	1.420	1,161
ZL-H-80120-44-20	(Z0605)	0.595	1.278	1,040	(Z0605)	0.603	1.400	1,140
ZL-H-80120-48-20	(Z0605)	0.574	1.264	1,024	(Z0605)	0.587	1.382	1,122
ZL-H-80120-52-20	(Z0605)	0.558	1.253	1,011	(Z0605)	0.574	1.360	1,106
ZL-H-80120-56-20	(Z0605)	0.547	1.241	0,998	(Z0605)	0.565	1.352	1,091

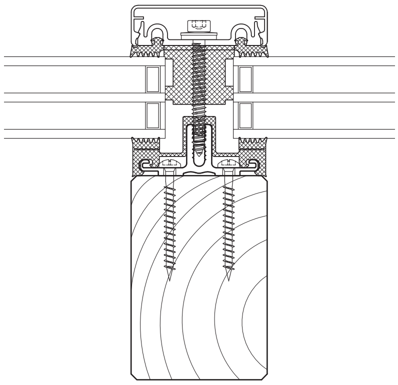
Passive house-suitable — Passive house-suitable

* **Effects of screws per piece 0.00083 W/K, for System 80 mm and with screw spacing of 250 mm = + 0.04** W/(m²·K)
Screw effects according to ebök (12.2008)

TI-H_9.4_002.dwg

U_f values

Determination of the U_f values according to DIN EN 10077-2



Stabalux AK-H

5090
Glass inset 15

Values without effect of screws*

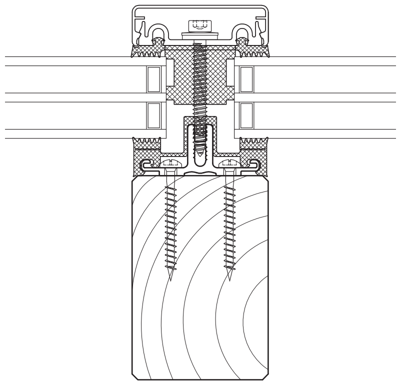
System	16,5 mm seal			
	U_f (W/m²K) with isolator		U_f (W/m²K) without isolator	
Outer seal	GD 1934		GD 5024	GD 1934
AK-H-6090-**24**-15	(Z0609)	1,381	2,230	1,805
AK-H-6090-**26**-15	(Z0609)	1,386	2,181	1,758
AK-H-6090-**28**-15	(Z0609)	1,362	2,129	1,705
AK-H-6090-**30**-15	(Z0606)	1,342	2,082	1,658
AK-H-6090-**32**-15	(Z0608)	1,010	2,045	1,626
AK-H-6090-**34**-15	(Z0608)	1,008	2,012	1,590
AK-H-6090-**36**-15	(Z0608)	0,091	1,979	1,559
AK-H-6090-**38**-15	(Z0608)	0,976	1,951	1,534
AK-H-6090-**40**-15	(Z0608)	0,957	1,918	1,503
AK-H-6090-**44**-15	(Z0608)	0,935	1,870	1,458
AK-H-6090-**48**-15	(Z0607)	0,690	1,836	1,421
AK-H-6090-**52**-15	(Z0607)	0,690	1,803	1,391
AK-H-6090-**56**-15	(Z0607)	0,675	1,774	1,363

* **Effects of screws for System 50 mm and with screw spacing of 250 mm = + 0.05** W/(m²·K)
Screw effects according to ebök (12.2008)

TI-H_9.4_002.dwg

U_f values

Determination of the U_f values according to DIN EN 10077-2



Stabalux AK-H

6090
Glass inset 15

Values without effect of screws*

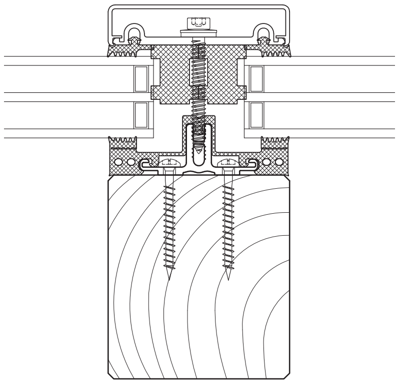
System	16.5 mm seal			
	U_f (W/m²K) with isolator		U_f (W/m²K) without isolator	
Outer seal	GD 1934		GD 6024	GD 1934
AK-H-6090-**24**-15	(Z0606)	1,314	2,151	1,712
AK-H-6090-**26**-15	(Z0606)	1,287	2,103	1,665
AK-H-6090-**28**-15	(Z0606)	1,257	2,051	1,617
AK-H-6090-**30**-15	(Z0606)	1,003	2,007	1,573
AK-H-6090-**32**-15	(Z0606)	0,962	1,973	1,542
AK-H-6090-**34**-15	(Z0606)	0,958	1,938	1,582
AK-H-6090-**36**-15	(Z0606)	0,941	1,908	1,548
AK-H-6090-**38**-15	(Z0605)	0,926	1,880	1,516
AK-H-6090-**40**-15	(Z0605)	0,909	1,850	1,483
AK-H-6090-**44**-15	(Z0605)	0,886	1,803	1,432
AK-H-6090-**48**-15	(Z0605)	0,674	1,765	1,390
AK-H-6090-**52**-15	(Z0605)	0,663	1,734	1,356
AK-H-6090-**56**-15	(Z0605)	0,648	1,705	1,324

* **Effects of screws for System 60 mm and with screw spacing of 250 mm = + 0.05** W/(m²·K)
Screw effects according to ebök (12.2008)

TI-H_9.4_002.dwg

U_f values

Determination of the U_f values according to DIN EN 10077-2



Stabalux AK-H

8090
Glass inset 20

Values without effect of screws*

System	16.5 mm seal			
	U_f (W/m²K) with isolator		U_f (W/m²K) without isolator	
Outer seal	GD 1934		GD 8024	GD 1934
AK-H-8090-**24**-20	(Z0606)	1.188	1.886	1,537
AK-H-8090-**26**-20	(Z0606)	1.161	1.849	1,503
AK-H-8090-**28**-20	(Z0606)	1.128	1.810	1,464
AK-H-8090-**30**-20	(Z0606)	0.916	1.774	1,429
AK-H-8090-**32**-20	(Z0606)	0.886	1.749	1,405
AK-H-8090-**34**-20	(Z0606)	0.883	1.722	1,374
AK-H-8090-**36**-20	(Z0606)	0.871	1.698	1,354
AK-H-8090-**38**-20	(Z0605)	0.857	1.673	1,331
AK-H-8090-**40**-20	(Z0605)	0.842	1.651	1,306
AK-H-8090-**44**-20	(Z0605)	0.817	1.611	1,272
AK-H-8090-**48**-20	(Z0605)	0.632	1.582	1,234
AK-H-8090-**52**-20	(Z0605)	0.626	1.547	1,214
AK-H-8090-**56**-20	(Z0605)	0.612	1.529	1,185

* **Effects of screws for System 80 mm and with screw spacing of 250 mm = + 0.04** W/(m²·K)
Screw effects according to ebök (12.2008)

TI-H_9.4_002.dwg

Humidity protection in the glass facade

Humidity protection

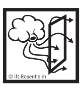
The highest demands are placed in the design of a modern mullion-transom facade, which can only be satisfied through competent planning and careful execution. The physical task of a structurally intact facade is to create a healthy room climate.
Heat insulation properties and humidity protection are among the most important characteristics of an intact outer shell around a structure. In principle, the following structure is applied in the design of a facade: water-repellent on the outside, sealed on the inside. This allows humidity precipitating on the component to diffuse outwards.

The Stabalux facade systems softly pack installed elements like panes, panels or opening elements between sealing profiles and then attach them to the mullion-transom construction using clamping strips. The so-called rebate is produced in the clamping area between the installed elements. This rebate must be vapour-proof toward the room and sealed again the penetration of water from the side exposed to the weather. Room-side vapour-proof qualities are mandatory. Warm room air flowing into the rebate can produce condensation as it cools.

It is not possible to explicitly exclude the possibility that condensation will form in our latitudes. The Stabalux insulation geometries safely transport any damp and condensation that penetrates due to imprecise assembly and changes through temperature fluctuation out of the rebate without it entering the construction.
There must be an opening at the highest and lowest points of the rebate. The opening in the rebate should exhibit a diameter of at least 8 mm and, designed as a slot, should have the dimensions 4 x 20 mm. Insulating glass manufacturers, standards and regulations require there to be a sufficiently ventilated rebate with pressure equalisation openings. This applies also to glazing with sealants, e.g. silicone.

Airtightness is also an important factor in connection with thermal insulation. Heat losses will be lower if the external wall is sealed. Room air exchange and extraction of warm air should take place exclusively through targeted ventilation in window openings and ventilation systems.
The Stabalux glazing system possesses outstanding sealant properties, as demonstrated in external testing. Stabalux facade systems are also suitable for the most exposed applications, e.g. on high-rise buildings.

Specifications

Stabalux H und Stabalux ZL-H		Facade 5 mm sealing height	Facades with inclinations up to 20°; overlapping inner sealing	Roof up to 2° inclination
System widths		**50, 60, 80 mm**	**50, 60, 80 mm**	**50, 60, 80 mm**
 **Air permeability EN 12152**		AE	AE	AE
 **Watertightness EN 12154/ENV 13050**	static dynamic	RE 1650 Pa 250 Pa/750 Pa	RE 1650 Pa 250 Pa/750 Pa	RE 1350 Pa*

*the test was carried out using a water volume of 3.4 ℓ/(m² min) - above the amount required by the standard

Humidity protection in the glass facade

Terms

Water vapour / condensation

Water vapour is a term used to describe the gaseous aggregate state produced by the evaporation of water. One cubic metre (m^3) of air can only absorb a limited quantity of water vapour. The amount rises with the temperature. When air cools, it is no longer able to hold the same quantity of water. The excess water condenses, hence converting from its gaseous to its liquid state. The temperature at which this effect occurs is called the temperature of dew point, or simply the dew point.
When the inside temperature of 20°C with relative humidity of 50% cools to 9.3°C, the relative humidity rises to 100%. Condensation will precipitate if the air or contact surfaces (thermal bridges) continue to cool down. The air is no longer able to absorb the water in the form of water vapour.

Relative humidity f

The maximum volume of water vapour is rarely encountered in practice. Merely a certain percentage is reached. This is known as relative humidity, which is also temperature-dependent. It rises when the temperature falls and falls when the temperature rises, with otherwise constant levels of moisture.
Example:
A mixture of water vapour and air of 1 m^3 at 0°C has a relative humidity of 100% if it contains 4.9 g of water. A reduction in relative humidity occurs if the temperature rises, for instance to 20°C, if water absorption does not increase. At this temperature, an atmosphere with 100% relative humidity would be able to hold no more than 17.3 g, so 12.4 g more, of water. But given that additional moisture is not added, the 4.9 g of moisture contained in the cold air would now represent relative humidity of 28%.

Water vapour pressure

Besides relative humidity, the prevalent pressure is another important factor in the diffusion process. The water vapour produces pressure that rises with the volume of water vapour contained in the air. The conditions for water molecules to condensate will be more favourable if the water vapour saturation pressure is exceeded, hence lowering the pressure.

Water vapour diffusion

Water vapour diffusion describes the proper motion of water vapour through construction materials. Variations in water vapour pressures on either side of the component trigger this mechanism. The water vapour held in the air migrates from the side with the higher pressure toward the side with the lower vapour pressure. Here, the water vapour pressure depends on the temperature and the relative humidity.

Important: A vapour block (e.g. metal foil) and similar installations can entirely prevent the transport of water vapour through the material, but they cannot stop the passage of heat!

Water vapour diffusion resistance coefficient μ

The quotient of the water vapour diffusion transfer coefficient in the air and the water vapour diffusion transfer coefficient in a substance. It therefore expresses the factor by which the water vapour diffusion resistance of the considered material is greater than that of the lay of air in the same thickness and temperature resting on the material. The water vapour diffusion resistance coefficient is a material property.*

Thickness of the air layer equivalent to the water vapour diffusion s_d

Thickness of a resting layer of air possessing the same water vapour diffusion resistance as the considered construction component, i.e. the component comprising several layers. It determines the resistance to water vapour diffusion. The thickness of the air layer equivalent to the water vapour diffusion is a layer, i.e. component property. It is defined for a component layer using the following formula:

$s_d = \mu \cdot d$*

* Excerpt from DIN 4180-3

Humidity protection in the glass facade

The water vapour is unable to diffuse evenly through all components. Hence the fall in pressure is not the same across the entire wall cross-section. The fall in pressure is large in impermeable materials and small in permeable materials. This phenomenon is precisely what the dimensionless water vapour diffusion resistance coefficient μ describes: The water vapour diffusion resistance of a material is μ times larger than the resting layer of air. So an air layer requiring the same diffusion resistance as the material would have to be μ times thicker than the material layer. The water vapour diffusion resistance coefficient μ is a material property and independent of the size (thickness) of the material. An example: The diffusion resistance of a layer of cellulose flakes with μ=2 and a thickness of 0.1 m is equivalent to an air layer with a thickness of 2×10 cm = 0.2 m. This "diffusion-equivalent air layer thickness", calculated using μ, is known as the S_d value.In other words:The S_d value of a component describes how thick the air layer resting on the component would have to be (in metres) to possess an equal diffusion resistance as the component.The S_d value is therefore a component-specific property and depends on the type of construction component and its thickness.

Temperature factor f_{Rsi}

Used to determine the freedom of fungal growth on window connections.
The temperature factor f_{Rsi} is the difference between the temperature of the inside surface θsi of a component and the outside air temperature θe, relative to the temperature difference between the inside θi and outside air θe.

A variety of requirements must be adhered to in order to introduce design measures to reduce the risk of fungal growth. For instance, for all constructive, shape-related and material-related thermal bridges that deviate from DIN 4108-2, the temperature factor f_{Rsi} at the least favourable point must satisfy the minimum requirement of $\mathbf{f_{Rsi} \geq 0.70}$:

Water vapour convection

Transfer of water vapour in a gaseous mixture by movements of the gaseous mixture as a whole, e.g. moist air, caused by the overall pressure gradient. Overall pressure gradients can occur, for instance, due to circumferential flow in the building through joints and leakages between inner rooms and their environments, or between ventilated layers of air (forced convection), i.e. due to differences in temperature and hence air density in ventilated and non-ventilated layers of air (free convection)*

Regulations

- DIN 4108 Thermal protection and energy economy in buildings
- DIN 4108-3 Protection against moisture subject to climate conditions; Requirements and directions for design and construction
- DIN 4108-4 Hygrothermal design values
- DIN 4108-7 Airtightness of building, requirements, recommendations and examples for planning
- DIN 18361 Glazing work (VOB Part C)
- DIN 18360 Metal work (VOB Part C)
- DIN 18545 Sealing of glazing with sealants
- Energy Saving Ordinance (EnEV)
- EnEV Validation of thermal bridges
- DIN EN ISO 10211: Thermal bridges in building construction
- Passive house standard
- DIN EN ISO Thermal and moisture behaviour of construction materials and products
- DIN EN 12086 Thermal insulating products for building applications - Determination of water vapour transmission properties

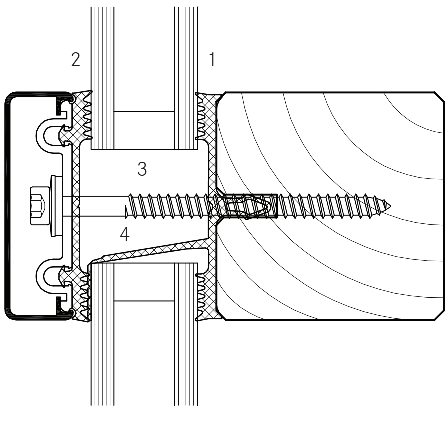
* Excerpt from DIN 4180-3

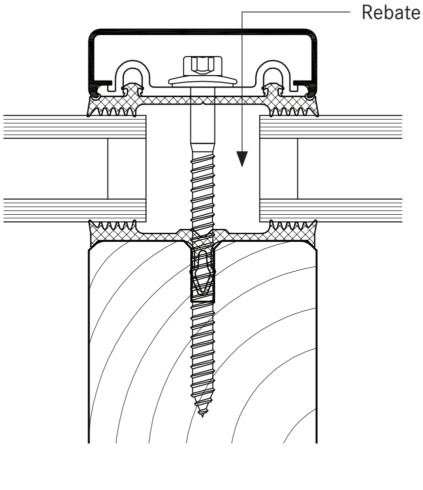
Humidity protection in the glass facade

General requirements for glass constructions

A glass construction that separates climates must transport the diffusing water vapour from the inside to the outside. This process should not produce condensation when possible. The wall must be permeable for diffusion travelling from the inside to the outside. This requires the following individual measures:

1. An inner sealing section with the greatest possible vapour diffusion resistance.
2. An outer sealing section with the lowest possible vapour diffusion resistance.
3. A suitable design of the rebates to enable convective removal of moisture.
4. Also a suitable design of the rebates to enable targeted removal of condensation.
5. Diffusion channel control also in the area connecting with the adjacent structure.





Important notes:

Experience has shown that absolute water and vapour imperviousness is not possible in a mullion-transom structure. Imprecise assembly of the sealant sections to the building connections may be possible sources of moisture damage. This may allow moisture to act directly on the room-side surfaces of thermal bridges and hence lead to the formation of condensation. In addition, damage may also be caused by the direct effects of moisture and elevated vapour pressure in the rebate with negative implications for the edge bonding of the inset elements. Water vapour may then penetrate the area between the panes.

Example: Leaks in profile surfaces may cause 20 litres of water to precipitate on an element measuring 1.35 (b) x 3.5 (h) during a dew period lasting 60 days.

It is essential to ensure that the rebate is produced precisely in order to prevent damage in the long term. This enables to rapid and unobstructed removal of moisture caused by precipitation and dew. Slab insulation must not prevent effective ventilation of the rebate! The slab insulation must be selected such that there is a gap of at least 10 mm to the lower edge of the rebate in order to provide ventilation and to extract condensation.

The edge bonding with the glazing must be selected carefully in order to prevent thermal bridges on profiles that may cause condensation and above all fungal growth in the hollow cavities. A favourable U_f value* for the profile is not sufficient on its own to guarantee the absence of dew. The ψ value* may be equally crucial. This depends on the type of edge bonding. Aluminium edge bonding is the least favourable. Therefore, the absence of dew must be checked when aluminium edge bonding is used. This applies in particular when the facade is adjacent to rooms with high humidity, e.g. bathrooms.

* see section on Thermal Insulation

Humidity protection in the glass facade

Inner sealing section

Construction materials are vapour-proof according to DIN EN 12086, i.e. DIN EN ISO 12572, if they exhibit an air layer thickness equivalent to water vapour diffusion of S_d von ≥ 1500 m. Standard glazing sealants are unable to provide these values. Nevertheless, the layer inhibiting diffusion can be considered adequate for the application described here if it accommodates layer thicknesses S_d of ≥ 30 m. In order to determine the air layer thickness equivalent to water vapour diffusion S_d, it is necessary to obtain the water vapour diffusion resistance coefficient μ and the component thickness.
Abutted points on seals are comparably impermeable as the entire sealant cross-section, provided they are glued using the “SG joint paste” recommended by Stabalux.
Vapour-proof connections with the structure must be positioned as far away from the room side as possible in order to prevent moisture penetrating the structure. (See Fig. 1) Additional film on the weather side (i.e., an external 2nd film) may only be used if driving rain or rising water cannot be kept out by other means. Vapour-permeable films must be used in this context. Layer thicknesses S_d of no more than 3 m shall be considered vapour-permeable for our constructions.

Outer sealing sections

The primary purpose of the external sealant is to keep out driving rain. Nevertheless, it is essential to ensure that convection openings provide a diffusion gradient from the inside to the outside. (See Fig. 2 and 3)

Convection flow

The rebates in Stabalux mullion-transom constructions are always ventilated. Ventilation is ensured by openings in the lower and upper ends in the area of the mullions. These openings, which are produced by design, must be impervious to driving rain.
The horizontal rebates are ventilated via the connections in the cross joints, i.e. openings in the cover strips. Should additional ventilation be required in the area of the transom (e.g. where panes are only supported on 2 sides or where transom length is $\ell \geq 2$ m), then this ventilation should be created by making holes in the cover strip and/or using notches on the lower sealing lips of the outer seal.

The following table shows several examples of materials.

Material		Gross density	μ - Water vapour diffusion coefficient	
		kg/m³	Dry	Damp
Air		1.23	1	1
Plaster		600-1500	10	4
Concrete		1800	100	60
Metal/glass		-	∞	∞
Mineral wool		10-200	1	1
Timber		500	50	20
Polystyrene		1050	100000	100000
Butyl rubber		1200	200000	200000
EPDM		1400	11000	11000

μ - is a value stated without dimensions. The higher the **μ** value, the greater the vapour-proof properties of the substance. It is multiplied with the thickness of the construction material to produce the component-based value $S_d = \mu \cdot d$

The S_d value of a component describes how thick the air layer resting on the component would have to be (in metres) to possess diffusion resistance equal to the component.

Humidity protection in the glass facade

Design details

Fig. 1 Horizontal wall connection

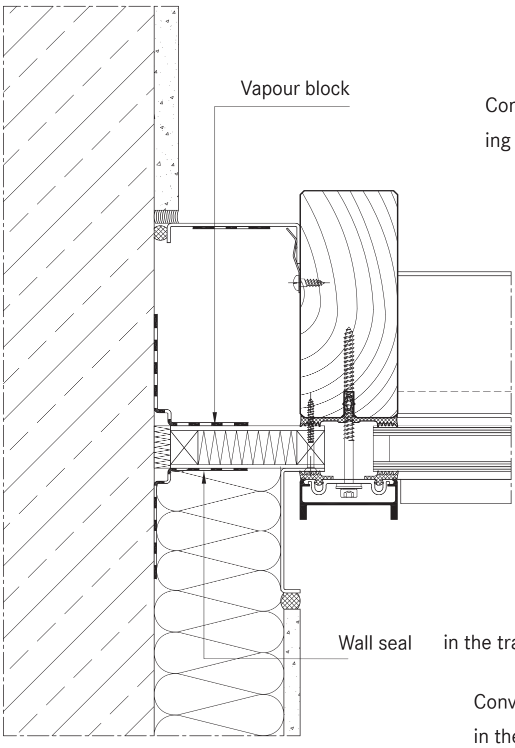


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Fig. 2 Ceiling connection

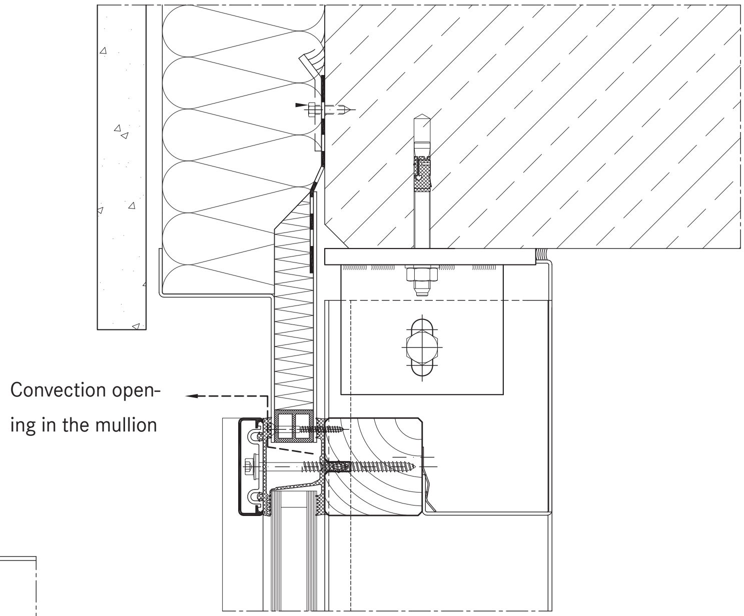
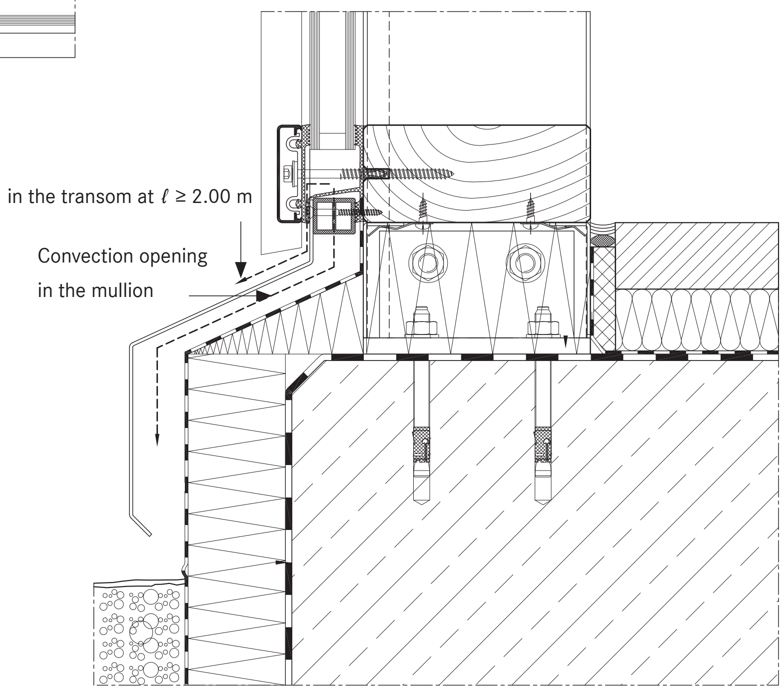


Fig. 3 Foot



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Humidity protection in the glass facade

Particular factors of the timber system

Condensation and fungal growth

Untreated timber is susceptible to fungal infestation, depending on the temperature and humidity. Cellulose decomposition leads to a destruction of the cell walls and hence to a reduction in strength. Moreover, organic decomposition processes are accompanied by staining and the development of odours.
In order to prevent these processes, it is important to stop the occurrence of any conditions that may lead to condensation or fungal growth in the timber.

Moisture concentration in timber

Extensive testing was conducted to ascertain the actual moisture concentration on the inside of load-bearing facade profiles, even under the most extreme conditions. In this respect we refer to the findings of the research by ift Rosenheim and others.

The results of these measurements were used to assessed by thermal flow analysis to determine the damaging moisture concentration for Stabalux systems. As the research report mentions, the extremely unfavourable conditions, which under normal circumstances would never occur, were also applied to extremely unfavourable solid wood profiles made of untreated softwood.

The facade profiles were exposed to different climates on either side over approximately 60 days. The climate on the room side was 23°C and 50% humidity, while the climate on the outside was -10°C.

An assessment of the findings permits the conclusion that the maximum core moisture content in the cross-sections equivalent to Stabalux profiles with direct screw fittings reached 17%. Stabalux systems with direct screw fittings have a clamping groove to accommodate the seal in the area affected by the highest moisture concentration; the research findings ascertain that it can be considered a relief groove.

Emergence of condensation on the threaded surfaces of the fixing screws

It is necessary to prove that under the aforementioned conditions and with the ascertained findings, condensation does not form, not even marginally, on the inserted screws that are exposed to the extreme cold of the outside climate. To do this, we calculated the surface temperatures of the threaded pins due to heat conduction and hence determined the absence of condensation. This calculation considered the complicating aspect that, as stated in relevant literature, fungal growth may occur from a saturation of 75%.
With due consideration of the extreme stress described above, and in anticipation of more favourable ambient conditions to promote fungal growth, the validation provided hereunder demonstrates that an impairment of the strength and durability cannot occur due to the direct screw fittings.

Validation for absence of condensation

Condensation begins to form on the extremely cooled screw surfaces if the water vapour saturation pressure on the surface of the screw ($P_{s,Oi}$) ≤ the water vapour saturation pressure of the surrounding timber (Ps, H), multiplied by the measured timber moisture. Converted into the moisture content from which condensation will form, the calculation is therefore:

$P_{s,\,Oi}$ for −4.8°C = 408 pa
$P_{s,\,Hi}$ for 10°C = 1228 pa

This means that condensation will precipitate on the screw surface from a moisture content of 33%. The maximum measured values are 17%. This ensures that damaging condensation will not emerge in the area of the screw fittings.

No fungal growth

Fungal growth any permanent damage of the timber occurs from a saturation level of 75%. The measured maximum values of 17% are still significantly below the 25% (approx. 75% of the condensation precipitation limit) at which there is a risk of fungal growth. The permanent function of the Stabalux direct screw fittings is therefore validated.

Humidity protection in the glass facade

9.5
1

Dew point temperature depending on the temperature and relative humidity (excerpt from DIN 4108-5 Table 1)

Air temperature in C°	Dew point temperature θ s[1] in C° at relative humidity as a % of														
	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	10.5	12.9	14.9	16.8	18.4	20.0	21.4	22.7	23.9	25.1	26.2	27.2	28.2	29.1	30.0
29	9.7	12.0	14.0	15.9	17.5	19.0	20.4	21.7	23.0	24.1	25.2	26.2	27.2	28.1	29.0
28	8.8	11.1	13.1	15.0	16.6	18.1	19.5	20.8	22.0	23.2	24.2	25.2	26.2	27.1	28.0
27	8.0	10.2	12.2	14.1	15.7	17.2	18.6	19.9	21.1	22.2	23.3	24.3	25.2	26.1	27.0
26	7.1	9.4	11.4	13.2	14.8	16.3	17.6	18.9	20.1	21.2	22.3	23.3	24.2	25.1	26.0
25	6.2	8.5	10.5	12.2	13.9	15.3	16.7	18.0	19.1	20.3	21.3	22.3	23.2	24.1	25.0
24	5.4	7.6	9.6	11.3	12.9	14.4	15.8	17.0	18.2	19.3	20.3	21.3	22.3	23.1	24.0
23	4.5	6.7	8.7	10.4	12.0	13.5	14.8	16.1	17.2	18.3	19.4	20.3	21.3	22.2	23.0
22	3.6	5.9	7.8	9.5	11.1	12.5	13.9	15.1	16.3	17.4	18.4	19.4	20.3	21.2	22.0
21	2.8	5.0	6.9	8.6	10.2	11.6	12.9	14.2	15.3	16.4	17.4	18.4	19.3	20.2	21.0
20	1.9	4.1	6.0	7.7	9.3	10.7	12.0	13.2	14.4	15.4	16.4	17.4	18.3	19.2	20.0
19	1.0	3.2	5.1	6.8	8.3	9.8	11.1	12.3	13.4	14.5	15.5	16.4	17.3	18.2	19.0
18	0.2	2.3	4.2	5.9	7.4	8.8	10.1	11.3	12.5	13.5	14.5	15.5	16.3	17.2	18.0

1) Approximate linear interpolation is permitted

Things to Know
Sound insulation

Sound insulation in the glass facade

Sound insulation

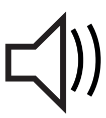
The noise insulating properties of a facade depend on a variety of factors, each of which affects the properties in a different way. Unfortunately it is not possible to summarise these complex interdependencies in simple and universally valid forms. The task of the planner is to expertly select the optimum design on a case-by-case basis. Different combinations of frame profiles, glazing strips and sound insulating glass have vastly different effects on noise insulation. Investigations and measurements performed by us are just examples of a huge range of possibilities and serve only as a guideline. The material selection and cross-sections must be discussed with specialists if higher sound insulation levels are required.

Terms

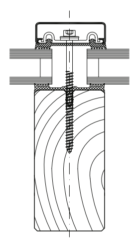
Sound insulation
Measures to reduce noise transmission from a source to a person. Sound insulation is the term used if the source of noise and the person are located in different rooms. Sound absorption is used if the source of noise and the person are located in the same room. Sound insulation distinguishes between airborne sound insulation and structure-borne sound insulation.

Airborne sound insulation
Airborne sound insulation describes the process of preventing the penetration of outside noise. Airborne noise mainly travels into the room through walls, ceilings, windows and doors.

Structure-borne sound insulation
Structure-borne sound insulation is sound insulation within the building. Structure-borne sound is mainly transmitted by pipes, footfall or circumferential facade mullions.



Noise source
(e.g. street noise)



Sound-insulating component

Receiver

Regulations

DIN 4109, sound insulation in buildings, regulates the matters pertaining to sound insulation under public law. The sound insulation classes described in VDI Guideline 2719, sound insulation of windows and additional fixtures, are often used as well. The measurement of sound insulation in buildings and of components takes place according to DIN EN ISO 717-1. We refer to ongoing harmonisation of European standards and possible changes.

Airborne sound insulation

Airborne sound insulation is the capability of a component (wall, ceiling or window) to prevent the penetration of airborne sound. It is therefore expressed in the unit decibels [dB], referring to the degree of sound insulation R and the sound level difference D in a defined frequency range.

Sound insulation degree R [dB]
This value describes the sound insulation of components. The measurement is performed in a laboratory setting according to EN ISO 140. It determines the acoustic properties for each one-third octave band between 100 and 3150 Hz (16 values).

Assessed sound insulation level R_w [dB]
The assessed sound insulation level R_w is used to determine the sound insulation of glass facades.

$\mathbf{R_{w,R}}$ values: This index weights the 16 measured values of the sound insulation level **R** in terms of their impact on the human ear. Here, $\mathbf{R_{w,P}}$ is the value determined in the laboratory testing. DIN 4109 demands that the calculated value $\mathbf{R_{w,R}} = \mathbf{R_{w,P}} - 2$ db is determined and entered in the Construction Components List.

$\mathbf{R'_w}$ values: According to DIN 52210, they are sound insulation values determined for the building.
For building certification, the minimum values for overall sound insulation may be exceeded by 5 dB.

Sound insulation in the glass facade

Spectrum adjustment values C and C_{tr}
These indices are corrective values for

(C) Pink noise = same sound level across the entire frequency spectrum;

(C_{tr}) Street noise = standardised urban street noise.

System Stabalux H

The tests we commissioned from the independent test institute ift-Rosenheim are intended to provide an overview of the sound insulation characteristics that Stabalux system facades exhibit. The tests are performed on large facade elements with standard grids. Measurements were performed using a variety of sound insulation glazings in accordance with the standard sound insulation requirements.

- Standard insulation glass (6/12 air/6)

- Insulation glass (8 /16 gas filling/6)

- Insulation glass (9 GH/16 gas filling/6)

The gas filling in the glazing was approx. 65% argon und approx. 35% SF6. The panes can no longer be installed due to the use of SF6.
It is not mandatory that the system manufacturer uses these glass types. Equivalent sound insulation values can be achieved with other sound insulation glazing.

The following table shows the sound insulation characteristics of the facades. The complexity of individual construction projects means that a precise assessment by experts and possibly measurements on the ground will usually be required.

We are glad to provide our individual test reports as required.

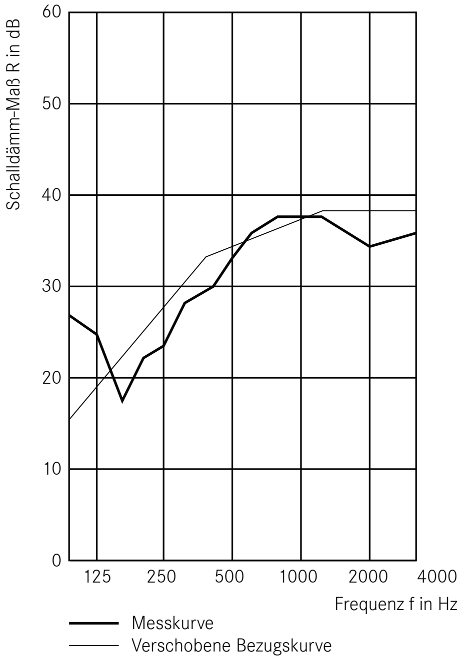
Profile structure		Glass structure Interior/SZR/exterior	assessed sound insulation level R_w		Class according to VDI	Test report by ift Rosenheim
vertical (mullion)	horizontal (transom)		Test value $R_{w,P}$	Calculated value $R_{w,R}$		
mm	mm		dB	dB		
60 x 120	60 x 60	6 / 12 / 6 air	**34**	32	2	161 18611/1.0.0
60 x 120	60 x 60	8 / 16 / 6 gas filling	**38**	36	3	161 18611/1.1.0
60 x 120	60 x 60	9GH / 16 / 6 gas filling	**41**	39	3	161 18611/1.2.0

Sound insulation class according to VDI Regulation 2719	Assessed sound insulation dimension R_w' of the working glazing installed in the building, measured according to DIN 52210 Part 5	Required assessed sound insulation dimension $R_{w,P}$ of the working glazing installed on the test rig according to DIN 52210 Part 2
	dB	dB
1	25 to 29	≤ **27**
2	30 to 34	≥ **32**
3	35 to 39	≥ **37**
4	40 to 44	≥ **42**
5	45 to 49	≥ **47**
6	> 50	≥ **52**

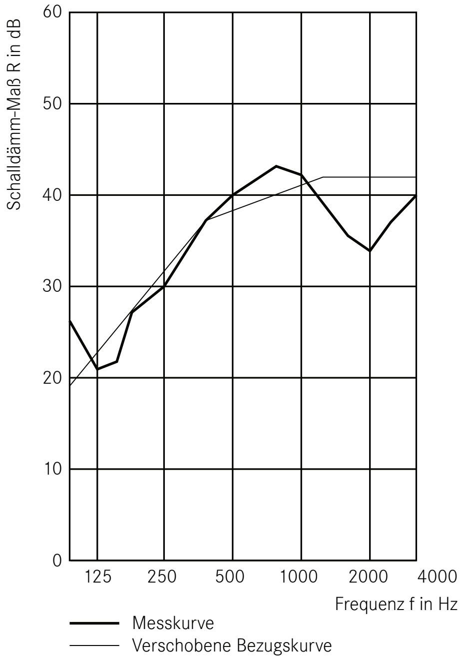
Sound insulation in the glass facade

Sound measurement curves in the laboratory testing

Test by ift Rosenheim
Test report no. 161 18611/1.0.0



Test by ift Rosenheim
Test report no. 161 18611/1.1.0



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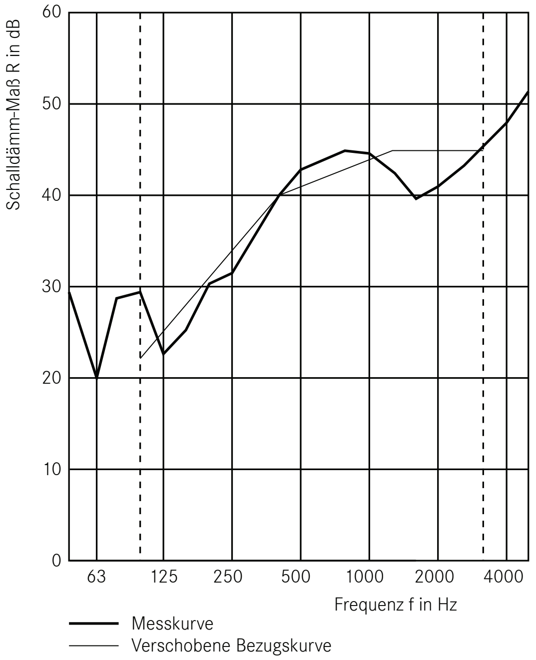


Overview

Fire protection glazing for facades

The development of Stabalux glazing into fire-resistant systems primarily addressed technical requirements relating to fire resistance. A secondary aspect was to create filigree and economic solutions. Tests at the competent institutes and the general building authorisations by Deutsche Institut für Bautechnik (DIBt) allow the use of Stabalux fire-resistance glazing in Germany. Its installation elsewhere in Europe must be clarified on a case-by-case basis.

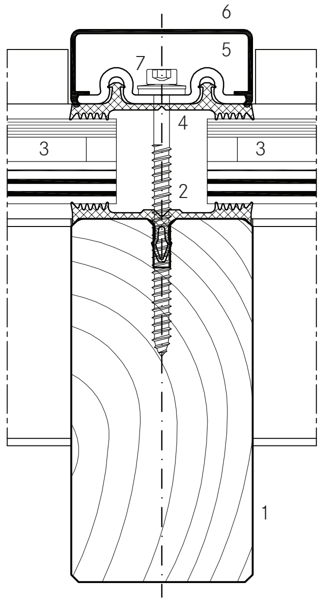
Overview of fire protection approvals

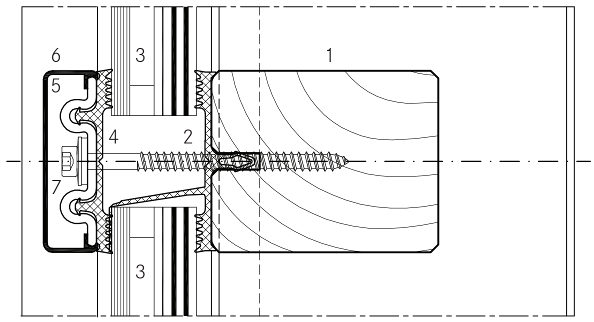
System	Class	Application	Glass type	Maximum glass dimensions in portrait format	Maximum glass dimensions in landscape format	Filling, maximum dimensions	Roof dimensions / maximum height	Country	Approval Number
				mm x mm	mm x mm	mm x mm	m		
Stabalux System H	G 30	Facade	Pyrodur	1210 x 2010	2000 x 1210	1000 x 2000 2000 x 1000	4.50	D	Z-19.14-1283
	F 30	Facade	Pyrostop	1350 x 2350	1960 x 1350	-	4.50	D	Z-19.14-1280
	F 30	Facade	Promaglas	1350 x 2350	1960 x 1350	-	4.50		Z-19.14-1280
	F 30	Facade	Contraflam	1500 x 2300	2300 x 1500	-	4.50	D	Z-19.14-1280

System Stabalux H in fire protection

The constructive details are stated in the respective building authorisation.
As a rule, Stabalux fire-resistance glazing provides the following benefits:

- The optical appearance of a normal facade is preserved.
- The use of a stainless steel bottom strip with concealed screw fittings enables the installation of all clipped upper screws.
- The test of stainless steel cover strips also allows visible screw fittings.
- Stabalux system H preserves all of the benefits of a design and assembly with direct screw fittings.





1 Timber profiles
2 Fire seals inside
3 Fire protection glass
4 Fire seals outside
5 Stainless steel bottom strip
6 Upper strip
7 Screw fittings

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Construction law / Standardisation

Structural fire protection according to the Federal State Building Order

The German constitution or Basic Law assigns the building code to the competencies of the federal states, and not to national government. Provisions concerning preventative fire protection in structures are therefore governed under the Federal State Building Order, the corresponding implementing provisions and a series of regulations and administrative ordinances.

Fire-resistant glazing is based on the following requirements of the General Building Order (MBO):

General requirements – Sec. 3 (1)
Structures must be arranged, constructed, modified and maintained such that they do not endanger public order and safety, in particular the life, limb and natural foundations of life.

Fire protection – Sec. 14
Structures must be arranged, constructed, modified and maintained such that the emergence of fire and the spread of fire and smoke (fire spread) are prevented and that the rescue of persons and animals and effective efforts to extinguish the fire are enabled.

The core statements can be taken to infer requirements for:

- the flammability of the construction materials used;
- the duration of fire resistance based on classifications for construction materials and components;
- the imperviousness of covers on openings;
- the arrangement, location and design of emergency exits.

Basics and requirements

Fire protection in buildings means the protection of life and limb and of commercial assets. Therefore, the manufacture and marketing of technical systems for fire protection requires sufficient expertise.

The following elaborations are intended to assist in the understanding of regulations applicable on the territory of the Federal Republic of Germany and how they relate to the current implementation regulations and the national German standard DIN 4102 “Fire behaviour of building materials and building components” in the area of fire-resistant glazing. Terms and definitions used in the harmonised series of European standards DIN EN 13501 “Fire classification of construction products and building elements” are also explained. This standard, as well as various other test standards (e.g. DIN EN 1364), now provide European provisions for the characterisation of the fire behaviour of construction materials (construction products) and components (types) and the definition of terms and tests. However, the European standards differ in places from the German DIN 4102 series, sometimes even substantially. It is therefore to be expected that the German and European classifications will continue to coexist as valid standards for some time to come.

The regulations under construction laws place demands in the fire behaviour of building materials and components. Intended as technical regulations within construction, the standards define these individual terms used in construction laws more precisely. They contain the conditions for assigning a construction material to a certain classification according to its fire behaviour, and what this classification will be called. Moreover, they explain the test arrangements for components and how they are classified in fire-resistance classes.

Technical classification of the components (construction types) in fire resistance classes according to DIN 4102, i.e. DIN EN 13501

According to DIN 4102-1, construction materials are assigned to the classes A (A1, A2 - not combustible) and B (flammable), with a further distinction in B1 for not easily flammable, B2 for flammable and B3 for easily flammable, depending on their fire behaviour. It is always prohibited to use easily flammable construction materials. It is also important to bear in mind that the fire behaviour when installed is authoritative. For instance, a roll of wallpaper is easily flammable, but not easy to set on fire when it is stuck to the wall.
In contrast, the European standard DIN EN 13501-1 assigns construction materials, i.e. products, to seven

Construction law / Standardisation

classes (A1, A2, B, C, D, E and F). The European standard also defines smoke development (s = smoke) and dripping while burning (d = droplets) as additional test and classification characteristics. The three characteristics are further assigned to three grades:

Smoke development s

s1: no/hardly any smoke development
s2: limited smoke development
s3: unlimited smoke development

Flaming droplets d

d0: no dripping
d1: no sustained dripping
d2: significant dripping

The following table shows the construction material classes according to DIN 4102-1 and DIN EN 13501-1 in a direct comparison. This comparison reveals another important aspect, namely that the classes according to the German/European standards are not entirely equivalent due to the different/additional test procedures.

Table 1: Allocation to classes according to the fire behaviour of construction materials / products (without flooring) according to DIN 4102-1, i.e. DIN EN 13501-1

Building inspectorate requirements	**European class according to DIN EN 13501-1**		**German class according to DIN 4102-1**	**Stabaluxproducts according to DIN 4102**
"No flammability"	A1		A1	SR, AL, AK, Screws, Cover strips
	A2	s1, d0	A2	
"Low flammability"	B, C	s1, d0	B1	Cross bars, wooden cylinder
	A2, B, C A2, B, C	s2, d0 s3, d0		
	A2, B, C A2, B, C	s1, d1 s1, d2		
	A2, B, C	s3, d2		
"Normal flammability"	D E	s1/s2/s3, d0	B2	H*, seals*, Insulating blocks
	D D E	s1/s2/s3, d1 s1/s2/s3, d2 d2		
"High flammability"	F		B3	ZL

*higher building material classes possible

Construction law / Standardisation

Technical classification of the components (construction types) in fire resistance classes according to DIN 4102 or DIN EN 13501

- German standard DIN 4102

The fire resistance classes of components, i.e. construction elements, are defined according to their fire behaviour. This is based on components fire tests according to DIN 4102-2 or other part of the 4102 standard.

Three items of information are used to describe the fire behaviour:

- The letter describes the type of classified component; for instance, "F" stands for supporting and space-enclosing components that are required to satisfy particular requirements in terms of fire resistance. They include walls, ceilings, struts, joists, stairwells and such like. "F" also stands for non-supporting interior walls.
- A number then states the duration of fire resistance. The various gradations (30, 60, 90, 120 and 180) specify the minimum duration in minutes during which a component must satisfy the defined requirements in a fire test.
- In addition to these classifications, DIN 4102 has another indicator to describe the fire behaviour of the main construction materials used in the component.

A The component consists exclusively of non-combustible construction materials.
AB All of the essential parts of the component consist of construction materials belonging to class A; construction materials in class B can be used otherwise.
B Essential parts of the component consists of flammable materials.

These three items of information produce the fire-resistance classes for components as defined in DIN 4102-2. The adjacent table shows the classification, the short name and a comparison of the "building inspectorate requirements".

Table 2:
Fire resistance classes of components according to DIN 4102-2 and their relevance under building inspectorate requirements (excerpt from DIN 4102-2, Tab. 2)

Building inspectorate requirements	Fire resistance class according to DIN 4102-2	Short description according to DIN 4102-2
Fire-retardant	Fire resistance class F 30	F 30-B
	Fire resistance class F 30 and mainly composed of "non-combustible" construction materials	F 30-AB
Fire-retardant and composed of "non-combustible" construction materials	Fire resistance class F 30 and composed of "non-combustible" construction materials	F 30
Highly fire-retardant	Fire resistance class F 60 and mainly composed of "non-combustible" construction materials	F 60-AB
	Fire resistance class F 60 and composed of "non-combustible" construction materials	F 60
Not easily flammable	Fire resistance class F 90 and mainly composed of "non-combustible" construction materials	F 90-AB
Not easily flammable and composed of "non-combustible" construction materials	Fire resistance class F 90 and composed of "non-combustible" construction materials	F 90-A
	Fire resistance class F 120 and composed of "non-combustible" construction materials	F 120-A
	Fire resistance class F 180 and composed of "non-combustible" construction materials	F 180-A

Classification of special components according to DIN 4102:

Some sections of DIN 4102 define requirements and tests for special components that also specify certain fire resistance classes. They include, in particular:

DIN EN 4102	Component	Fire resistance class
Part 3	External wall elements	W30 TO W180
Part 5	Fire barriers	T30 TO T180
Part 6	Ventilation lines and flaps	L30 TO L120
Part 9	Cable fire shields	S30 TO S180
Part 11	Pipe cladding and pipe firestops, installation shafts and barriers in their inspection openings	R30 TO R120 I30 TO I 120
Part 12	System integrity of electrical cables	E30 TO E90
Part 13	**Fire resistant glazing** **G glazing** **F glazing**	**G30 TO G120** **F30 TO I 120**

Construction law / Standardisation

European standard DIN EN 13051

Similar to the classification of fire behaviour for construction materials/construction products, the classification of fire behaviour for construction components/construction types according to the European standard DIN EN 13051, Parts 1 and 2, is more complex than in the German standard DIN 4102.

- It applies an equivalent method of letters and numbers to indicate the classification. Again the numbers indicate the duration of fire resistance in minutes, whereby the European classification system considers more intervals of time (20, 30, 45, 60, 90, 120 180 and 240 minutes).
- The letters describe the assessment criteria based on the type of component. But there is no indication for the essential construction materials used in the component.
- Other groups of letters provide additional information to describe the classification criteria.

Table 3: European classification criteria for the fire resistance of components, i.e. designs according to DIN EN 13501 (excerpt)

Abbreviation	Criterion	Application
R (Resistance)	Carrying capacity	to describe the fire resistance capability
E (Etancheite)	Protective barrier	
I (Isolation)	Thermal insulation (when exposed to fire)	
W (Radiation)	Limitation in heat transmission	
M (Mechanical)	Mechanical effects on the walls (impact stress)	
S (Smoke)	Limitation in smoke permeability (density, leakage rate)	Smoke protection doors (as additional requirement, also for fire barriers), ventilation systems, including flaps
C (Closing)	Self-closing property (with number of load cycles), including permanent function	Smoke protection doors, fire barriers (including barriers for transport systems)
P	Maintenance of power supply and/or signal transmission	Electrical cable systems in general
K1, K2	Fire protection capacity	Wall and ceiling panelling (fire protection panelling)
I1, I2	Different thermal insulation criteria	Fire barriers (including barriers for transport systems)
i → o i ← o i ↔ o (in-out)	Direction of the fire resistance duration	Non-supporting outside walls, installation shafts/ducts Ventilation systems, i.e. flaps
a ↔ b (above-below)	Direction of the fire resistance duration	Suspended ceilings
v_e h_0 vertical, horizontal)	Classified for vertical/horizontal installation	Ventilation lines/flaps

Construction law / Standardisation

Combined with the type of component, the fire resistance duration and additional data, there is now a broad variety of European fire resistance classes that did not exist at the time of the national classification system.
Table 4 lists a selection of components with their assigned fire-resistance classes according to DIN EN 13501, Parts 2 and 3. The first column refers to the building inspectorate requirements that are based on the provisions set forth in the Federal State Building Orders.
Details concerning the fire resistance classes according to DIN 4102 are shown in italics as a "comparison". The varying test and assessment
procedures applied to fire resistance classes according to German and European standards mean that a complete comparability is not possible; hence the values are intended merely to provide guidance.
In summary, although the European classification and test standards on the fire behaviour of components/ construction types can be used to test and classify on a European level, and although they exist as equals to the German DIN 4102 standard, fitness for purpose remains controlled by national regulations. It is therefore of the utmost importance to define and describe all requirements unequivocally during the phase of coexistence.

Table 4: Fire resistance classes of selected components according to DIN EN 13501 Part 2 and Part 3

Building inspectorate requirements	**Supporting components**		**Non-supporting interior walls**	**Non-supporting exterior walls**	**Self-supporting suspended ceilings**	**Fire barriers (also in transport systems)**
	without protective barrier	with protective barrier				
Fire-retardant	R 30 *F 30*	REI 30 *F 30*	EI 30 *F 30*	E 30 (i → o) EI 30 (i ← o) *W 30*	E 30 (a → b) EI 30 (a ← b) EI 30 (a ↔ b) *F 30*	EI2 30-C *T 30*
highly fire-retardant	R 60 *F 60*	REI 60 *F 60*	EI 60 *F 60*	E 60 (i → o) EI 60 (i ← o) *W 60*	E 60 (a → b) EI 60 (a ← b) EI 60 (a ↔ b) *F 60*	EI2 60-C *T 60*
not easily flammable	R 90 *F 90*	REI 90 *F 90*	EI 90 *F 90*	E 90 (i → o) EI 90 (i ← o) *W 90*	E 90 (a → b) EI 90 (a ← b) EI 90 (a ↔ b) *F 90*	EI2 90-C *T 90*
Fire resistance after 120 min	R 120 *F 120*	REI 120 *F 120*				
Fire wall		REI 90-M *F 90*	EI 90-M *F 90*			

Column 1 shows the assignment to the building inspectorate requirements
Content shown in italics indicates the comparable fire resistance classes according to DIN 4102

Construction law / Standard-isation

Product-specific classifications and terms

The following section provides a more precise definition of some terms, as the standards regulate a large number of construction materials/products, i.e. components/ building types and at the same time influence construction law regulations.

Fire-resistant glazing
Fire-resistant glazings are components comprising one or several translucent elements, installed in a frame with holder and enclosed within sealing and fastening elements prescribed by the manufacturer. The product can only be considered fire-resistant glazing if it consists of the entirety of these constructive elements and complies with all prescribed dimensions and dimensional tolerances.

Fire-resistant glazing in fire resistance class F (F glazing)
The term F glazing applies to all translucent building components in a vertical, inclined or horizontal alignment that are designed not merely to prevent the spread of fire and smoke as designated in their fire resistance duration, but also to stop transmittance of heat radiation.

Fire resistance glazing in fire resistance class G (G glazing)
The term F glazing applies to all translucent building components in a vertical, inclined or horizontal alignment that are designed merely to prevent the spread of fire and smoke as designated in their fire resistance duration. Transmittance of heat radiation is merely impeded.

Fire-retardant glazing
Fire-retardant glazing is the name give to fire-resistant glazing that satisfies at least the requirements of F 30. It stipulates that fire-retardant glazing shall be F glazing that is impervious to heat radiation for a period of at least 30 minutes in accordance with the requirements of DIN 4102 Part 13.

Fireproof glazing
Fireproof is the name give to fire-resistant glazing that satisfies at least the requirements of F 90. It stipulates that fire-retardant glazing shall be F glazing that is impervious to heat radiation for a period of at least 90 minutes in accordance with the requirements of DIN 4102 Part 13.

“Fire resistance” glazing
Glazing described as fire-resistant provides a room barrier according to DIN 4102 Part 13 in the case of fire, but it permits the transmittance of heat and hence is not used with the building inspectorate designations or “fire-retardant” and “fireproof”. This includes all G glazing

Fire resistance classes according to DIN 4102

Fire resistance duration in minutes	F glazing	G glazing
≥ 30	F 30	G 30
≥ 60	F 60	G 60
≥ 90	F 90	G 90
≥ 120	F 120	G 120

The following terms and classifications are equivalent to the European provisions: The letters R, E, I and W are used to describe the fire resistance capability. S and C describe criteria applicable to fire doors and fire barriers.

R (Resistance / Loadbearing capacity)
The capability of a component to withstand fire stress from one or several sides without losing stability.

E (Étanchéité / Room barrier)
The capability of a component to act as a barrier to a room and to withstand fire stress from one side. It prevents the spread of fire to the side away from the fire caused by the passage of flames or substantial quantities of hot gases that would lead to combustion on the side away from the fire or in adjacent material.

W (Radiation / Radiation reduction)
The capability of a component to act as a barrier to a room and to withstand fire stress from one side such that the heat radiation measured on the side away from the fire remains below a certain value for a defined period.

Construction law / Standardisation

I (Isolation)
The capability of a construction component to withstand fire load applied from just one side without transferring the fire due to an excessive transmittance of heat from the fire side to the side opposite the fire, thus leading to combustion in the side opposite the fire or of adjacent materials, as well as the capability to present a sufficiently strong thermal barrier for the period defined in the classification in order to protect the lives of persons located in the vicinity of the structural element.

S (Smoke)
The capability of a construction component to restrict the movement of hot or cold gases or smoke from one side to the other.

C (Closing)
The capability of a construction component to automatically close an opening (either after each opening or only in cases of fire) in the event of the emergence of fire or smoke.

Classification of the fire resistance of non-loadbearing fire resistant glazing enclosing a space

a) Curtain walls and exterior walls
(EN 1364-2, EN 1364-4)

Fire resistance duration in minutes	E glazing	EW glazing	EI glazing
15	E-15		EI-15
20		EW-20	EI-20
30	E-30	EW-30	EI-30
45	E-45		EI-45
60	E-60	EW-60	EI-60
90	E-90		EI-90

Curtain walls and exterior walls can be tested in different ways from both sides:

- Fire exposure from inside:
  Uniform temperature curve

- Fire exposure from outside:
  A temperature/time curve equivalent to ETK to 600°C and then even for the rest of the test duration.

The following abbreviation describes the direction of the classified fire resistance duration
“i → o“ / inside - outside
“i → o“ / outside - inside
“i → o“ / inside and outside

The classification of curtain facades and exterior walls usually refers to both loads.

b) Partition walls (EN 1364-1)

Fire resistance duration in minutes	E glazing	EW glazing	EI glazing
15			EI-15
20	E-20	EW-20	EI-20
30	E-30	EW-30	EI-30
45			EI-45
60	E-60	EW-60	EI-60
90	E-90		EI-90
120	E-120		EI-120
180			EI-180
240			EI-240

c) Fire barriers (EN 1634-1)

Fire resistance duration in minutes	E glazing	EW glazing	EI glazing
15	E-15		EI-15
20		EW-20	EI-20
30	E-30	EW-30	EI-30
45	E-45		EI-45
60	E-60	EW-60	EI-60
90	E-90		EI-90
120	E-120		EI-120
180	E-180		EI-180
240	E-240		EI-240

Classifications C and S may be necessary in addition for certain types of fire barrier.

Construction law / Standardisation

Validation process

Allocation of the DIN classifications within the Federal State Building Order
The terms used by the building inspectorate of “fire retardant” and “fire resistant” are not mentioned in DIN 4102. The federal states of Germany issued decrees to introduce DIN 4102 within building inspectorate procedures that specify whether components classified in fire resistance classes according to this standard should be considered “fire retardant” or “fire resistant”.

Official validation of fitness for purpose
The suitability of construction materials or components for the purpose of fire resistance in structural engineering must usually be provided in the form of a test certificate issued by an accredited test institute.
This does not apply to construction materials and components that are listed and classified in DIN 4102 Part 4. Components that cannot be assessed solely according to DIN 4102 require separate validation. Fire resistance glazing belongs in this category.

General construction test certificate (abP)
A general construction test certificate (abP) is a proof of fitness for purpose that is issued for a construction product whose use is not associated with the satisfaction of significant requirements in regard to the safety of structures, or for a construction product that can be assessed according to generally accepted test methodologies (Sect 19 (1) Model Building Code (MBO)). The Construction Product List A Part 1, Part 2 and Part 3 state in detail for which products an abP can be issued. Exclusively the test institutes accredited by the Deutsche Institut für Bautechnik (DIBt) or the most senior building inspectorate are entitled to issue an abP.
An abP cannot be issued for fire-resistant glazing.

General building authorisation (abZ)
General building authorisations (abZ) are issued for construction products and construction techniques that are governed by the Federal State Building Codes and for which there are no generally acknowledged rules of technology, in particular DIN standards, or that differ substantially from these rules. Exclusively the Deutsche Institut für Bautechnik issues general building authorisations on behalf of the federal states. They are a validation of the fitness for purpose, i.e. suitability for use, of an unregulated construction product or an unregulated construction technique in regard to the building inspectorate requirements defined in the Federal State Building Codes. Fire-resistance glazing is regulated by abZs.

Case-by-case approval
Case-by-case approval, known as ZiE, can be applied for if fire-resistance glazing approved by the building inspectorate is not available to satisfy a certain requirement. This applies also if the actual construction implemented differs from the approval. The case-by-case approval replaces the missing approval by the building inspectorate in an exceptional instance.

The principal must place an application for this approval with the senior building inspectorate in the respective federal state in which the project is being implemented. In most cases an application for case-by-case approval will be granted if test findings validate the fitness for purpose or if there are equivalent findings available elsewhere (assessor’s report), or if the effort involved in performing the tests is considered unreasonable and if the use in the intended construction technique is considered acceptance from a fire-resistance perspective.

The following page lists the competent bodies in the individual federal states.

Assessor’s report
An assessor’s report (GaS) if issued by a state-accredited test institute. It is considered a validation of fitness for purpose in place of testing, provided this can be ascertained by an expert’s opinion. It is submitted to the Deutsche Institut für Bautechnik, i.e. to the competent senior building inspectorate. The application for an assessor’s report should always take place in consultation with the senior building inspectorate. It is advisable to commission the report from the test institute that performed the fire tests for the respective approval. These are the following institutes for the approval of Stabalux systems:

Construction law / Standardisation

Test body	Telephone	Telefax
MPA NRW Materialprüfamt Nordrhein-Westfalen Erwitte Branch, Auf den Thränen 2 D-59597 Erwitte	+49 (0)2943/8970 (Switchboard) +49 (0)2943/89715 (Mr Werner)	+49 (0)2943/89733
IBMB MPA Braunschweig Materialprüfamt für das Bauwesen Beethovenstraße 52 D-38106 Braunschweig	+49 (0)531/391/5472 (Switchboard) +49 (0)531/391 5909	+49 (0)531/391 8159

Competent authorities for the issue of approval in individual cases

Federal state	Ministry	Telephone	Telefax
Baden-Württemberg	Haus der Wirtschaft, Landesstelle für Bautechnik, Willy Bleicher Straße 19, D-70174 Stuttgart	+49 (0)711/1230 (Switchboard) +49 (0)711/123 3385	+49 (0)711/123 3388
Free State of Bavaria	Bayerisches Staatsministerium des Innern, -Oberste Baubehörde- Postfach 22 00 36, D-80535 Munich	+49 (0)89/219202 (Switchboard) +49 (0)89/2192 3449 (Dr Schu-bert) 089/2192/3496 (Hr. Keil)	+49 (0)89/2192 13498
Berlin	Senatsverwaltung für Stadtentwicklung –II- Prüfamt für Bautechnik und Rechtsangelegenheiten der Bauaufsicht, Abteilung 6E21 Württenbergische Straße 6, D-10702 Berlin	+49 (0)30/900 (Switchboard) +49 (0)30/90124809 (Dr Espich)	+49 (0)30/901 23 525
Brandenburg	Ministerium für Stadtentwicklung, Wohnen und Verkehr des Landes Brandenburg, Referat 24 Henning-von-Tresckow-Straße 2-8 D-14467 Potsdam	+49 (0)331/8660 (Switchboard) +49 (0)331/866 8333	+49 (0)331/866 8363
Free Hanseatic City of Bremen	Free Hanseatic City of Bremen Der Senator für Bau und Umwelt Ansgaritorstraße 2, D-28195 Bremen	+49 (0)421/3610 (Switchboard)	
Free Hanseatic City of Hamburg	Free Hanseatic City of Hamburg Amt für Bauordnung und Hochbau Stadthausbrücke 8, D-20355 Hamburg	+49 (0)40/428400 (Switchboard) +49 (0)40/428 40 3832	+49 (0)40/428 40 3098
Hesse	Hessisches Ministerium für Wirtschaft, Verkehr und Landesentwicklung –Abteilung VII- Kaiser-Friedrich-Ring 75, D-65185 Wiesbaden	+49 (0)611/8150 (Switchboard) +49 (0)611/815 2941	+49 (0)611/815 2219
Mecklenburg-Vorpom-mern	Ministerium für Arbeit und Bau Mecklenburg-Vorpommern Abteilung II, Schloßstraße 6-8 D-19053 Schwerin	+49 (0)385/5880 (Switchboard) +49 (0)385/588 3611 (Mr Harder)	+49 (0)385/588 3625
Lower Saxony	Niedersächsisches Innenministerium, Abteilung 5 Lavesallee 6, D-30169 Hannover	+49 (0)511/1200 (Switchboard) +49 (0)511/120 2924 (Mr Bode) +49 (0)511/120 2925 (Mr Janke)	+49 (0)511/120 3093
North Rhine Westphalia	Ministerium für Städtebau und Wohnen, Kultur und Sport des Landes Nordrhein-Westfalen, Abteilung II, Elisabethstraße 5-11 D-40217 Düsseldorf	+49 (0)211/38430 (Switchboard) +49 (0)211/384 3222	+49 (0)211/384 3639
Rhineland Palatinate	Ministerium für Innen und Sport des Landes Rhein-land-Pfalz Schillerstraße 3-5, D-55116 Mainz	+49 (0)6131/160 (Switchboard) +49 (0)6131/163406	+49 (0)6131/163447
Saarland	Ministerium für Umwelt, Oberste Bauaufsicht Keppelerstraße 18, D-66117 Saarbrücken	+49 (0)681/50100 (Switchboard) +49 (0)681/501 4771 (Ms Elleger)	+49 (0)681/501 4101
Saxony Anhalt	Ministerium für Wohnungswesen, Städtebau und Verkehr des Landes Sachsen-Anhalt, Abteilung II Turmschanzenstraße 30, D-39114 Magdburg	+49 (0)391/56701 (Switchboard) +49 (0)391/567 7421	

Construction law / Standardisation

Federal state	Ministry	Telephone	Telefax
Free State of Saxony	Sächsisches Staatsministerium des Innern, Abteilung 5, Referat 53 Wilhelm-Buck-Straße 2, D-01095 Dresden	+49 (0)351 / 5640 (Switchboard) +49 (0)351 / 643530 (Dr Fischer)	+49 (0)351 / 5643509
Schleswig-Holstein	Innenministerium des Landes Schleswig-Holstein, Bauaufsicht und Landesbauord-nung, Referat IV 65 Düsternbrooker Weg 92, D-24105 Kiel	+49 (0)431 / 9880 (Switchboard) +49 (0)431 / 9883319 (Mr Dammann)	+49 (0)431 / 9882833
Thuringia	Oberste Bauaufsichtsbehörde im Thüringer Innen-ministerium Referat 50b, Bautechnik, Steigerstraße 24, D-99096 Erfurt	+49 (0)361 / 37900 (Switchboard) +49 (0)361 / 3793931 (Ms Müller)	+49 (0)361 / 3793048

Burglary-resistant facades

Recommendations for use

The selection of applicable resistance class must be made to reflect the individual hazard exposure, for instance the location of the property or the exposure of the particular element.The police services information centres and insurance providers offer assistance in this respect.
DIN EN 1627 assigns construction components to the resistance classes RC1 to RC6. They each define minimum requirements for the system and the mounted glazing and panels.

Regulations and testing

The standard DIN EN1627 defines the requirements for and classification of a burglary-resistant facade. The test methods used to determine resistance under static and dynamic load are defined in the standards DIN EN 1628 and DIN EN 1629. The test method for the determination of resistance to manual burglary attempts is defined in DIN EN 1630. Validation of adherence to the requirements set forth in the aforementioned standards must be obtained from an accredited test institute. The filling elements used are governed by the standard DIN EN 356.

Labelling and validation obligations

The system provider must submit assembly instructions and a test report as minimum requirements. An assessor's report clarifies the influence of deviations in or changes to the test specimens in respect of their capability to withstand burglary attempts.

An assembly certificate should be obtained from the facade manufacturer, confirming that assembly was performed professionally and according to the assembly instructions issued by the system provider. DIN EN 1627 contains a template for this purpose. Stabalux can also provide a suitable template. The assembly certificate must be submitted to the principal.

The processor can also, as a means of voluntary quality assurance, obtain certification according to DIN CERTCO or an alternative certification institute accredited according to DIN EN 45011.

In this case, construction components with burglary-resistant properties must be labelled permanently, for instance using a name plate attached discretely on the facade. The name plate must be clearly legible and have a minimum size of 105 mm x 18mm; it must contain the following information at least:

- Burglary-resistant component according to DIN EN 1627
- Achieved resistance class
- Product designation by the system provider
- Certification mark if applicable
- Manufacturer
- Test report number ..., date ...
- Notifying body, code as applicable
- Year of manufacture

Police services only recommend the use of a business certified by an accredited certification institute. The certification programme "Burglary protection", which is available from DIN CERTCO, contains additional information on the issue of the "DIN tested" label.

Tested systems

- Stabalux H RC 2
- Stabalux AK-H RC 2

Burglary-resistant facades

Design

The most important properties in the construction of a burglary-resistant facade are:

- Use of tested panes and panels as filling elements.
- Definition of the inlay depth for the filling elements.
- Installation of lateral blocks to prevent displacement of the filling elements.
- Use of a stainless steel bottom strip for the clamp connection.
- Definition of the screw spacing and the screw depths
- Securing of the screws against loosening.

The appearance of burglar-resistant facades using Stabalux System H is the same as the normal construction.

- The same design options and styles are possible as with a normal construction.
- All upper strips can be used when fitting stainless steel bottom strips.
- All inner seal systems (1, 2 and 3 sections) can be used.
- Stabalux system H preserves all of the benefits thanks to direct screw fittings in the milled groove.

Burglary-resistant facades

9.8
1

Assembly certificate
according to DIN EN 1627

Company: ....

Address: ....

....

certifies that the burglar-resistant components listed hereafter were installed
according to the specification of the assembly instructions (appended with the test report)

in the property: ....

Address: ....

....

.

Part	Location in the property:	Resistance class	Particulars

....

Date Stamp Signature

Burglary-resistant facades - RC2

9.8
2

Resistance class RC2

In Stabalux system H, facades in resistance class RC2 can be mounted in the system widths 50 mm, 60 mm and 80 mm.

Compared to a normal facade, this only requires a minor additional
manufacturing workload in order to achieve resistance class RC2.

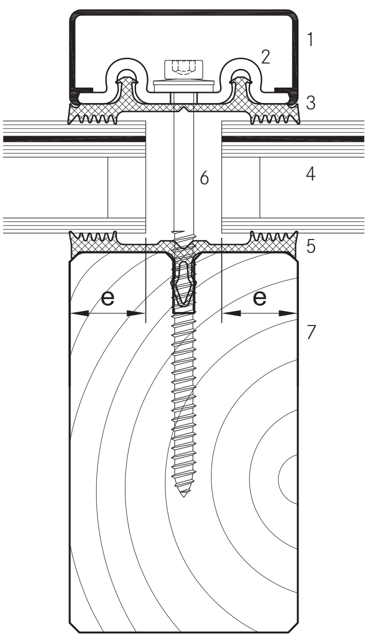
- Securing of the filling elements against lateral displacement.
- Arrangement and selection of the clamping strip screw fittings relative to the permissible axis dimensions in the fields.
- Securing of the clamping strip screw fitting against loosening.

System articles and filling elements are only approved for use if they have been tested and received a positive assessment.

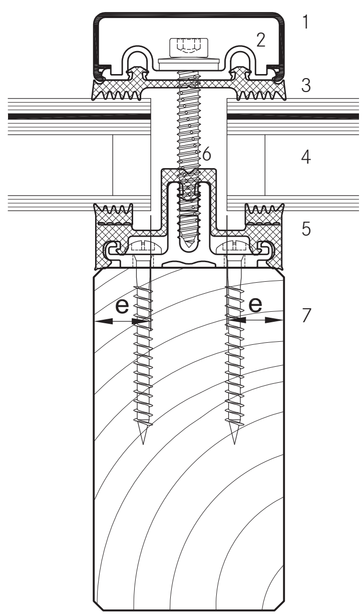
It is always necessary to validate that in the dimensions selected, the components used will satisfy the static requirements placed in the system for the specific project.

The design options for the facade remain preserved, as all aluminium upper strips that can be clipped on to the stainless steel bottom strips UL 5110, UL 6110 and UL 8110 can still be used.

Sealing systems
The inner sealing system for burglary-resistant facades can also use systems with 1 section or overlapping sealing systems with 2 or 3 sections.



Inset “e” of the filling element
System width 50 mm: s= 15 mm
System width 60 mm: e = 20 mm
System width 80 mm: e = 20 mm



TI-H_9.8_001.dwg

1 Upper strip
2 Bottom strip
3 Outer seal
4 Filling element
5 Inner seal
(e.g. with 1 drainage level)
6 System screw fittings
7 Timber support profile

Burglary-resistant facades - RC2

9.8
2

Approved system articles for the Stabalux H system

System components Stabalux H	System width 50 mm	System width 60 mm	System width 80 mm [1]
Mullion cross-section minimum dimensions	Timber profile, width b = 50 mm height at least H = 70 mm	Timber profile, width b = 60 mm height at least H = 70 mm	Timber profile, width b = 80 mm height at least H = 70 mm
Transom cross-section minimum dimensions	Timber profile, width b = 50 mm height at least H = 70 mm	Timber profile, width b = 60 mm height at least H = 70 mm	Timber profile, width b = 80 mm height at least H = 70 mm
Mullion-transom joint	bolted transom retainer according to the general building authorisation, or timber connection validated by the standard	bolted transom retainer according to the general building authorisation, or timber connection validated by the standard	bolted transom retainer according to the general building authorisation, or timber connection validated by the standard
Inner seal mullions	e.g.GD 5201	e.g. GD 6202	e.g. GD 8202
		e.g. GD 6206	
	e.g. GD 5314	e.g. GD 6314	e.g. GD 8314
	e.g. GD 5315	e.g. GD 6315	e.g. GD 8315
Inner seal transom (with connected transom)	e.g. GD 5203, GD 5204	e.g. GD 6204, e.g. GD 6205	e.g. GD 8204
		e.g. GD 6303	
	e.g. GD 5317	e.g. GD 6318	e.g. GD 8318
Outer seal mullion	e.g. GD 5024, GD 1932	e.g. GD 6024, GD 1932	e.g. GD 8024, GD 1932
Outer seal transom	e.g. GD 5054, GD 1932	e.g. GD 6054, GD 1932	e.g. GD 1932
Clamping strips	UL 5009	UL 6009	UL 8009
Screw fittings for clamping strips	System screws (cylinder head screw with sealing washer, internal hex, stainless steel, e.g. Z 0335)	System screws (cylinder head screw with sealing washer, internal hex, stainless steel, e.g. Z 0335)	System screws (cylinder head screw with sealing washer, internal hex, stainless steel, e.g. Z 0335)
Glass supports	GH 5053, i.e. GH 5055 (with hanger bolts, i.e. hardwood cylinders and bolts)	GH 5053, i.e. GH 5055 (with hanger bolts, i.e. hardwood cylinders and bolts)	GH 5053, i.e. GH 5055 (with hanger bolts, i.e. hardwood cylinders and bolts)
Lateral blocks	e.g. Z 1061 or blocks b x h = 24 mm x 20 mm Length ℓ = 120 mm, cut from PUR recycling material (e.g. Purenit, Phonotherm)	e.g. Z 1061 or blocks b x h = 24 mm x 20 mm Lengthℓ = 120 mm, Cut from PUR recycling material (e.g. Purenit, Phonotherm)	Blocks b x h = 36 mm x 20 mm Length ℓ = 120 mm, cut from PUR recycling material (e.g. Purenit, Phonotherm)
Screw locks	not necessary	not necessary	not neccessary

1) System articles for the system width 80 mm available only on request

Burglary-resistant facades - RC2

Approved system articles for the Stabalux AK-H system

System components Stabalux AK-H	**System width 50 mm**	**System width 60 mm**	**System width 80 mm** [1]
Mullion cross-section minimum dimensions	Timber profile, width b = 50 mm height at least H = 70 mm	Timber profile, width b = 60 mm height at least H = 70 mm	Timber profile, width b = 80 mm height at least H = 70 mm
Transom cross-section minimum dimensions	Timber profile, width b = 50 mm height at least H = 70 mm	Timber profile, width b = 60 mm height at least H = 70 mm	Timber profile, width b = 80 mm height at least H = 70 mm
Mullion-transom joint	bolted transom retainer according to the general building authorisation, or timber connection validated by the standard	bolted transom retainer according to the general building authorisation, or timber connection validated by the standard	bolted transom retainer according to the general building authorisation, or timber connection validated by the standard
Inner seal mullions	GD 5071	GD 6071	GD 8071
Inner seal transom (with connected transom)	GD 5072	GD 6072	GD 8072
	GD 5073	GD 6073	GD 8073
Outer seal mullion	e.g. GD 5024, GD 1932	e.g. GD 6024, GD 1932	e.g. GD 8024, GD 1932
Outer seal transom	e.g. GD 5054, GD 1932	e.g. GD 6054, GD 1932	e.g. GD 1932
Clamping strips	UL 5009	UL 6009	UL 8009
Screw fittings for clamping strips	System screws (cylinder head screw with sealing washer, internal hex, stainless steel, e.g. Z 0335)	System screws (cylinder head screw with sealing washer, internal hex, stainless steel, e.g. Z 0335)	System screws (cylinder head screw with sealing washer, internal hex, stainless steel, e.g. Z 0335)
Glass supports	GH 6071, GH 6072	GH 6071, GH 6072	GH 6071, GH 6072
Lateral blocks	e.g. Z 1061 or blocks b x h = 24 mm x 20 mm Length ℓ = 120 mm, cut from PUR recycling material (e.g. Purenit, Phonotherm)	e.g. Z 1061 or blocks b x h = 24 mm x 20 mm Lengthℓ = 120 mm, Cut from PUR recycling material (e.g. Purenit, Phonotherm)	Blocks b x h = 36 mm x 20 mm Length ℓ = 120 mm, cut from PUR recycling material (e.g. Purenit, Phonotherm)
Screw locks	not neccesary	not neccesary	not neccesary

1) System articles for the system width 80 mm available only on request

Burglary-resistant facades - RC2

Filling elements

It is important to check on-site that the filling elements satisfy the static requirements of the project.

Glazing and panels must satisfy the requirements of at least DIN EN 356.

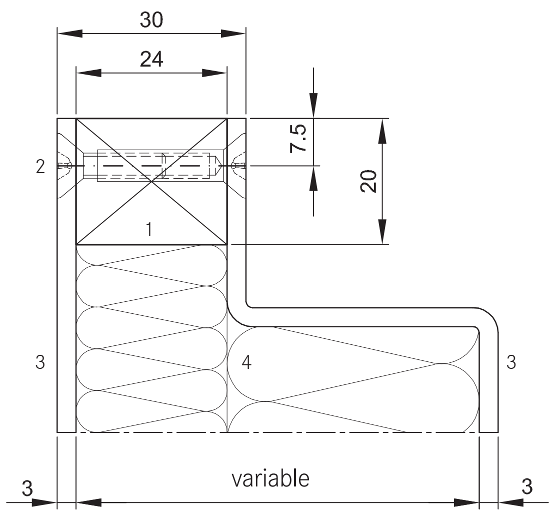
Glass

To satisfy resistance class RC2, it is necessary to fit impact-resistant glazing type P4A, as provided by the firm SAINT GOBAIN. The total structure of the glass has a thickness of approx. 30 mm.

- Product SGG STADIP PROTECT CP 410
- Resistance class P4A
- Multi-pane insulating glass, glass structure from outside in.
- 4 mm float /16mm SZR / 9.52 mm VSG
- Glass thickness Δ = 29,52 mm ≈ 30 mm
- Glass weight approx. 32 kg/m²

Panel

Panel structure:
3 mm aluminium sheet / 24 mm PUR (or comparable material) with reinforced edge bonding / 3 mm aluminium sheet. The total thickness is 30 mm.



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Edge bonding:
A circumferential edge of 24mm x 20 mm made of PUR recycling material (e.g. Purenit, Phonotherm) is inserted to reinforce the panels. Both sheets are screwed together in the area of the edge bonding; screws are positioned on each side in intervals of a ≤ 116 mm and screwed together along the entire length. Stainless steel screws Ø 3.9 mm x 38 mm can be used in this respect; they are cut off and ground down on the side not exposed to an attack. Fixing screws / nuts M4 can be used alternatively.
It is permitted, in order to satisfy additional requirements placed in the panel (e.g. in regard to thermal insulation), to deviate from the cross-section geometry shown in the diagram below. This applies only if the material thickness of the sheet aluminium t = 3 mm is preserved and the edge bonding is prepared as described above.

Inset of the filling elements

The inset of the filling elements is e = 15 mm for timber profiles in the system width 50 mm. The inset of the filling elements is e = 20 mm for timber profiles in the system width 60 mm and 80 mm.

1 Edge bonding
2 Screw fittings, e.g. fixing screw / nut M4
3 Aluminium sheet t = 3 mm
4 Insulation

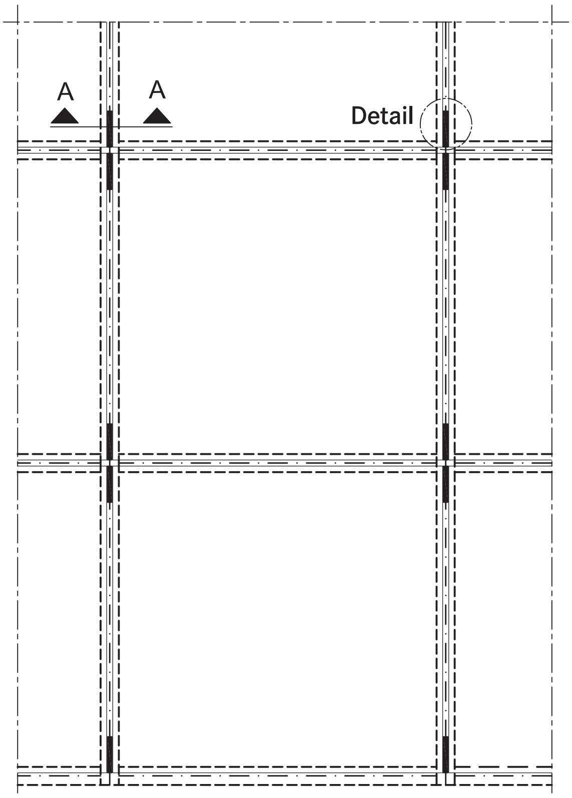
Burglary-resistant facades - RC2

Lateral blocks on the filling elements

The filling elements must be secured against lateral displacement. Installation of a lateral, pressure-resistant blocks prevents any displacement of the filling elements in the event of manipulation.

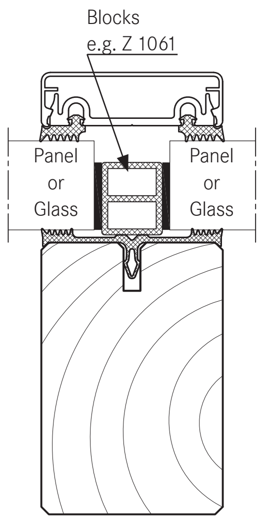
One block must be fitted in each corner of the mullion rebate. The blocks must be glued into the system. The glue used must be compatible with the edge bonding of the filling elements and the blocks. The blocks can also be fixed in place by screwing them to the timber profile.

In addition to the blocks used in the test (art. no. Z 1061, plastic tube h x b x t = 20 mm x 24 mm x 1.0 mm, length ℓ = 120 mm), the blocks can also be cut out of another pressure-resistant, non-absorbent material such as PUR recycling material (e.g. Purenit, Pho notherm).

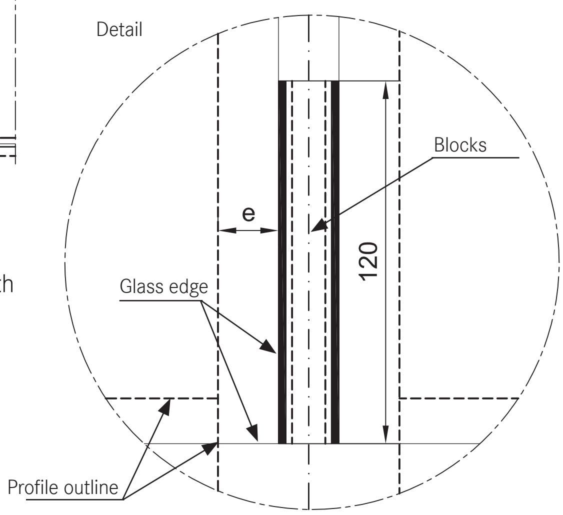


*)Glue in the blocks (the glue must be compatible with the edge bonding of the filling elements)
or
Use fixing screw to secure the position in the central groove

Cut A - A



Detail



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STABALUX

Burglary-resistant facades - RC2

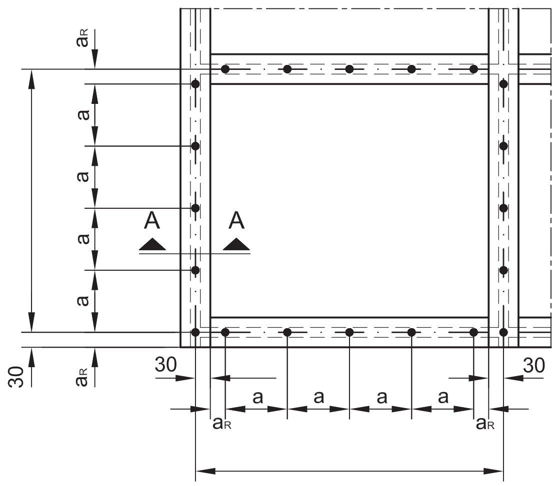
9.8
2

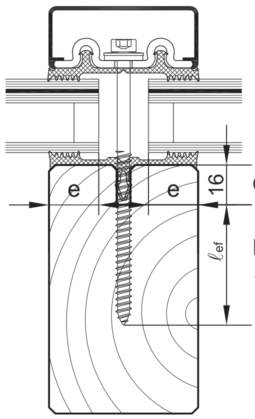
Screw fittings for clamping strips System H

- The screw fitting is positioned in the central groove of the timber profiles.
- The screw length must be calculated for each project.
- The effective insertion depth of the screws is $\ell_{ef} \geq 41$ mm.
- Holes must be pre-drilled with 0.7 · d = 4.6 mm to hold the screw fittings.
- The edge distance of the screw fittings for clamping strips is defined as a_R = 30 mm.
- The selection and arrangement of the screw fittings depends on the axis dimensions of the fields. The maximum distance between screws is a = 125 mm and must on no accounts be exceeded.
- The axis dimensions B and H can be selected indefinitely, the minimum field size is 485 x 535 mm. There must be at least 5 screws per side.

Securing clamping strip screw fittings against loosening

Securing the clamping strip screw connection is not necessary with the Stabalux H system.





Burglary-resistant facades - RC2

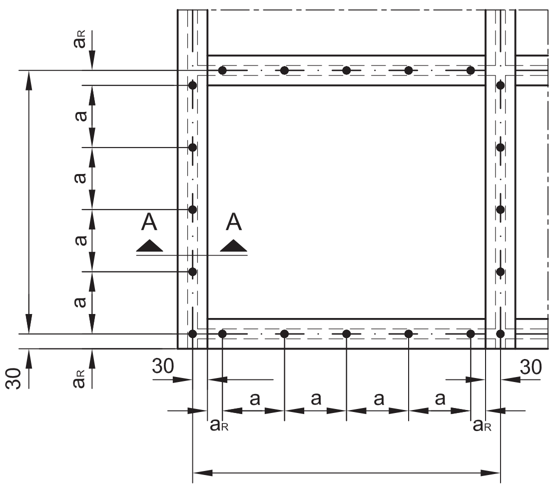
9.8
2

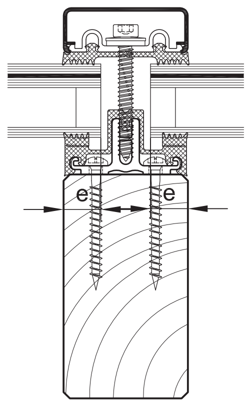
Screw fittings for clamping strips System AK-H

- The screw fitting is positioned in the screw channel.
- The screw length must be calculated for each project.
- The edge distance of the screw fittings for clamping strips is defined as a_R = 30 mm.
- The selection and arrangement of the screw fittings depends on the axis dimensions of the fields. The maximum distance between screws is a = 125 mm and must on no accounts be exceeded.
- The axis dimensions B and H can be selected indefinitely, the minimum field size is 485 x 535 mm. There must be at least 5 screws per side.

Securing clamping strip screw fittings against loosening

Securing the clamping strip screw connection is not necessary with the Stabalux AK-H system.





Burglary-resistant facades - RC2

Assembly instructions Stabalux H

The processing instructions provided in Section 1.2 of the catalogue apply as a rule to the system Stabalux H. The following items must be considered additionally and executed in the necessary stages of processing in order to satisfy the criteria of resistance class RC2.

1 Construction of the facade using the tested system articles and according to static requirements.

2 The filling elements (glass and panel) must be impact-resistant according to DIN EN 356. Tested glazing of the type P4A, for instance by SGG STADIP PROTECT CP 410 with approx. 30 mm glass structure, must be used in order to obtain resistance class RC2. The panel structure must be the same as the tested panel structure.

3 The inset of the filling elements is e = 15 mm for timber profiles in the system width 50 mm. The inset of the filling elements is e = 20 mm for timber profiles in the system width 60 mm and 80 mm.

4 Blocks must be used to secure the filling elements against lateral displacement. To achieve this, blocks are needed in each filling corner in the rebate of the mullion.

5 Exclusively Stabalux system screws with sealing washers and internal hex may be used (e.g. article no. Z 0335). The effective insertion depth of the screws, measured below the central groove, must be $\ell_{ef} \geq$ 41 mm. The edge distance of the screw fittings for clamping strips is a_R = 30 mm.

The maximum bolt spacing between them must not exceed the value a = 125 mm.

6 The glass supports should be positioned so that they can be mounted between the 125 mm screw grid.

7 The support of the mullions (head, foot and intermediate support) must be calculated with sufficient static leeway so that any forces applied during an attempted burglary can be absorbed with certainty. Accessible fixing screws must be secured against unauthorised loosening.

8 Burglary-resistant components are intended for installation in solid walls. The minimum requirements provided in DIN EN 1627 apply to wall connections.

Assignment of burglar-resistant components in resistance class RC2 to the walls

Resistance class of the burglary-resistant component according to DIN EN 1627	**Surrounding walls**							
	Masonry according to DIN 1053 – 1			Reinforced concrete according to DIN 1045		Aerated concrete wall		
	Rated thickness	Compressive strength class of the blocks	Mortar group	Rated thickness	Strength class	Rated thickness	Compressive strength class of the blocks	Execution
RC2	≥ 115 mm	≥ 12	II	≥ 100 mm	≥ B 15	≥ 170 mm	≥ 4	glued

Burglary-resistant facades - RC2

Assembly instructions Stabalux AK-H

The processing instructions provided in Section 3.2 of the catalogue apply as a rule to the system Stabalux AK-H. The following items must be considered additionally and executed in the necessary stages of processing in order to satisfy the criteria of resistance class RC2.

1 Construction of the facade using the tested system articles and according to static requirements.

2 The filling elements (glass and panel) must be impact-resistant according to DIN EN 356. Tested glazing of the type P4A, for instance by SGG STADIP PROTECT CP 410 with approx. 30 mm glass structure, must be used in order to obtain resistance class RC2. The panel structure must be the same as the tested panel structure.

3 The inset of the filling elements is e = 15 mm for timber profiles in the system width 50 mm. The inset of the filling elements is e = 20 mm for timber profiles in the system width 60 mm and 80 mm.

4 Blocks must be used to secure the filling elements against lateral displacement. To achieve this, blocks are needed in each filling corner in the rebate of the mullion.

5 Exclusively Stabalux system screws with sealing washers and internal hex may be used (e.g. article no. Z 0156). The edge distance of the screw fittings for clamping strips is a_R = 30 mm.

The maximum bolt spacing between them must not exceed the value a = 125 mm.

6 The glass supports should be positioned so that they can be mounted between the 125 mm screw grid.

7 The support of the mullions (head, foot and intermediate support) must be calculated with sufficient static leeway so that any forces applied during an attempted burglary can be absorbed with certainty. Accessible fixing screws must be secured against unauthorised loosening.

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RC2	≥ 115 mm	≥ 12	II	≥ 100 mm	≥ B 15	≥ 170 mm	≥ 4	glued