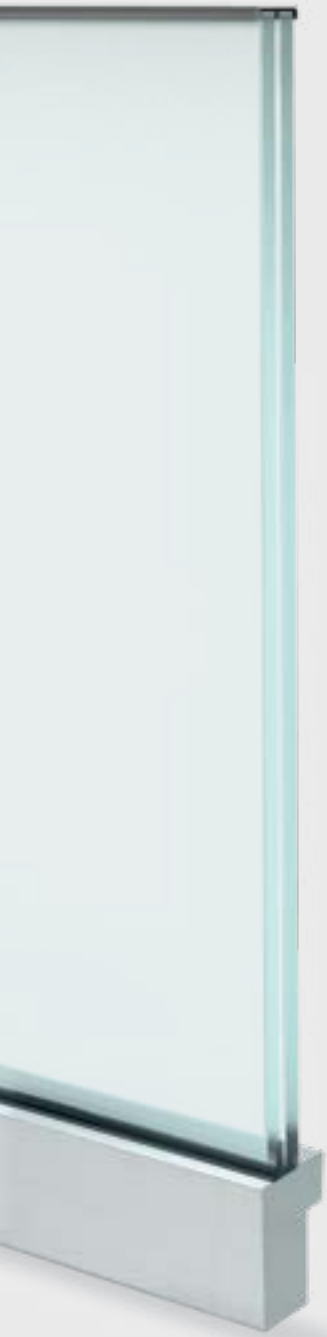
GLASSLINE

Planning manual

BALARDO *steel*

Frameless glass balustrade



BALARDO *steel* – The original

The first, modular frameless glass balustrade made of steel with high application flexibility for elevated floor structures, uneven substrates and ETICS bridges.

- **1 support profile and 2 glass fitting systems: Wedge system and rod system**
- **13 connection systems for bolting or welding to the top and side of the building structure.**
- **Quick and easy fitting**
- **For private and public construction projects**
- **Up to 1.0 kN/m top rail load (for higher top rail loads, BALARDO *hybrid* and *core hd* are recommended)**
- **Glass panes up to 6,000 mm wide and 1,400 mm high**
- **Laminated safety glass (LG) structures 2 x 8 mm and 2 x 10 mm with PVB 1.52 mm**
- **For indoor and outdoor areas**
- **For levels and stairs**

ETA
With European Technical Assessment (ETA)

CE
CE marking

AbP
With general building authority test certificate (AbP)

With type-tested structural analysis

LGA tested
LGA tested safety

Also used in sports complexes Ball-proof.

DIN 18008-4 geprüft
DIN 18008-4 tested

MADE IN GERMANY

Table of Contents

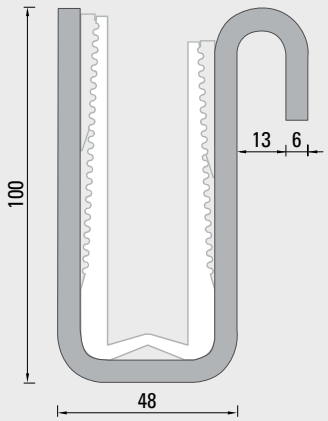
Wedge system

Assembly set

**2 systems for quick glass installation.
You have the choice.**

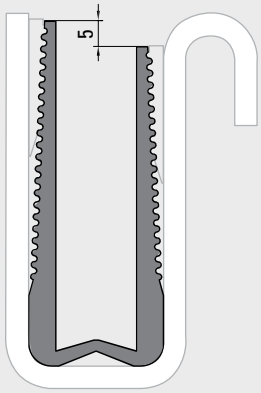
Support profile

- Material: Steel
  - galvanised, drilled or left blank
  - plain, drilled or left blank
- Delivery length: 2,400 mm



Clamping shoe

- Material: EPDM
- Delivery length: 2,400 mm

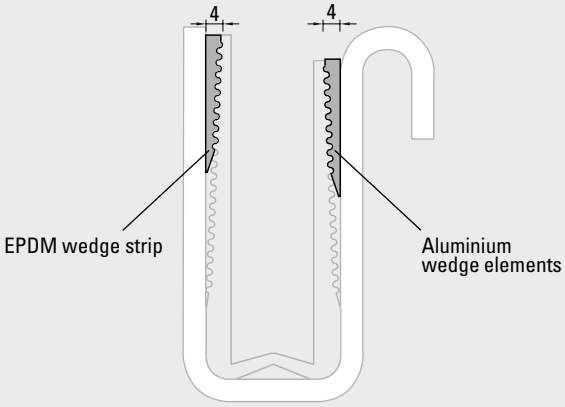


Wedge strip

- Material: EPDM
- Delivery length: 2,400 mm
- Thickness: 4 mm

Aluminium wedge elements

- Material: Aluminium
- Delivery length: 20 x 120 mm
- Thickness: 4 mm



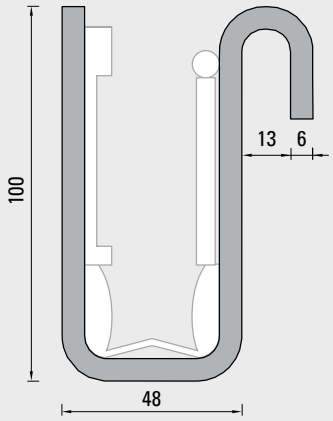
Wedge strip and aluminium wedge elements 3 or 5 mm as a compensation set see Accessories Page 80.
Assembly see Page 88-89.

Rod system

Assembly set

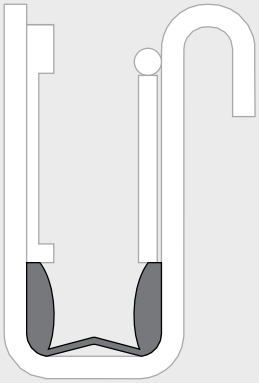
Support profile

- Material: Steel
  - galvanised, drilled or left blank
  - plain, drilled or left blank
- Delivery length: 2,400 mm



Clamping shoe

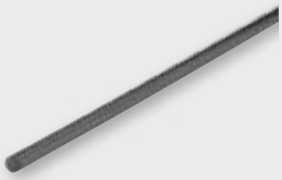
- Material: EPDM
- Delivery length: 2,400 mm



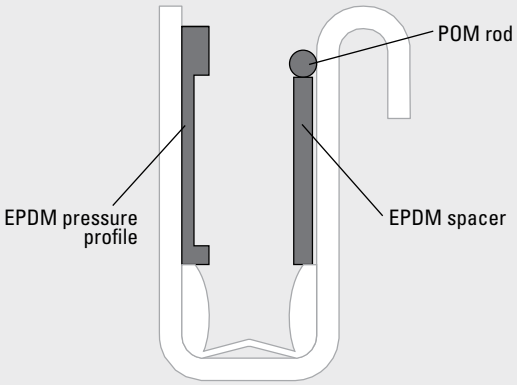
Pressure profile + spacer

- Material: EPDM
- Delivery length: 2,400 mm
- Pressure profile thickness:
  11 mm for LG 2 x 8 mm or
  9 mm for LG 2 x 10 mm

POM rod



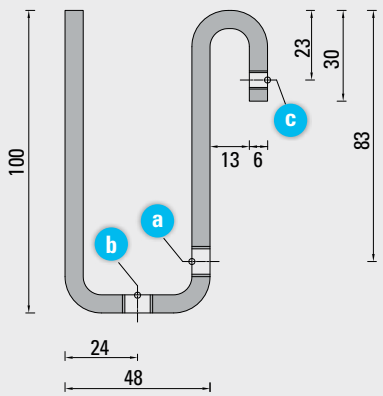
- Material: POM
- Delivery length: 300 mm
- Ø 10 mm for LG 2 x 8 mm or
  Ø 8 mm for LG 2 x 10 mm

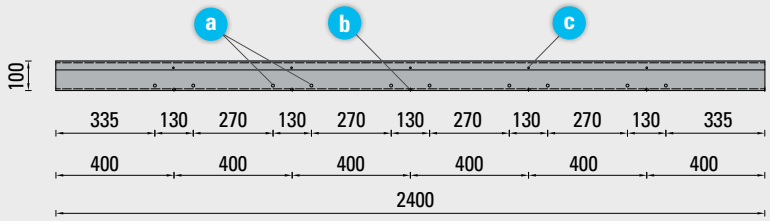


Pressure profile 8 and 10 mm and POM rod Ø 7, 9 and 11 mm as a compensation set see Accessories Page 80.
Assembly see Page 90-91.

Connection to building

From above or from the side, bolted or welded





a	M10	For bolting on, for top or side connection
b	M10	For bolting on, for side connection with bracket
c	M6	Locking bolt for securing the position

Special drilling pattern on request

Connection from above

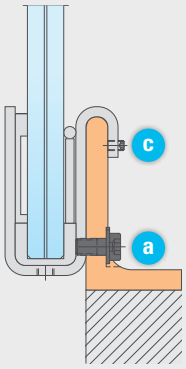
Distance ≤ 800*mm

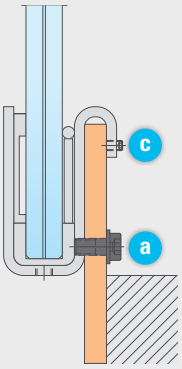
Lateral connection

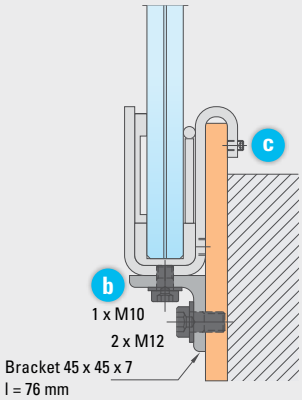
Distance ≤ 800*mm

with bracket fitting

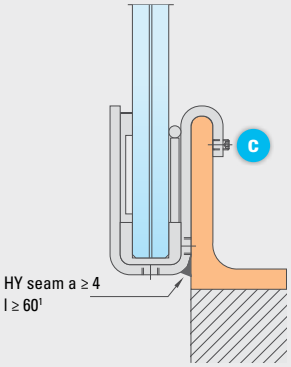
bolted

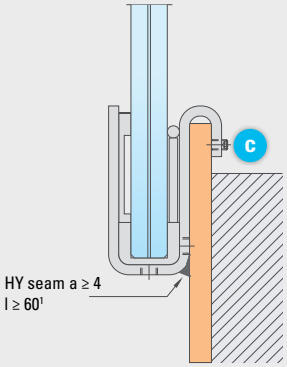






welded





Apply a liquid threadlocker (e.g. Loctite) to all bolted connections to secure them permanently.

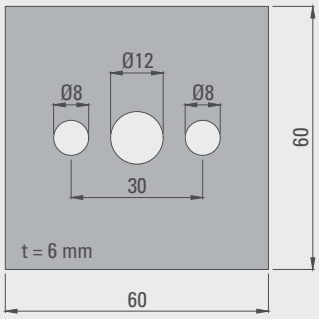
* In case of increased static requirements, distance 400 mm, see Page 65.

[1] In case of rotated bracket (reverse loading condition) l ≥ 120 mm.

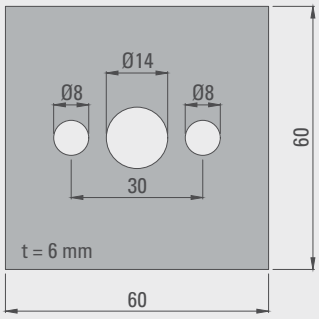
Filler panes

for filling remaining cavities/gaps

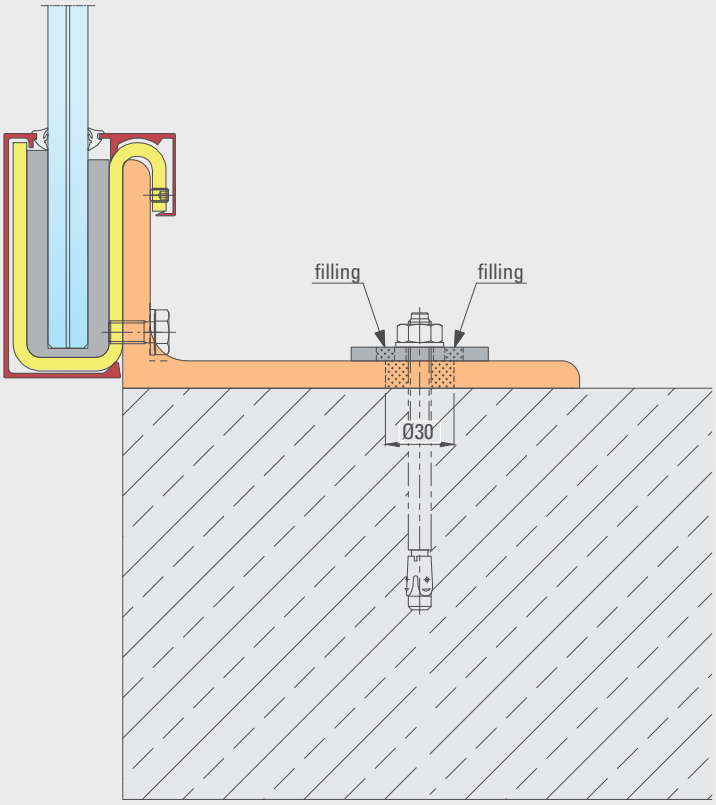
Filler pane M10
for fastener Ø10 mm

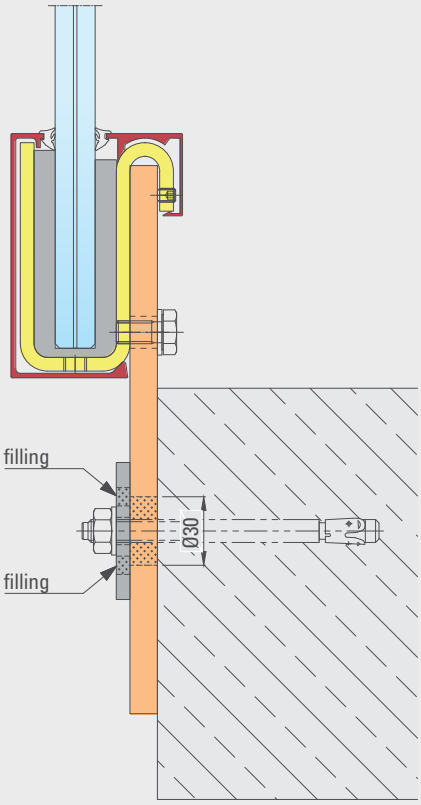


Filler pane M12
for fastener Ø12 mm



- Material: Steel, S235
- Surface: galvanised





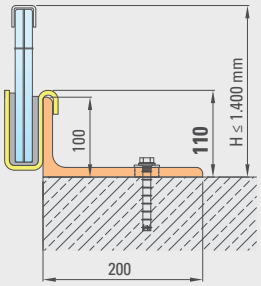
Fill the remaining cavities/gaps in the connection and support elements of bolted connections with fillers (e.g. Hilti-HIT) in a load-bearing manner.
Filler panes and Hilti-HIT see Accessories Page 81.

13 systems for different floor structures

Connection to the substructure from **above up to 260 mm**

System 1

Page 10



System 2.A

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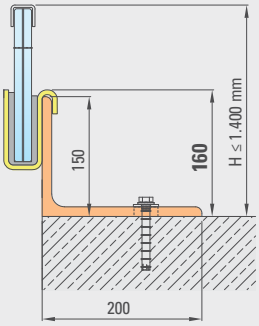
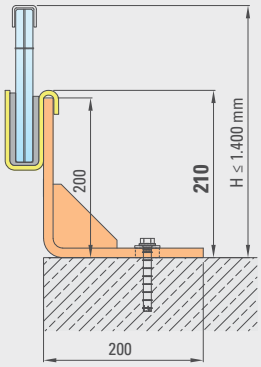


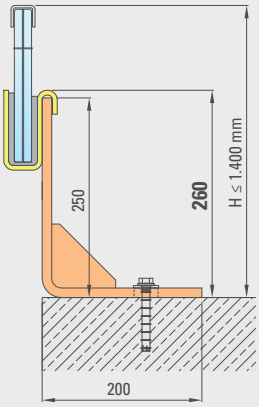
System 2.B

Page 18



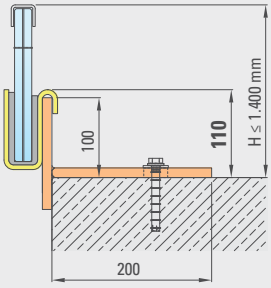
System 2.C

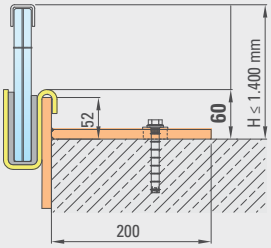
Page 22



System 5

Page 34



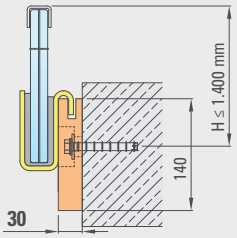


Lateral connection to the substructure, **distance up to 180 mm**

Directly to the building

System 3

Page 26



System 4

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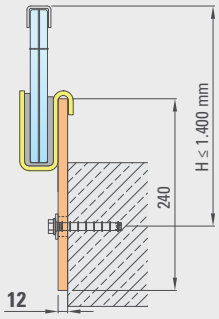
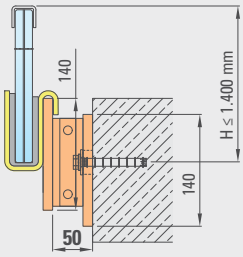


Distance 50 mm

System 6

Page 38



System 7

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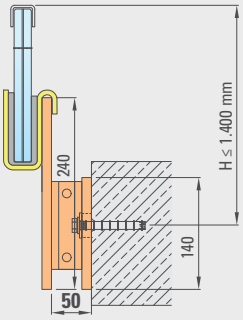

Distance 90 mm

System 8

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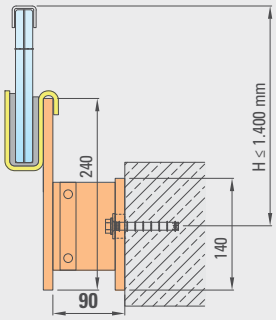
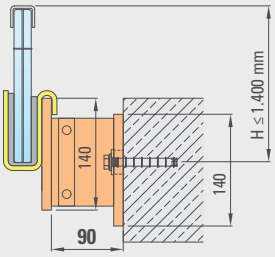


System 9

Page 50



Distance 180 mm

System 10

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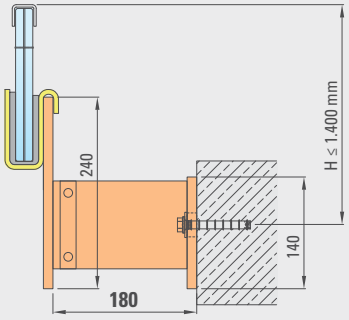
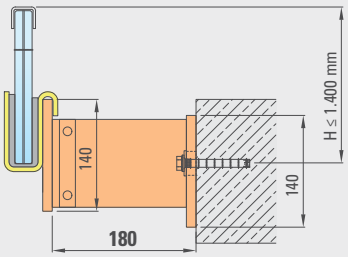


System 11

Page 58

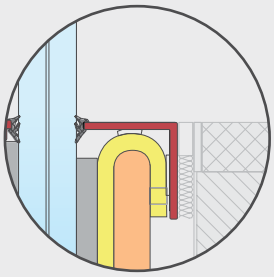


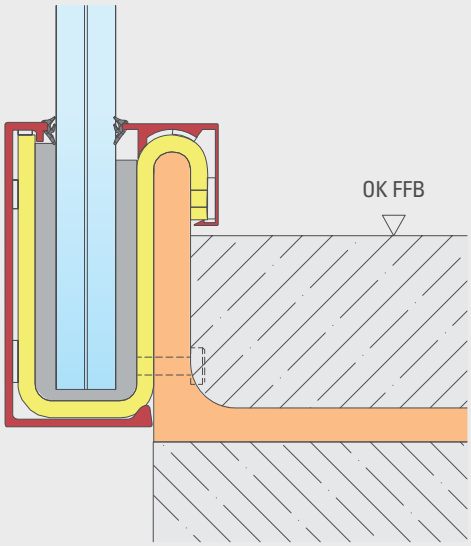
System 1

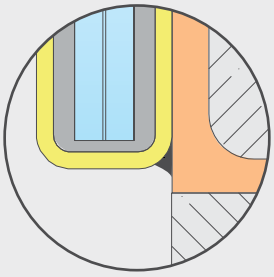
Master plan

Connection from above, bolted or welded

Floor structure up to 110 mm

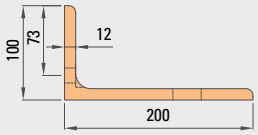


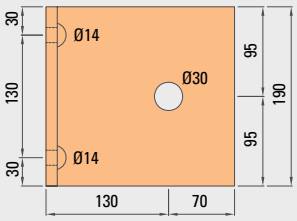




System 1

Structural connection element and trim set



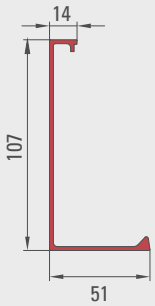


- Material: Steel, S355
- Surface: galvanised

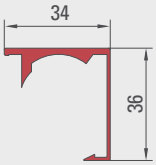
L 200 x 100 x 12 · Length = 190 mm

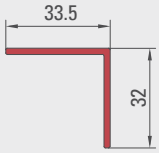
Ø 14: for bolting onto the support profile
Ø 30: for dowel fastening

Outer trim clip-on profile



Inner trim clip-on profile and connection bracket

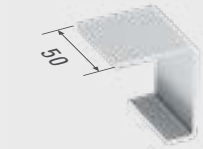


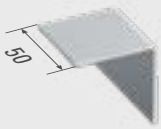


- Material: Aluminium
- Delivery length: 3,000 mm

- Surface
  - "Natural" untreated
  - stainless steel effect (E6EV1)
  - RAL or special colour, powder-coated or anodised

Splice plate



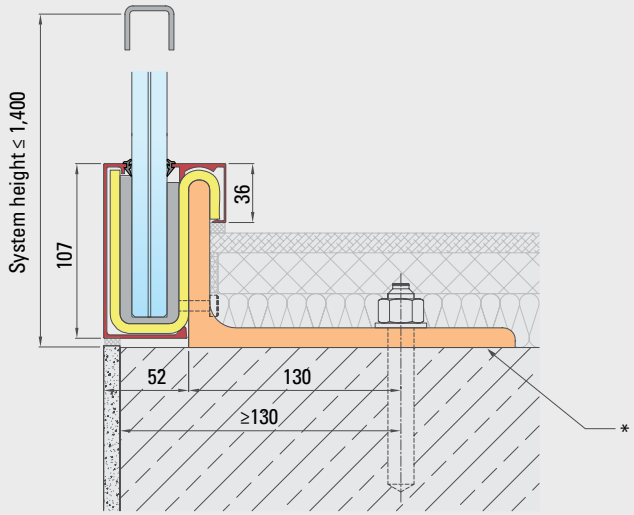


For details about the splice plates see Page 82-83.

System 1

Application examples

1



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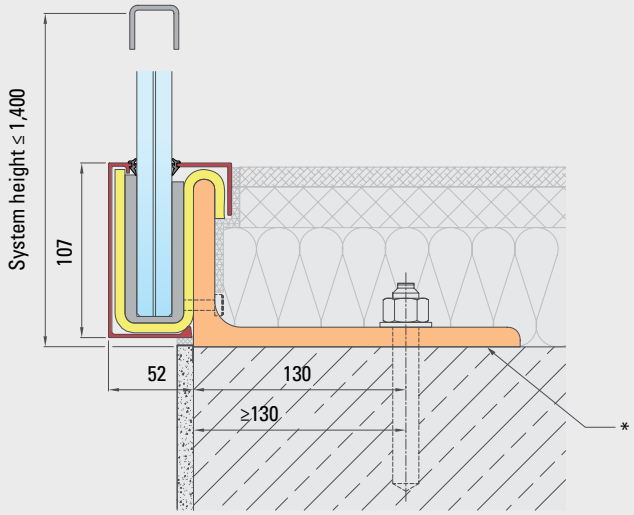


* Pressure-resistant thermal separation (e.g. Thermostop)

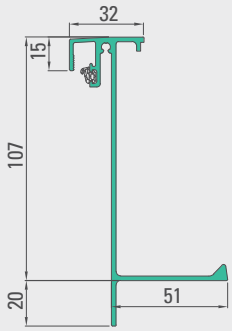
Welding the support profile onto the building connection element see Page 6.

Fastener spacing 400 or 800 mm, see tables Page 64-65.

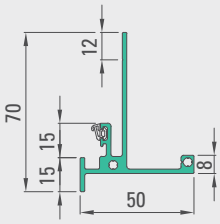
System 1

Profiles for on-site structural cladding

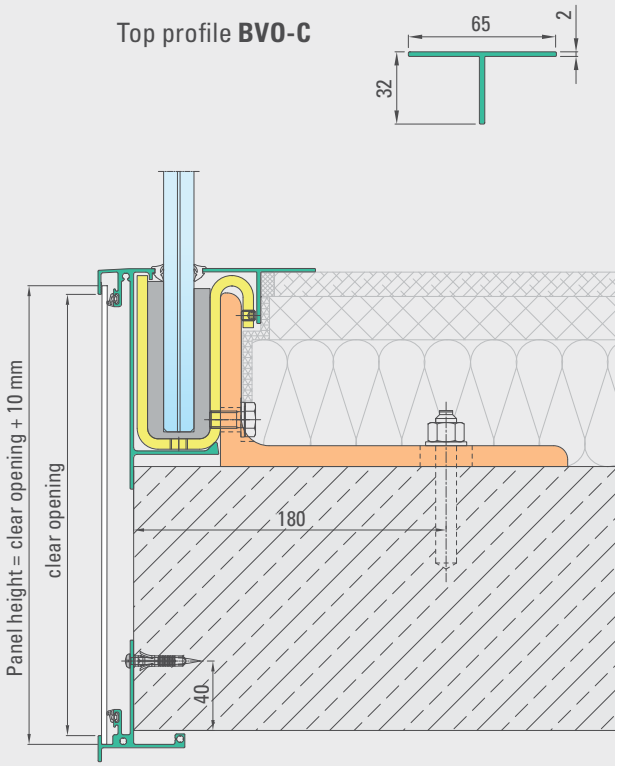
Top profile **BVO-A**



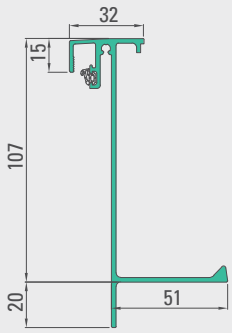
Bottom profile **BVU-A**



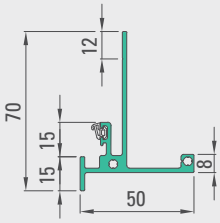
Top profile **BVO-C**



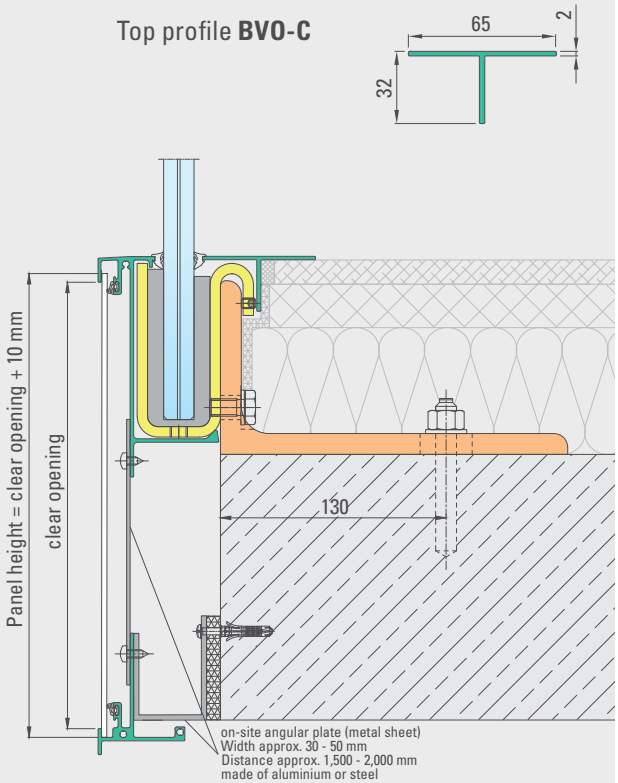
Top profile **BVO-A**



Bottom profile **BVU-A**



Top profile **BVO-C**



Panel thickness 3-5 mm.

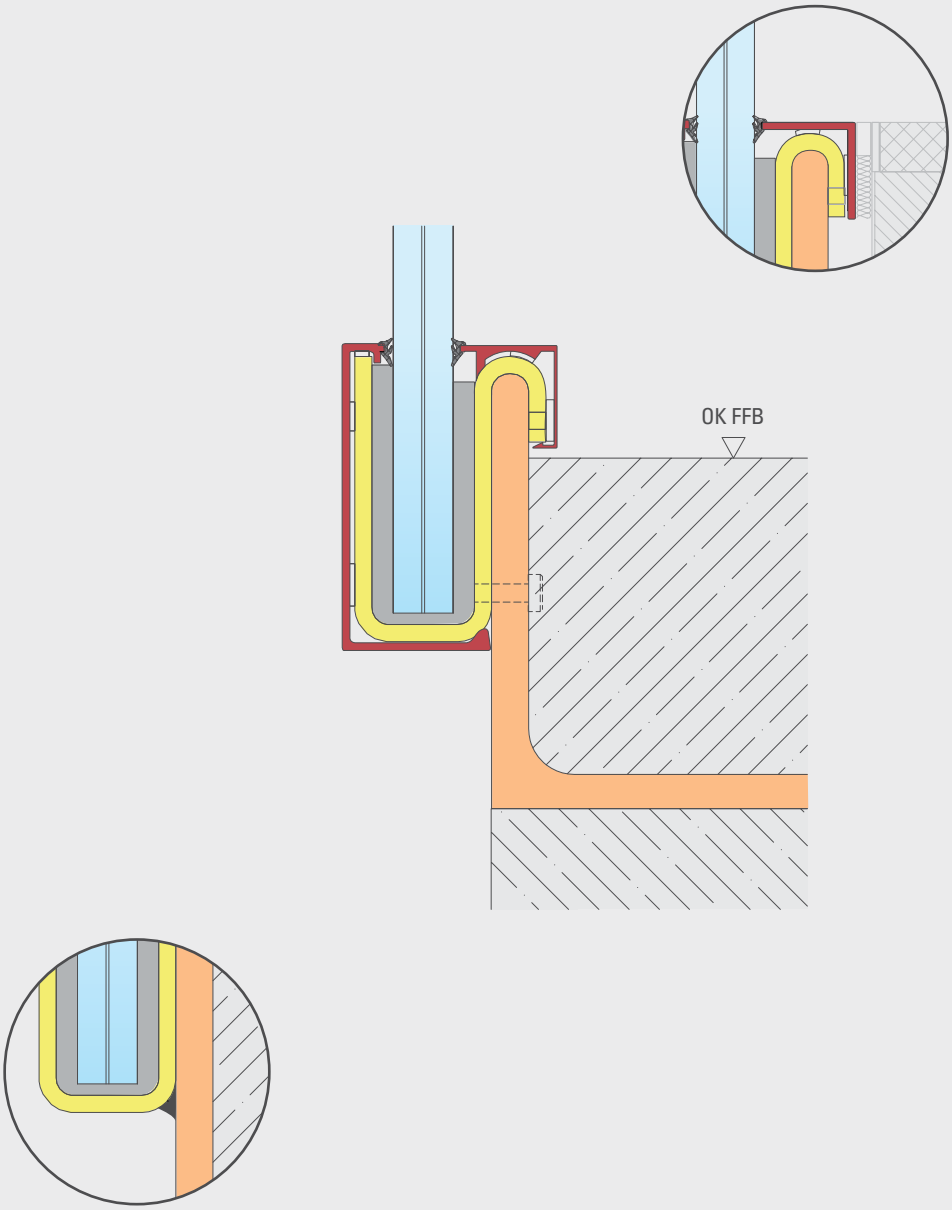
For assembly instructions, see page 84 ff.

System 2.A

Master plan

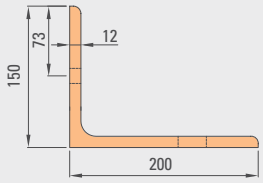
Connection from above, bolted or welded

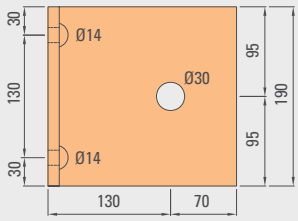
Floor structure up to 160 mm



System 2.A

Structural connection element and trim set



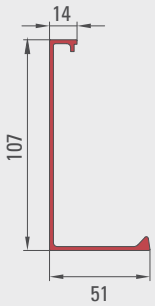


- Material: Steel, S355
- Surface: galvanised

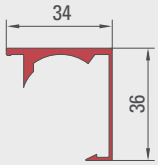
L 200 x 150 x 12 · Length = 190 mm

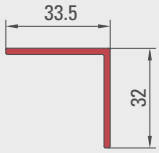
Ø 14: for bolting onto the support profile
Ø 30: for dowel fastening

Outer trim clip-on profile



Inner trim clip-on profile and connection bracket

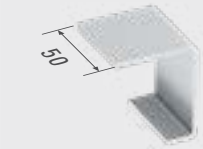


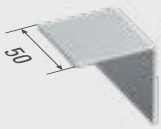


- Material: Aluminium
- Delivery length: 3,000 mm

- Surface
  - "Natural" untreated
  - stainless steel effect (E6EV1)
  - RAL or special colour, powder-coated or anodised

Splice plate



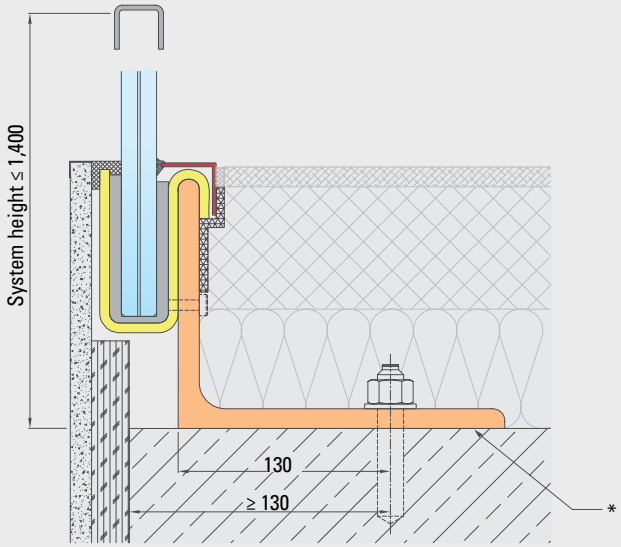


For details about the splice plates see Page 82-83.

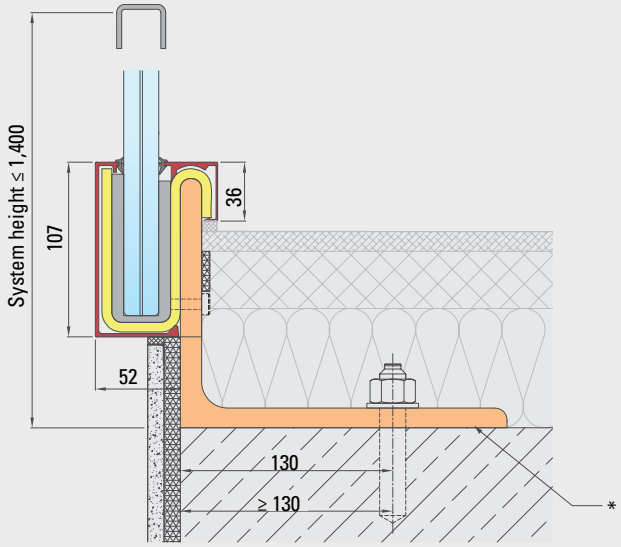
System 2.A

Application examples

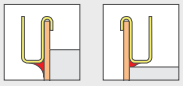
1



2



* Pressure-resistant thermal separation (e.g. Thermostop)



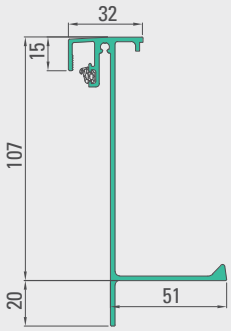
Welding the support profile onto the building connection element see Page 6.

Fastener spacing 400 or 800 mm, see tables Page 64-65.

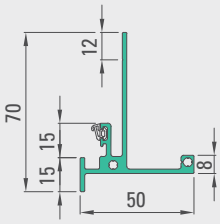
System 2.A

Profiles for on-site structural cladding

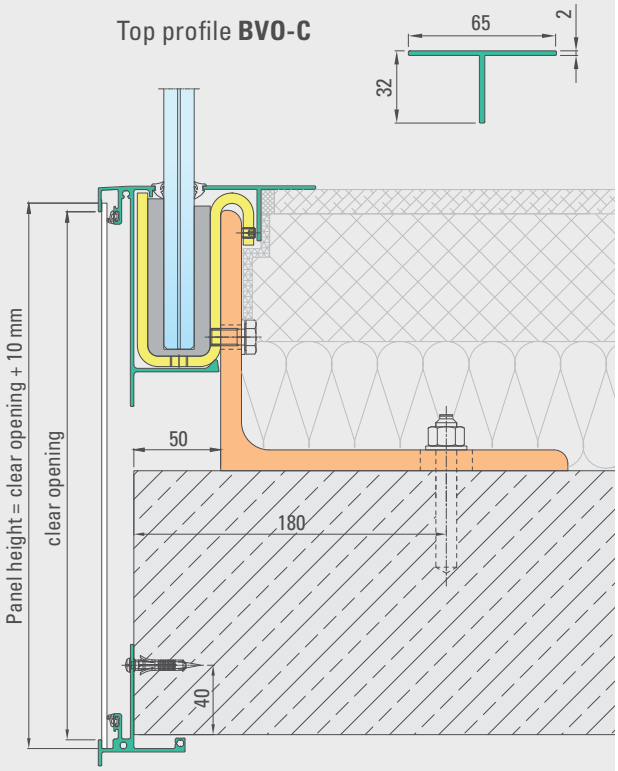
Top profile **BVO-A**



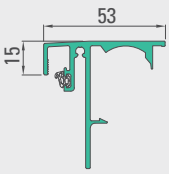
Bottom profile **BVU-A**



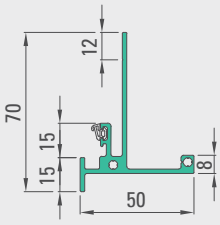
Top profile **BVO-C**

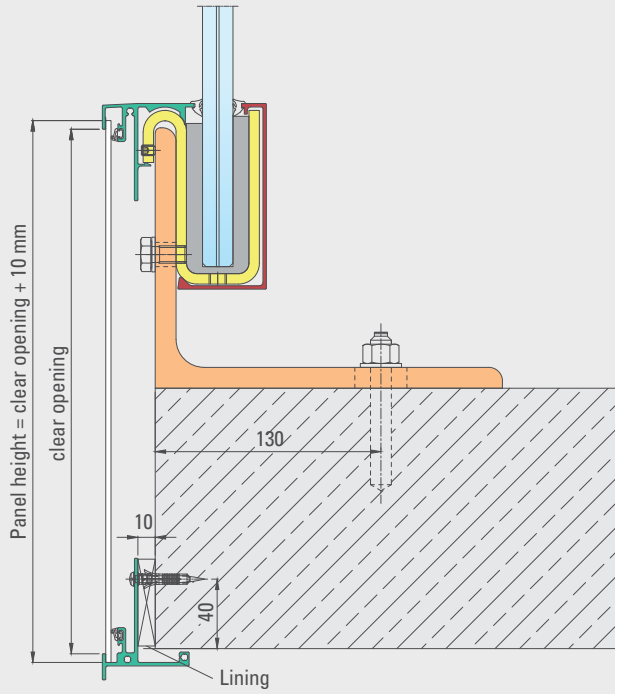


Top profile **BVO-B**



Bottom profile **BVU-A**





Panel thickness 3-5 mm.

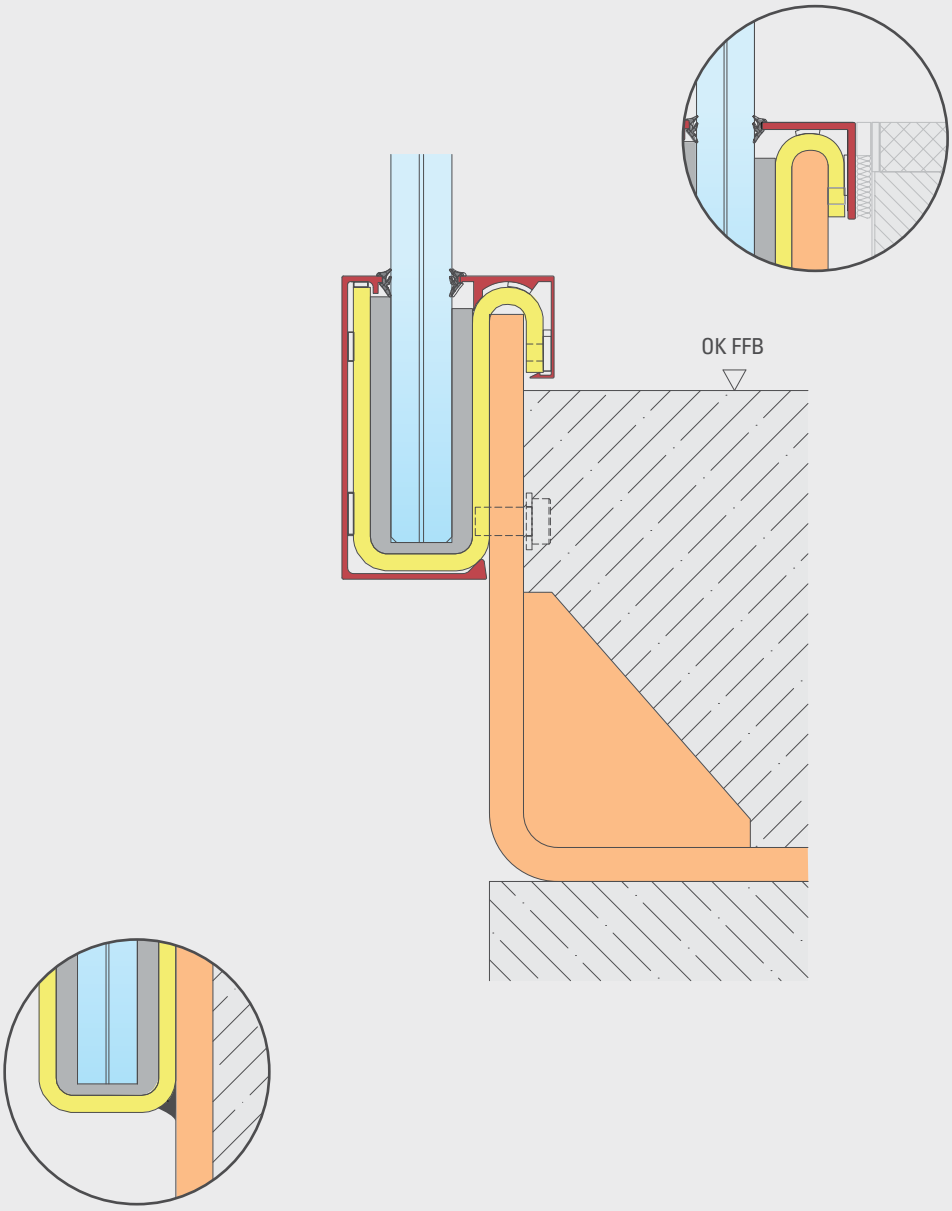
For assembly instructions, see page 84 ff.

System 2.B

Master plan

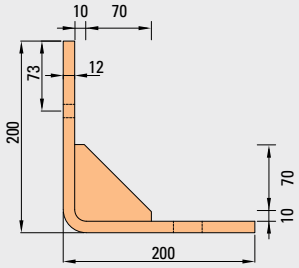
Connection from above, bolted or welded

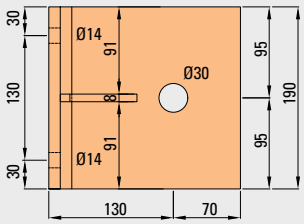
Floor structure up to 210 mm



System 2.B

Structural connection element and trim set



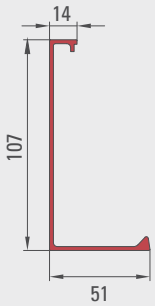


- Material: Steel, S355
- Surface: galvanised

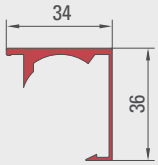
L 200 x 200 x 12 · Length = 190 mm
BL 80 x 80 x 8

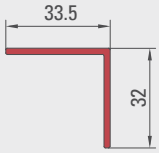
Ø 14: for bolting onto the support profile
Ø 30: for dowel fastening

Outer trim clip-on profile



Inner trim clip-on profile and connection bracket

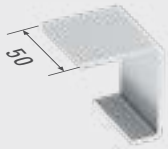


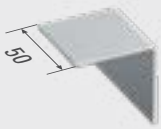


- Material: Aluminium
- Delivery length: 3,000 mm

- Surface
  - "Natural" untreated
  - stainless steel effect (E6EV1)
  - RAL or special colour, powder-coated or anodised

Splice plate



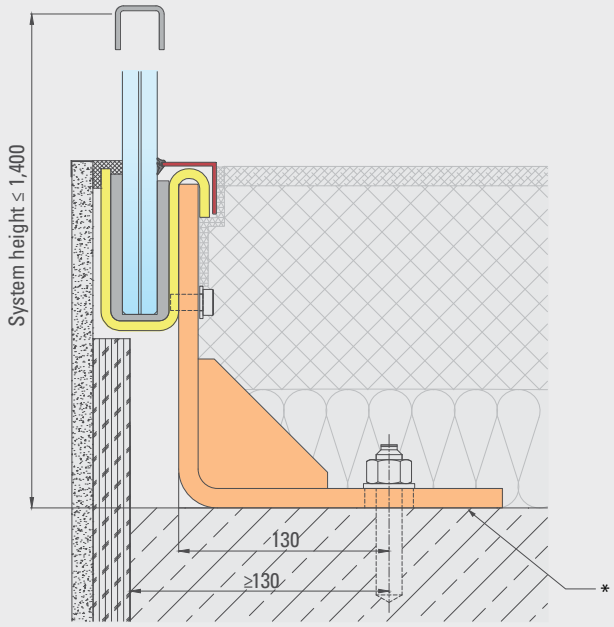


For details about the splice plates see Page 82-83.

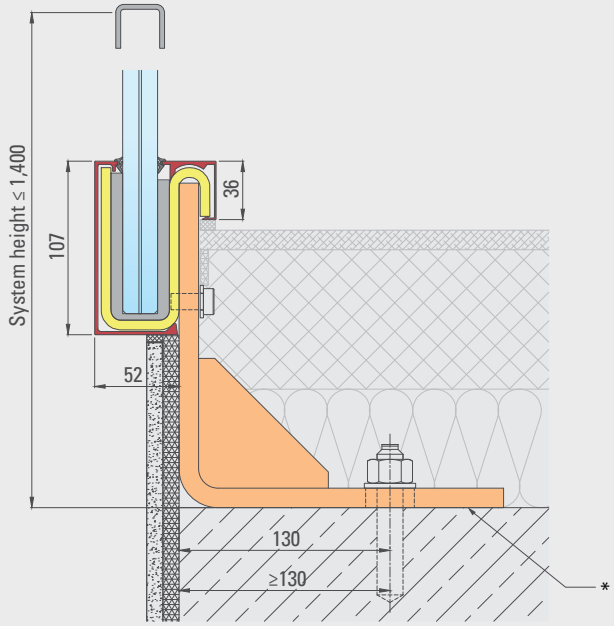
System 2.B

Application examples

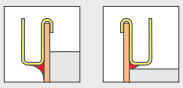
1



2



* Pressure-resistant thermal separation (e.g. Thermostop)



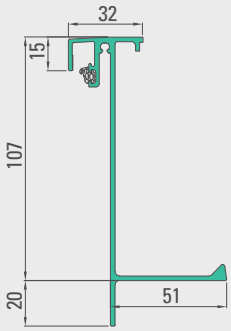
Welding the support profile onto the building connection element see Page 6.

Fastener spacing 400 or 800 mm, see tables Page 64-65.

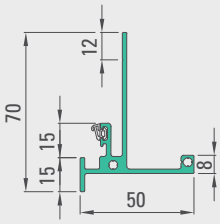
System 2.B

Profiles for on-site structural cladding

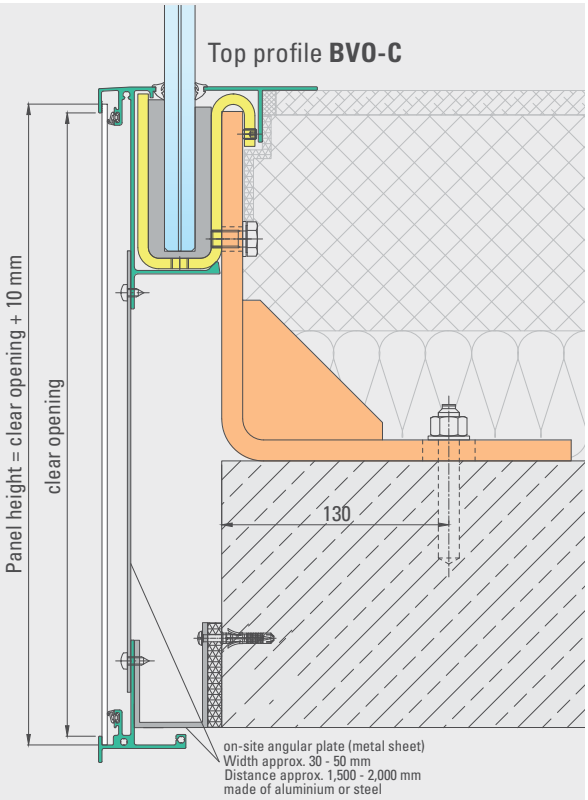
Top profile **BVO-A**



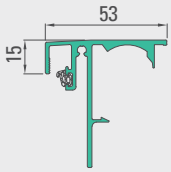
Bottom profile **BVU-A**



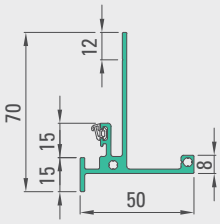
Top profile **BVO-C**

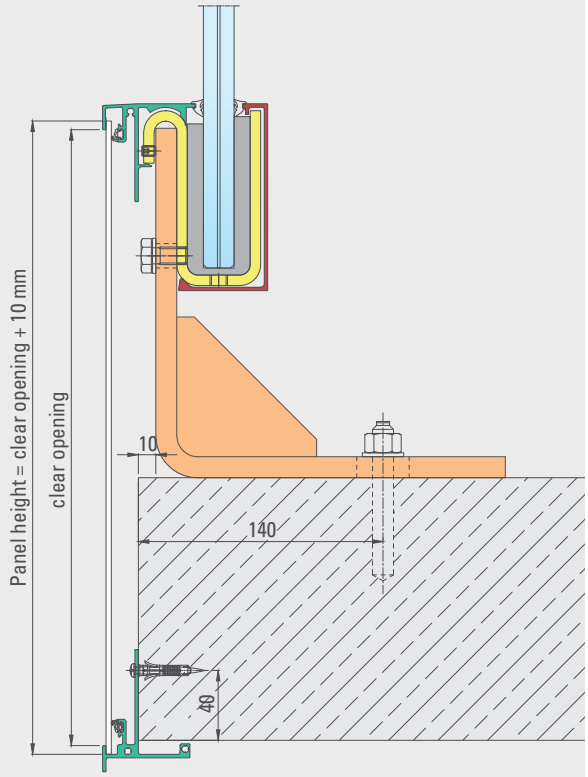


Top profile **BVO-B**



Bottom profile **BVU-A**





Panel thickness 3-5 mm.

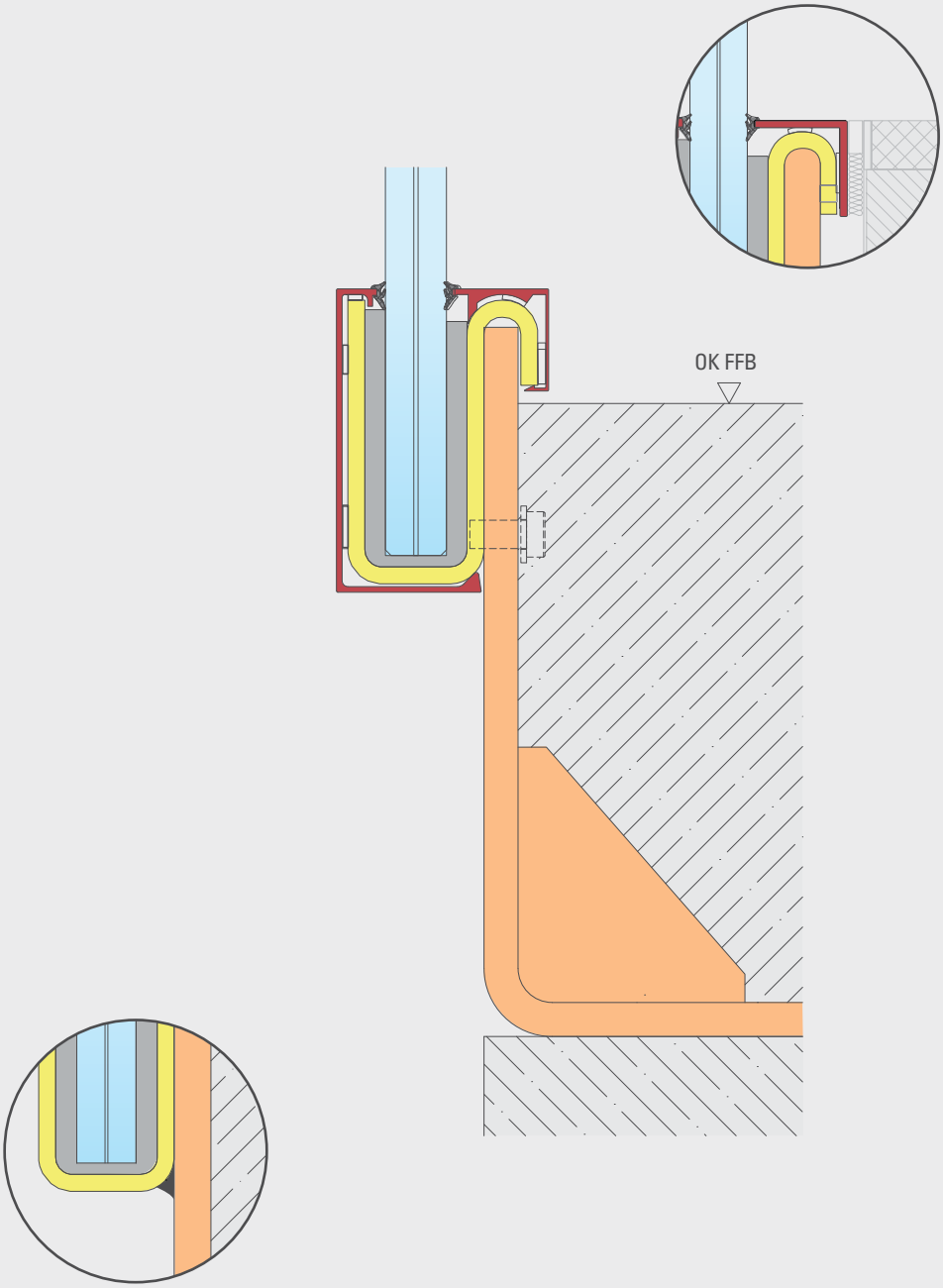
For assembly instructions, see page 84 ff.

System 2.C

Master plan

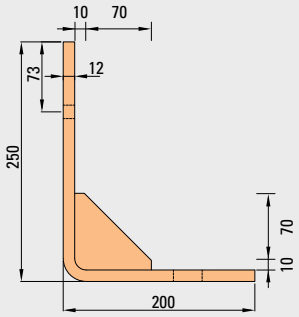
Connection from above, bolted or welded

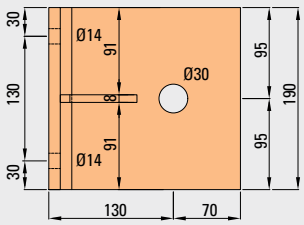
Floor structure up to 260 mm



System 2.C

Structural connection element and trim set



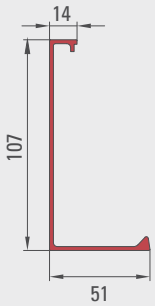


- Material: Steel, S355
- Surface: galvanised

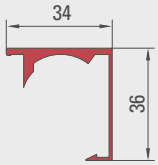
L 200 x 250 x 12 · Length = 190 mm
BL 80 x 80 x 8

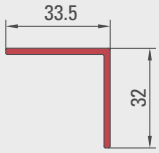
Ø 14: for bolting onto the support profile
Ø 30: for dowel fastening

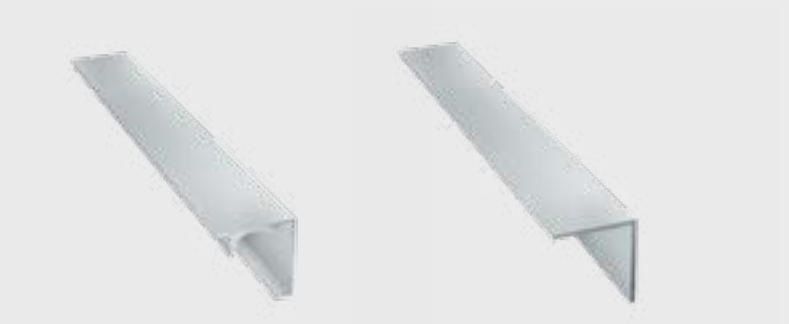
Outer trim clip-on profile



Inner trim clip-on profile and connection bracket



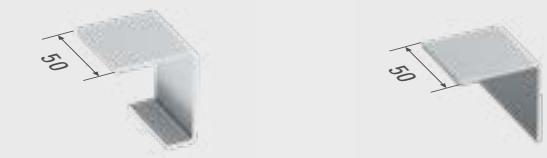




- Material: Aluminium
- Delivery length: 3,000 mm

- Surface
  - "Natural" untreated
  - stainless steel effect (E6EV1)
  - RAL or special colour, powder-coated or anodised

Splice plate

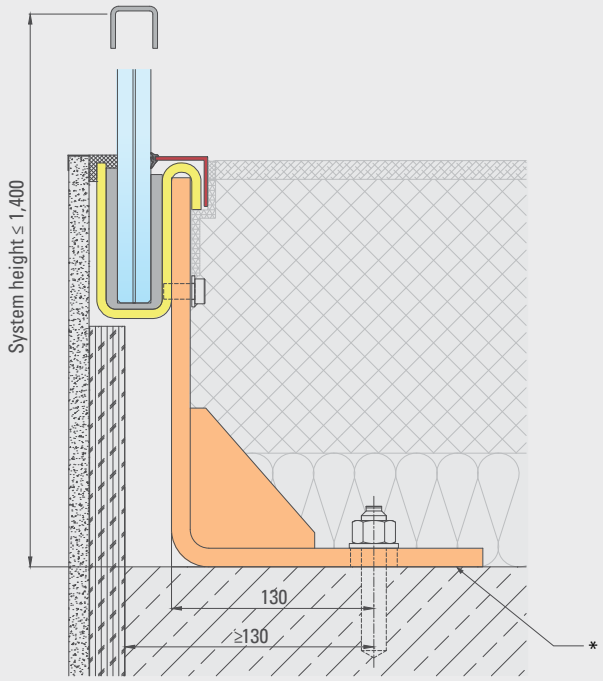


For details about the splice plates see Page 82-83.

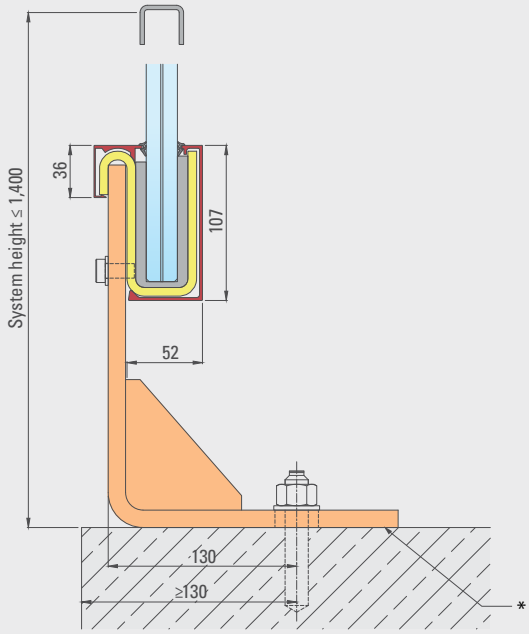
System 2.C

Application examples

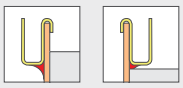
1



2



* Pressure-resistant thermal separation (e.g. Thermostop)



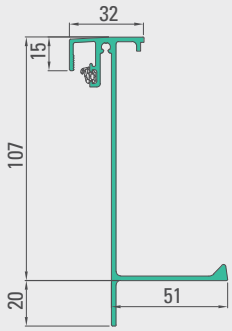
Welding the support profile onto the building connection element see Page 6.

Fastener spacing 400 or 800 mm, see tables Page 64-65.

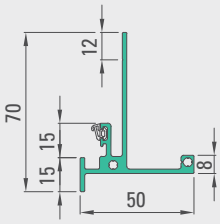
System 2.C

Profiles for on-site structural cladding

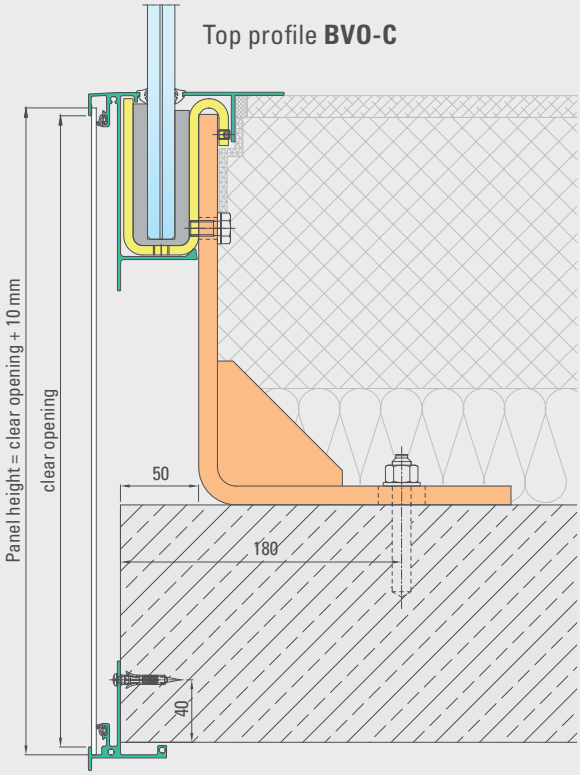
Top profile **BVO-A**



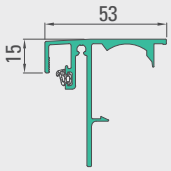
Bottom profile **BVU-A**



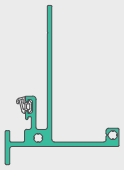
Top profile **BVO-C**

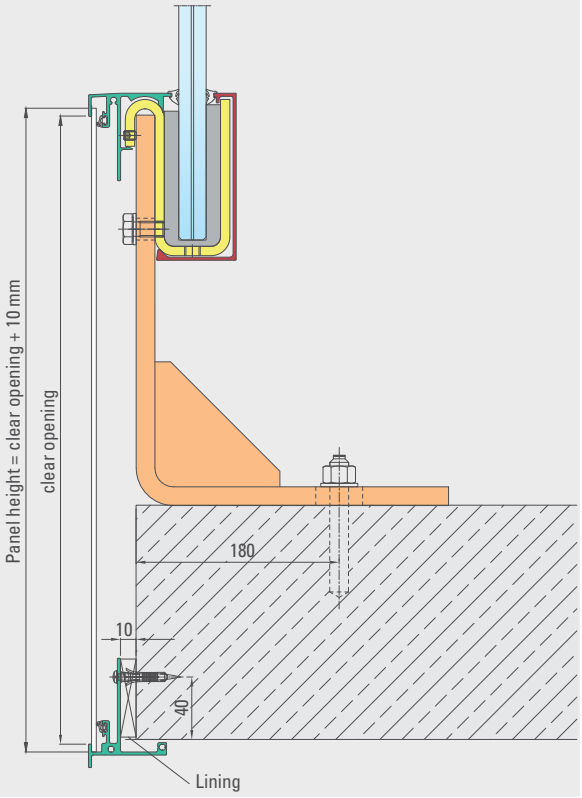


Top profile **BVO-B**



Bottom profile **BVU-A**





Panel thickness 3-5 mm

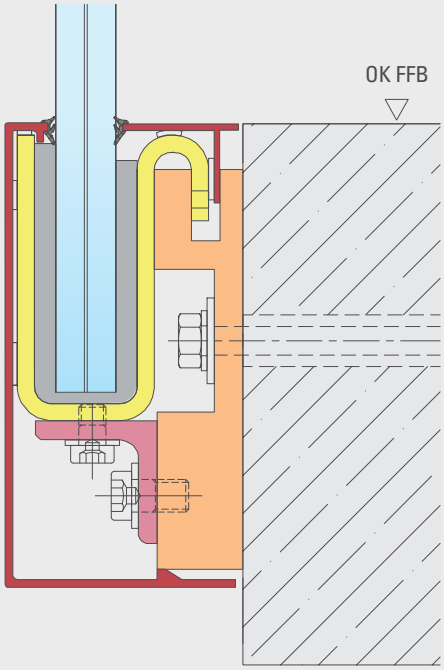
For assembly instructions, see page 84 ff.

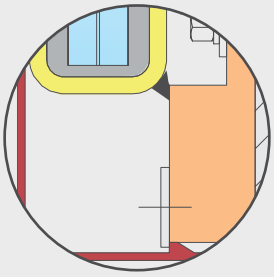
System 3

Master plan

Side connection, bolted or welded

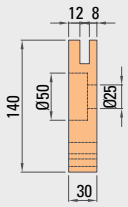
Directly to the building

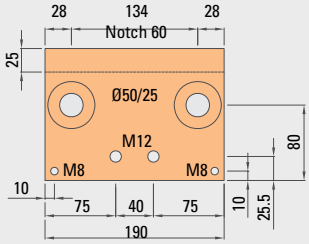




System 3

Structural connection element and trim set





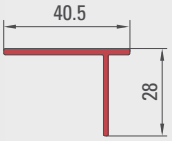
- Material: Steel, S355
- Surface: galvanised

Bl 140 x 30 · Length = 190 mm
Ø 50/25: for dowel fastening

M 12: for bolting the bracket
M 8: for fastening the trim

Outer trim clip-on profile

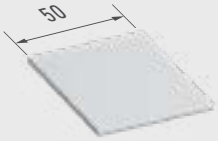
Inner trim Slide-in profile



- Material: Aluminium
- Delivery length: 3,000 mm

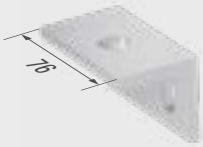
- Surface
  - "Natural" untreated
  - stainless steel effect (E6EV1)
  - RAL or special colour, powder-coated or anodised

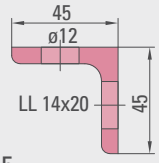
Splice plate



For details about the splice plates see Page 82-83.

Bracket for bolting from underneath



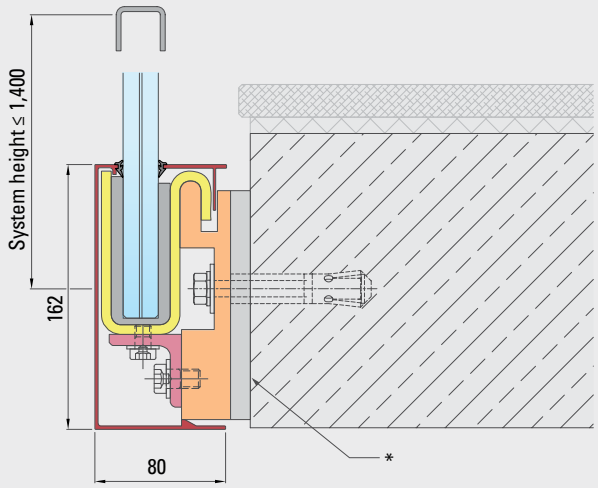


- Material: Steel, S355
- Surface: galvanised

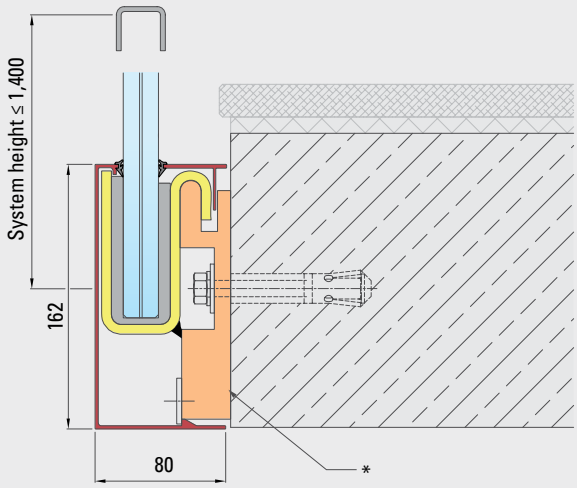
System 3

Application examples

1



2



* Pressure-resistant thermal separation (e.g. Thermostop)

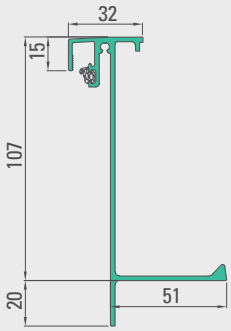
Welding the support profile onto the building connection element see Page 6.

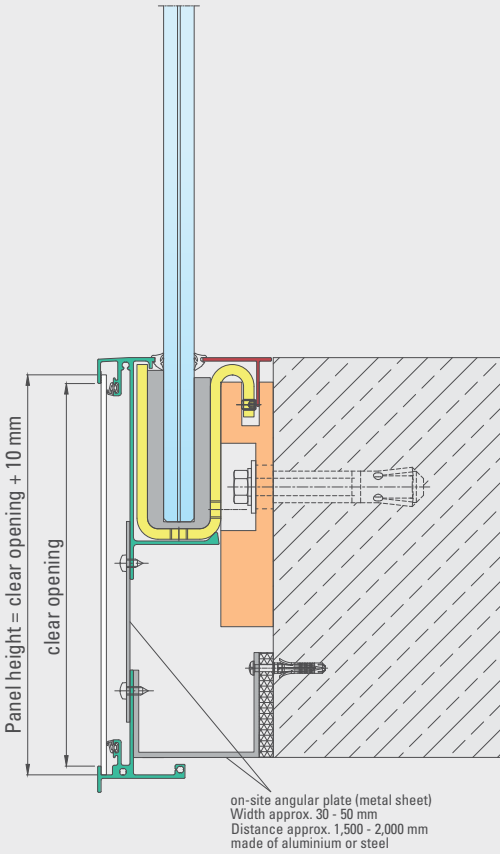
Fastener spacing 400 or 800 mm, see tables Page 64-65.

System 3

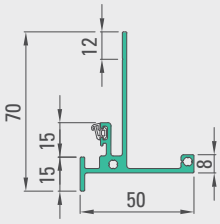
Profiles for on-site structural cladding

Top profile **BVO-A**





Bottom profile **BVU-A**



Panel thickness 3 – 5 mm.

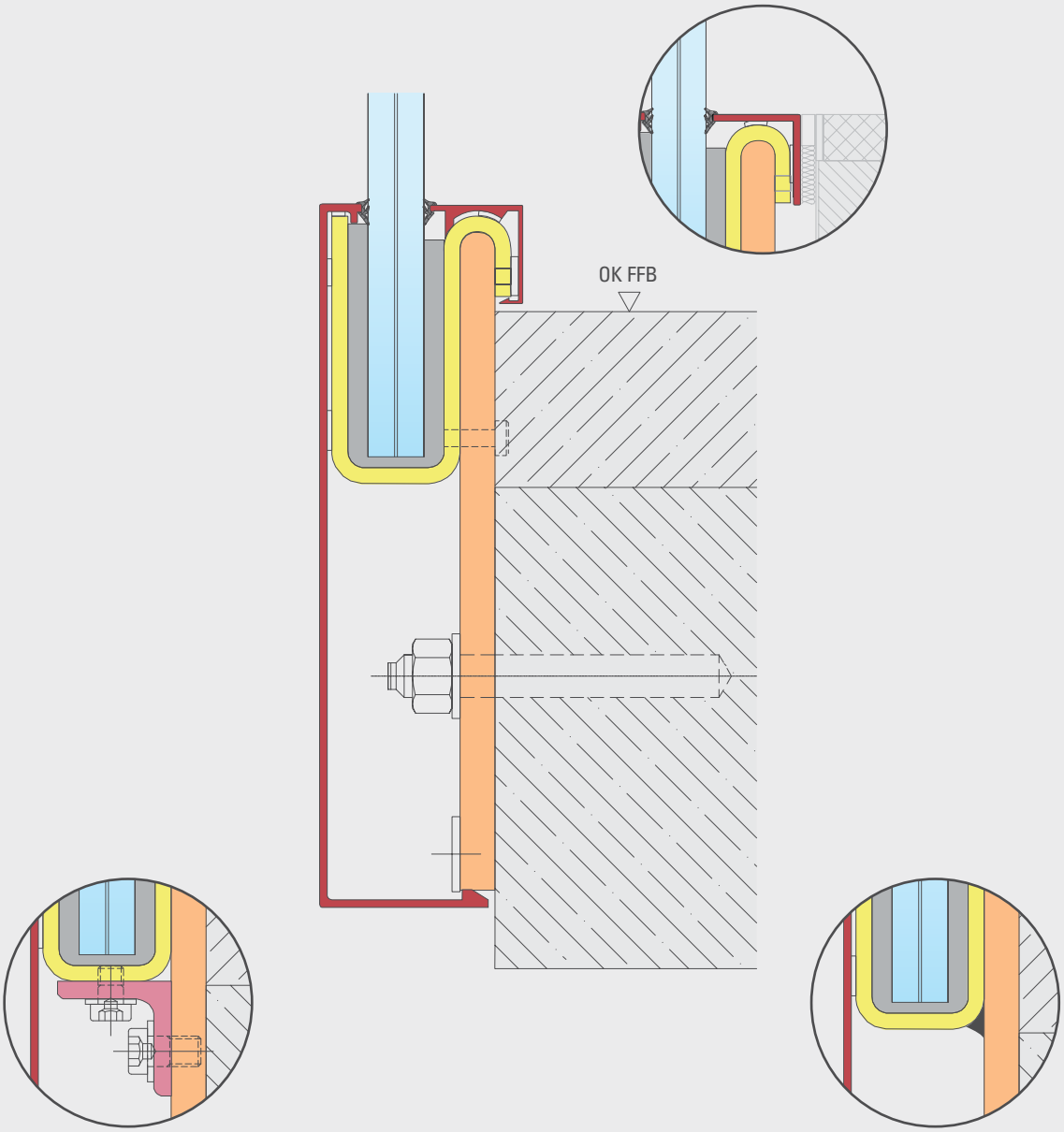
For assembly instructions, see page 84 ff.

System 4

Master plan

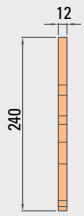
Side connection, bolted or welded

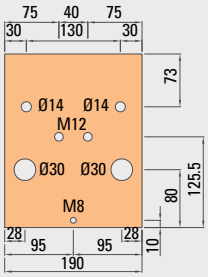
Directly to the building



System 4

Structural connection element and trim set



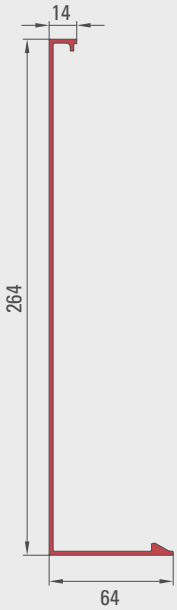


- Material: Steel, S355
- Surface: galvanised

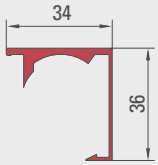
Bl 240 x 12 · Length = 190 mm
Ø 14: for bolting onto the support profile

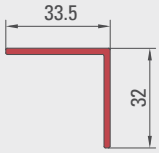
M 12: for bolting the bracket
Ø 30: for dowel fastening
M 8: for fastening the trim

Outer trim clip-on profile



Inner trim clip-on profile and connection bracket

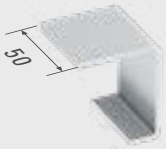


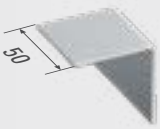


- Material: Aluminium
- Delivery length: 3,000 mm

- Surface
  "Natural" untreated
  stainless steel effect (E6EV1)
  RAL or special colour, powder-coated or anodised

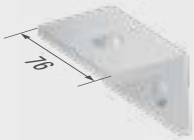
Splice plate

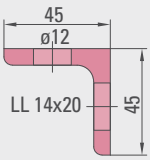




For details about the splice plates see Page 82-83.

Bracket for bolting from underneath



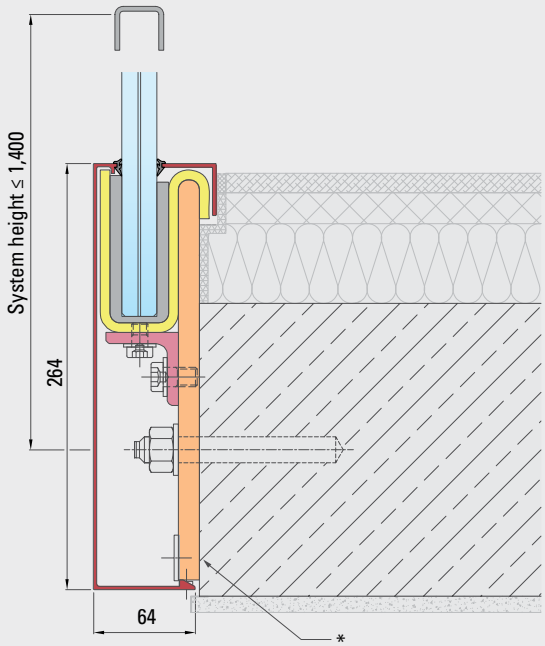


- Material: Steel, S355
- Surface: galvanised

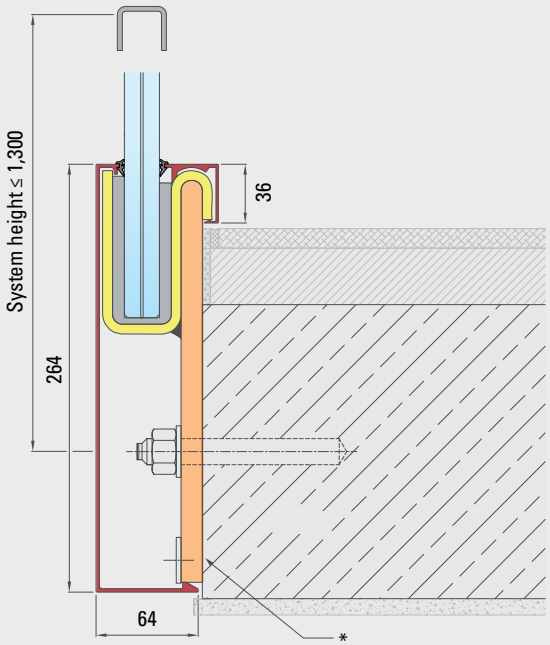
System 4

Application examples

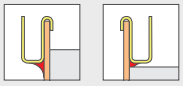
1



2



* Pressure-resistant thermal separation (e.g. Thermostop)



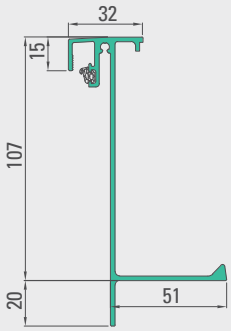
Welding the support profile onto the building connection element see Page 6.

Fastener spacing 400 or 800 mm, see tables Page 64-65.

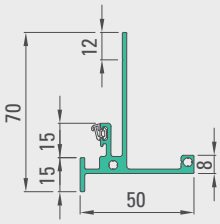
System 4

Profiles for on-site structural cladding

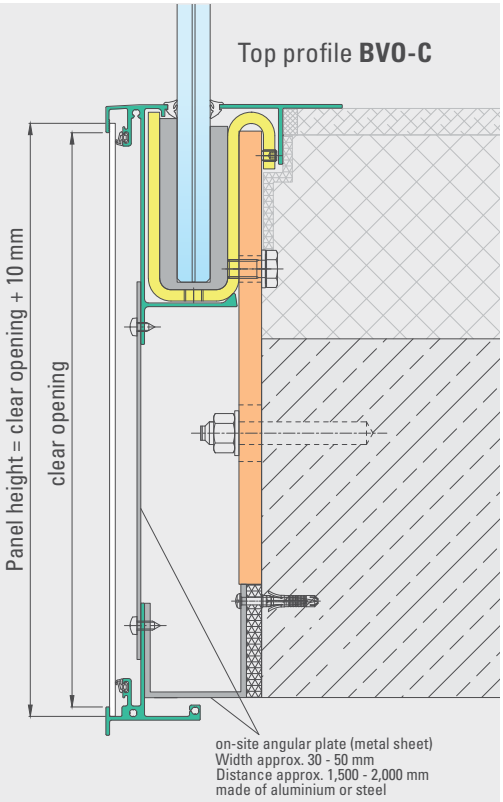
Top profile **BVO-A**



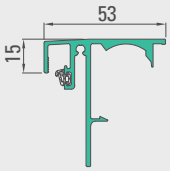
Bottom profile **BVU-A**



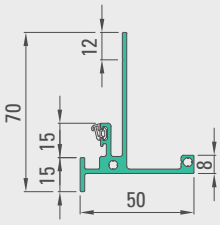
Top profile **BVO-C**

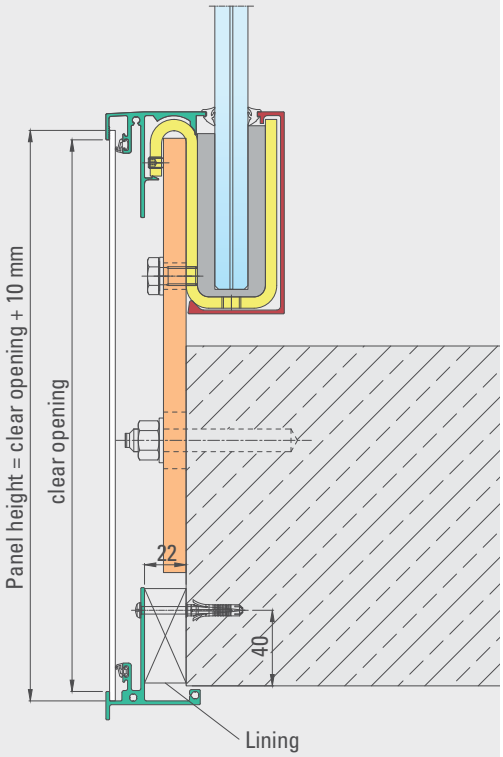


Top profile **BVO-B**



Bottom profile **BVU-A**





Panel thickness 3 – 5 mm.

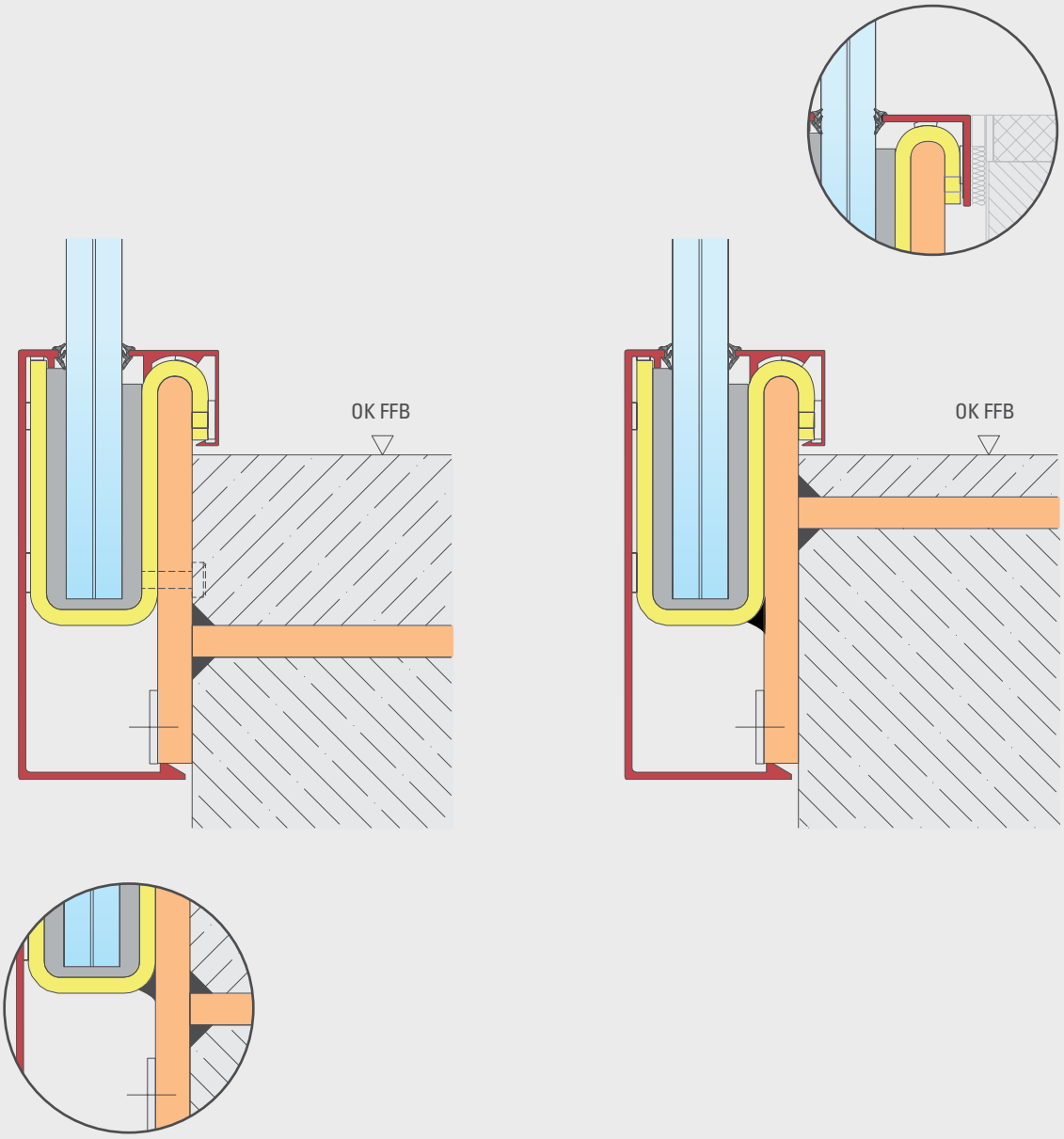
For assembly instructions, see page 84 ff.

System 5

Master plan

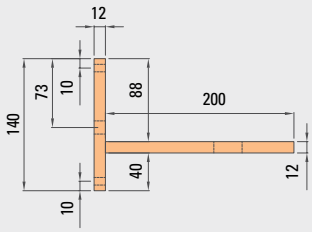
Connection from above, bolted or welded

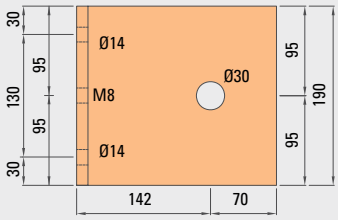
Floor structure 110 mm or 60 mm



System 5

Structural connection element and trim set



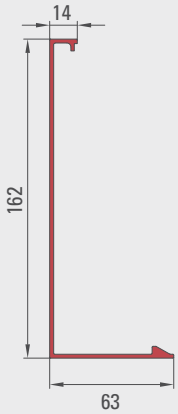


- Material: Steel, S355
- Surface: galvanised

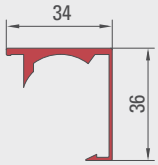
Bl 140 x 12 · Length = 190 mm
Bl 200 x 12 · Length = 190 mm

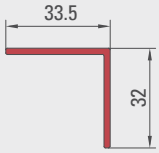
Ø 14: for bolting the bracket
Ø 30: for dowel fastening
M 8: for fastening the trim

Outer trim clip-on profile



Inner trim clip-on profile and connection bracket

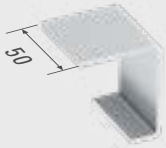


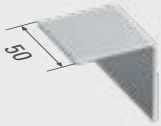


- Material: Aluminium
- Delivery length: 3,000 mm

- Surface
  - "Natural" untreated
  - stainless steel effect (E6EV1)
  - RAL or special colour, powder-coated or anodised

Splice plate



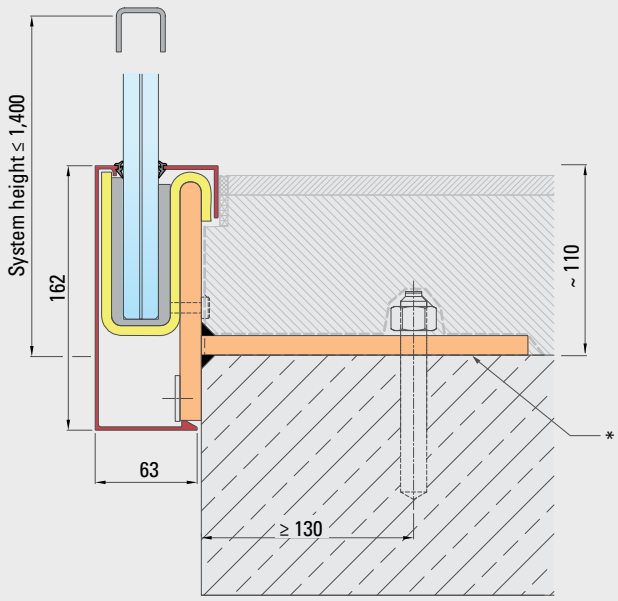


For details about the splice plates see Page 82-83.

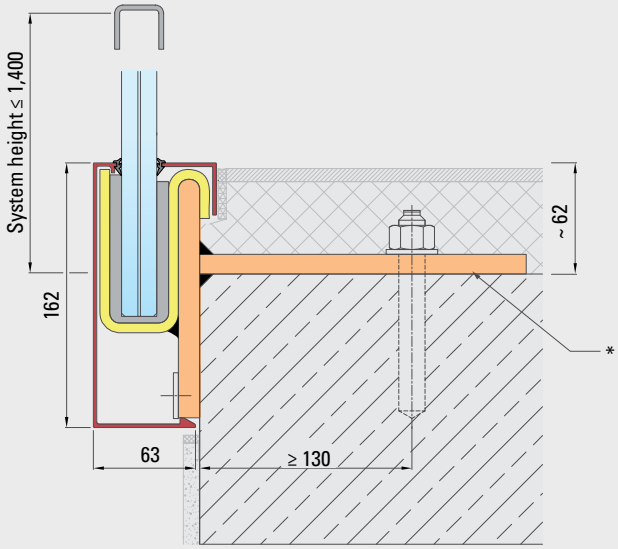
System 5

Application examples

1



2



* Pressure-resistant thermal separation (e.g. Thermostop)

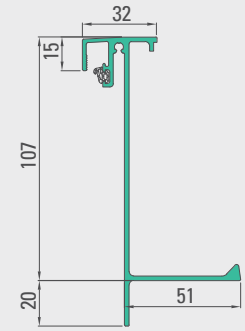
Welding the support profile onto the building connection element see Page 6.

Fastener spacing 400 or 800 mm, see tables Page 64-65.

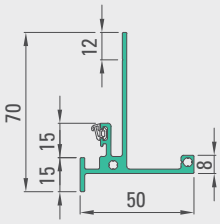
System 5

Profiles for on-site structural cladding

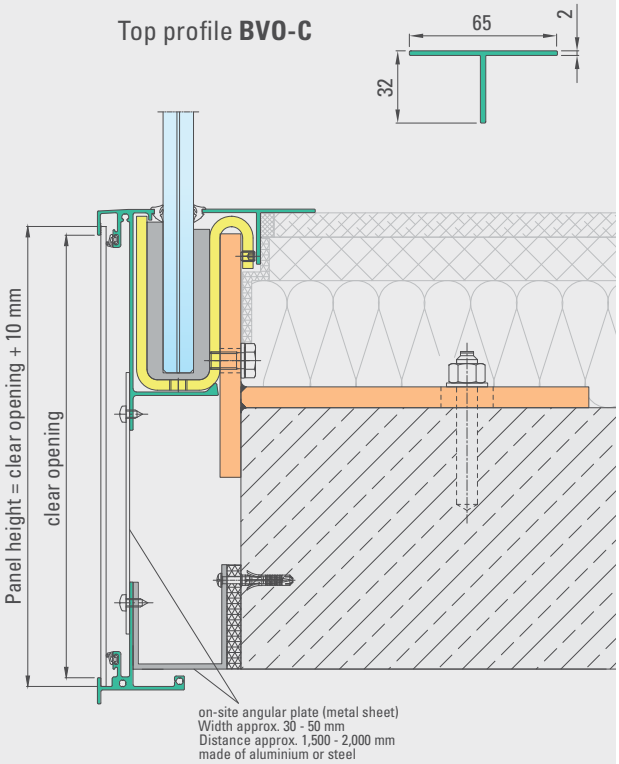
Top profile **BVO-A**



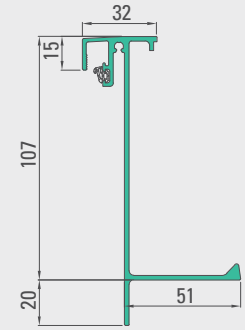
Bottom profile **BVU-A**



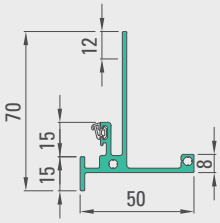
Top profile **BVO-C**



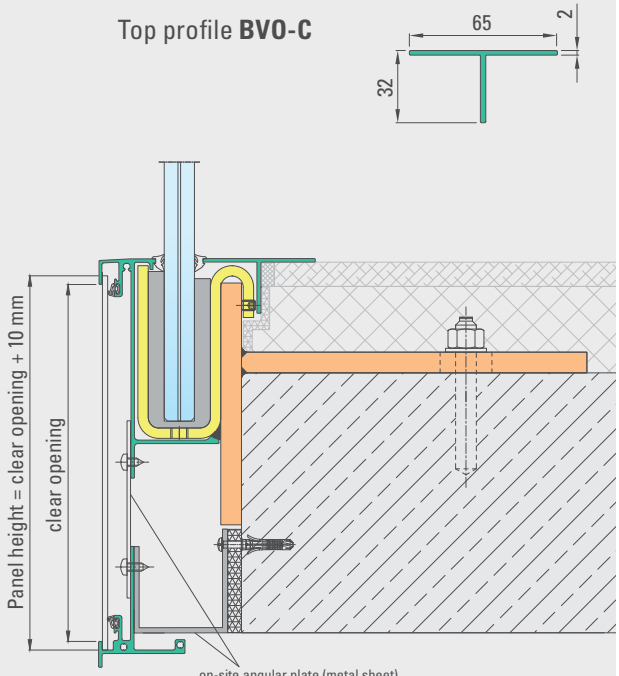
Top profile **BVO-A**



Bottom profile **BVU-A**



Top profile **BVO-C**



Panel thickness 3 – 5 mm.

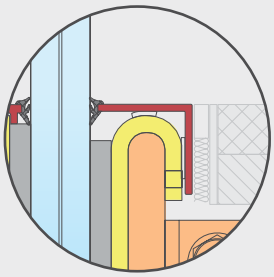
For assembly instructions, see page 84 ff.

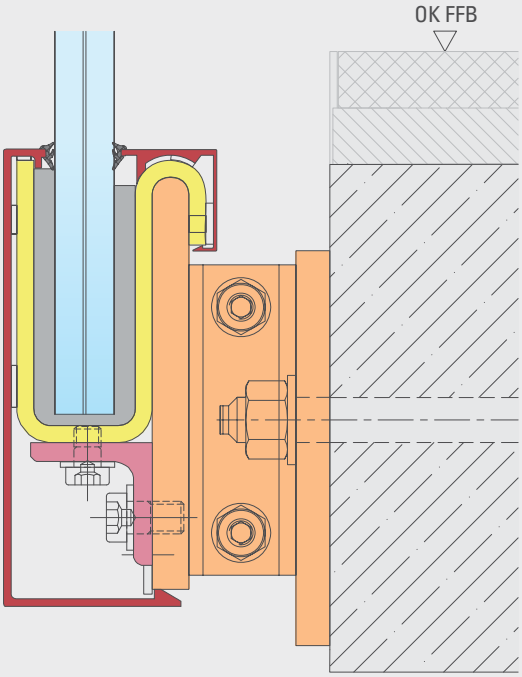
System 6

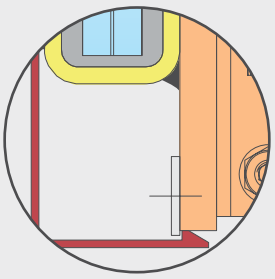
Master plan

Side connection, bolted or welded

Distance 50 mm to the building structure

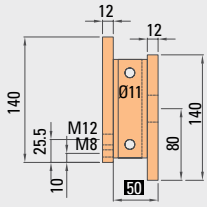


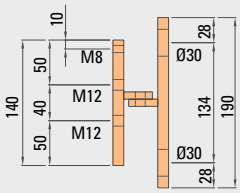




System 6

Structural connection element and trim set (distance **50 mm** to the building structure)



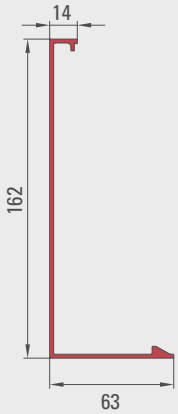


- Material: Steel, S355
- Surface: galvanised

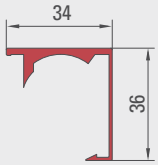
Bl 140 x 12 · Length = 190 mm
Bl 140 x 12 · Length = 140 mm
2 Bl 29 x 8 · Length = 110 mm

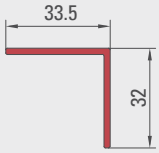
M 12: for bolting the bracket
Ø 30: for dowel fastening
M 8: for fastening the trim

Outer trim clip-on profile



Inner trim clip-on profile and connection bracket

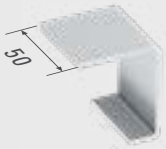


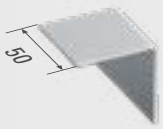


- Material: Aluminium
- Delivery length: 3,000 mm

- Surface
  - "Natural" untreated
  - stainless steel effect (E6EV1)
  - RAL or special colour, powder-coated or anodised

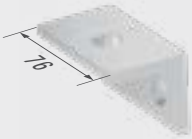
Splice plate

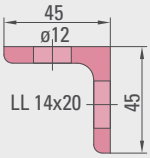




For details about the splice plates see Page 82-83.

Bracket for bolting from underneath



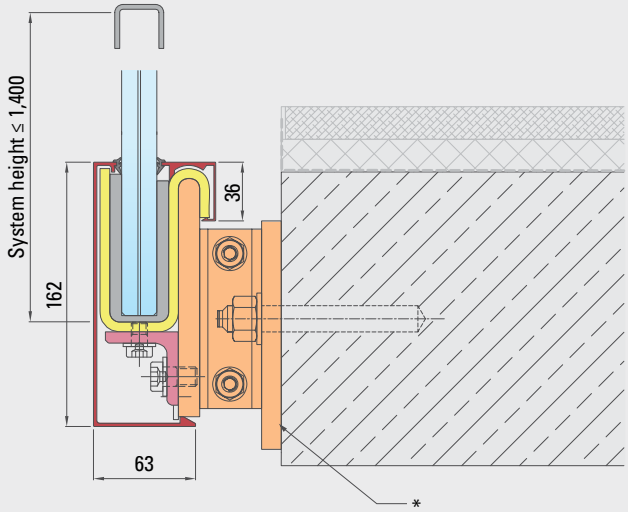


- Material: Steel, S355
- Surface: galvanised

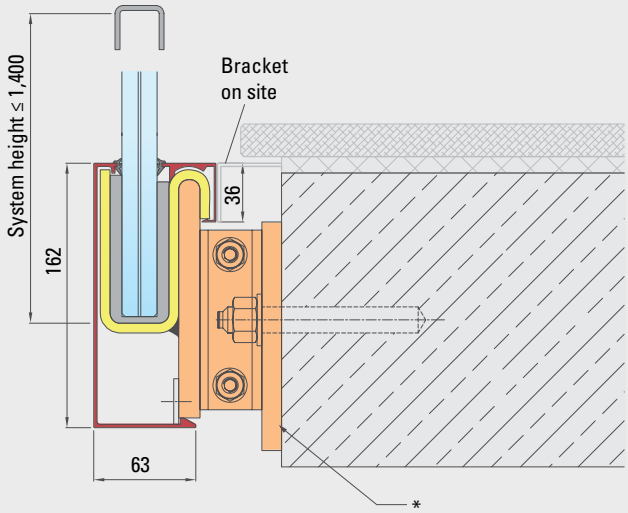
System 6

Application examples

1



2



* Pressure-resistant thermal separation (e.g. Thermostop)

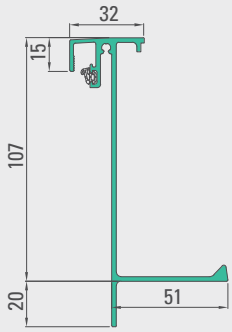
Welding the support profile onto the building connection element see Page 6.

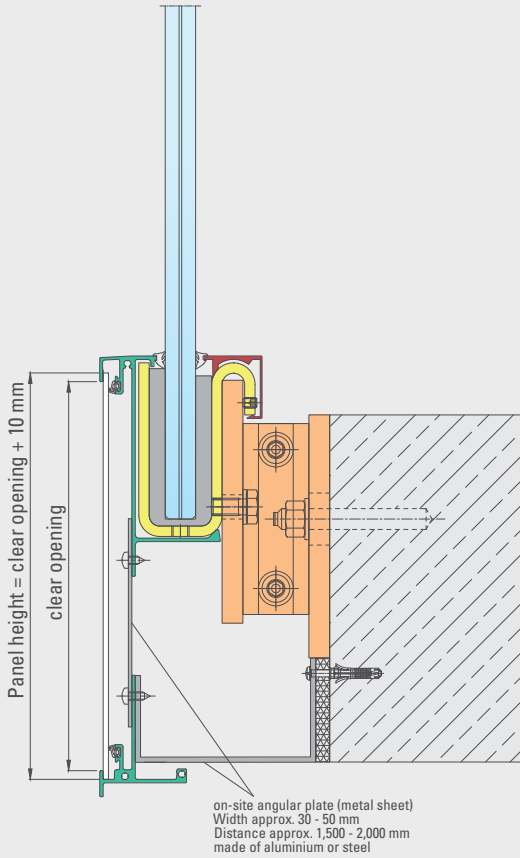
Fastener spacing 400 or 800 mm, see tables Page 64-65.

System 6

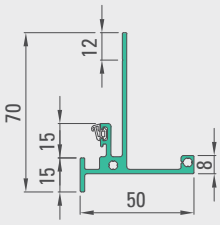
Profiles for on-site structural cladding

Top profile **BVO-A**





Bottom profile **BVU-A**



Panel thickness 3 – 5 mm.

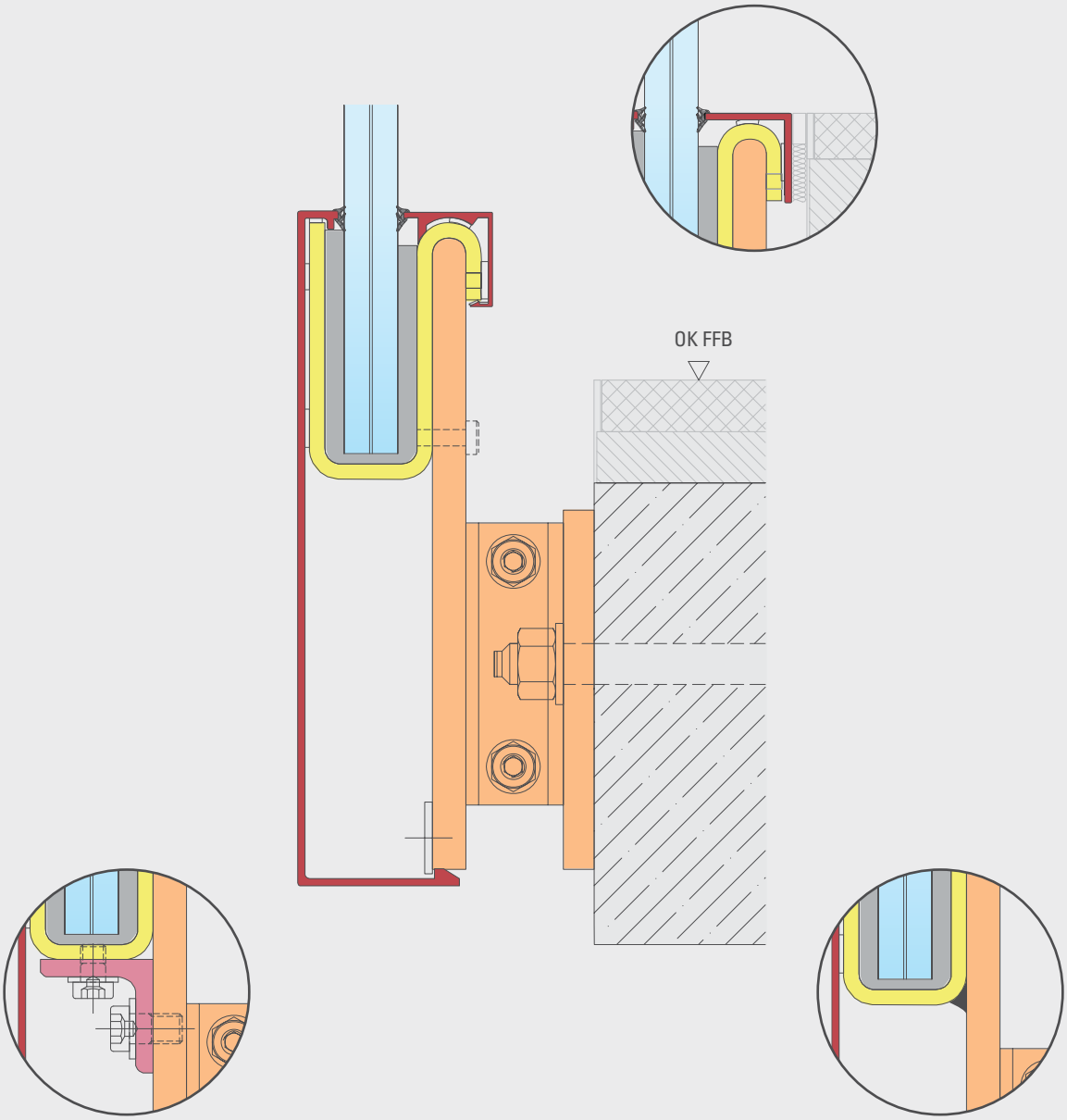
For assembly instructions, see page 84 ff.

System 7

Master plan

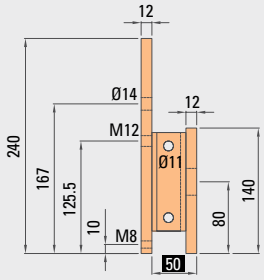
Side connection, bolted or welded

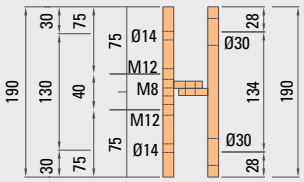
Distance 50 mm to the building structure



System 7

Structural connection element and trim set (distance **50 mm** to the building structure)



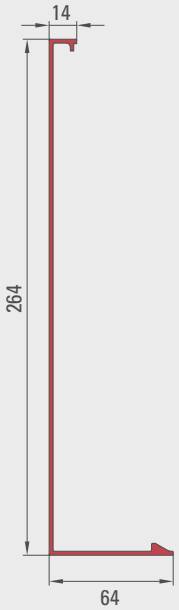


- Material: Steel, S355
- Surface: galvanised

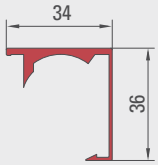
Bl 140 x 12 · Length = 190 mm
Bl 240 x 12 · Length = 190 mm
2 Bl 29 x 8 · Length = 110 mm

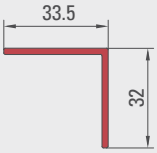
Ø 14: for bolting onto the support profile
M 12: for bolting the bracket
Ø 30: for dowel fastening
M 8: for fastening the trim

Outer trim clip-on profile



Inner trim clip-on profile and connection bracket

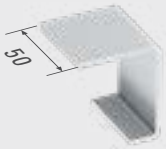


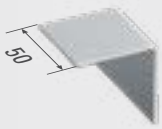


- Material: Aluminium
- Delivery length: 3,000 mm

- Surface
  - "Natural" untreated
  - stainless steel effect (E6EV1)
  - RAL or special colour, powder-coated or anodised

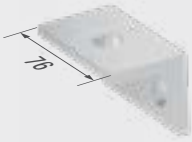
Splice plate

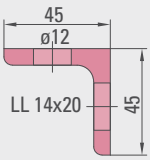




For details about the splice plates see Page 82-83.

Bracket for bolting from underneath



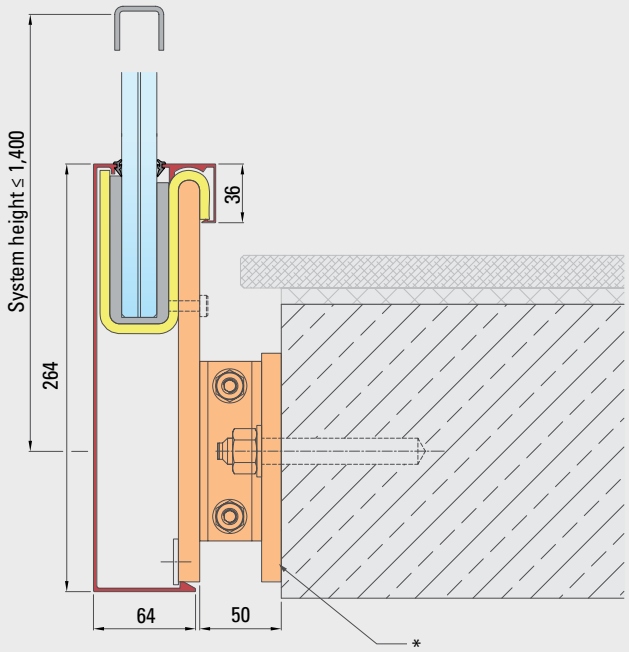


- Material: Steel, S355
- Surface: galvanised

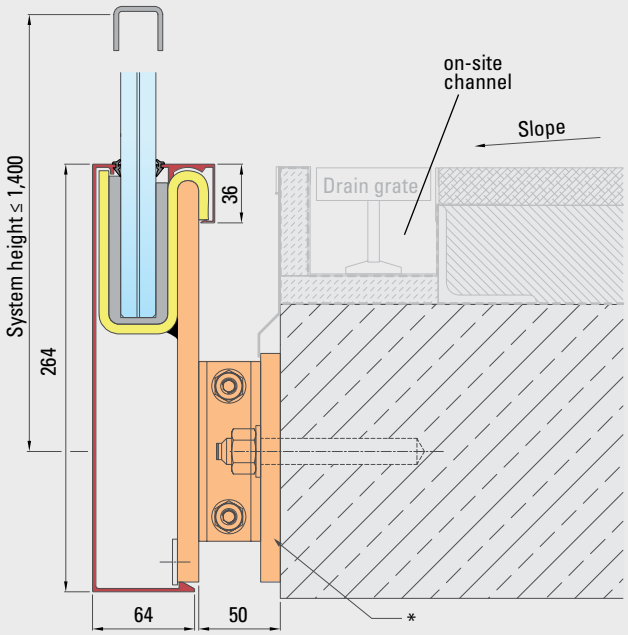
System 7

Application examples

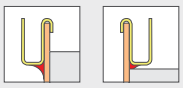
1



2



* Pressure-resistant thermal separation (e.g. Thermostop)



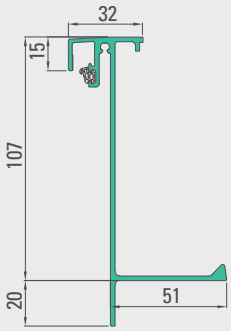
Welding the support profile onto the building connection element see Page 6.

Fastener spacing 400 or 800 mm, see tables Page 64-65.

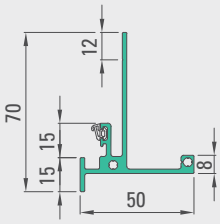
System 7

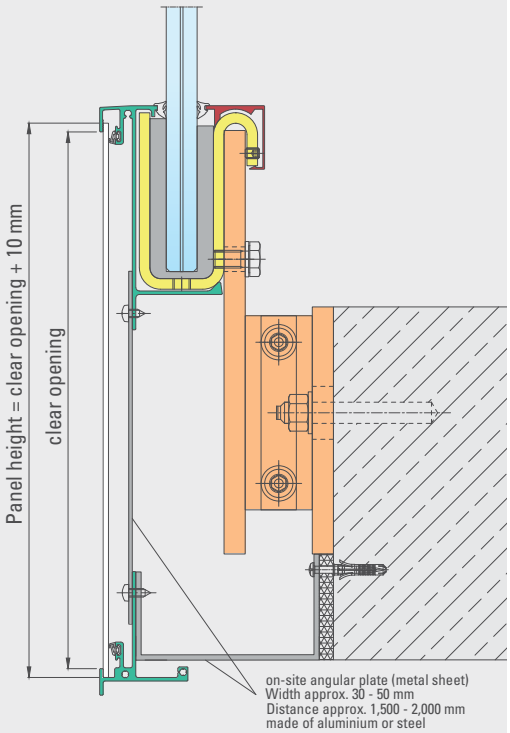
Profiles for on-site structural cladding

Top profile **BVO-A**

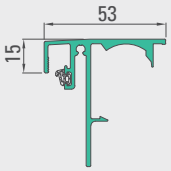


Bottom profile **BVU-A**

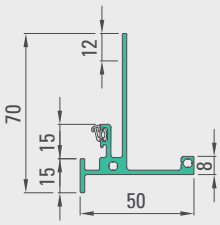


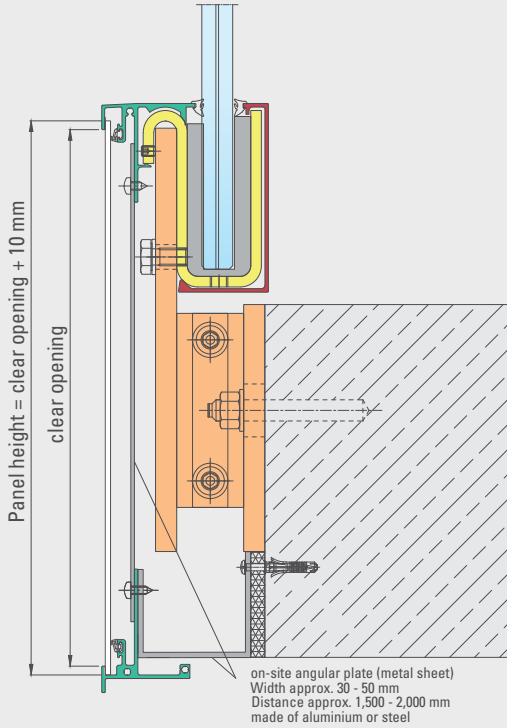


Top profile **BVO-B**



Bottom profile **BVU-A**





Panel thickness 3 – 5 mm.

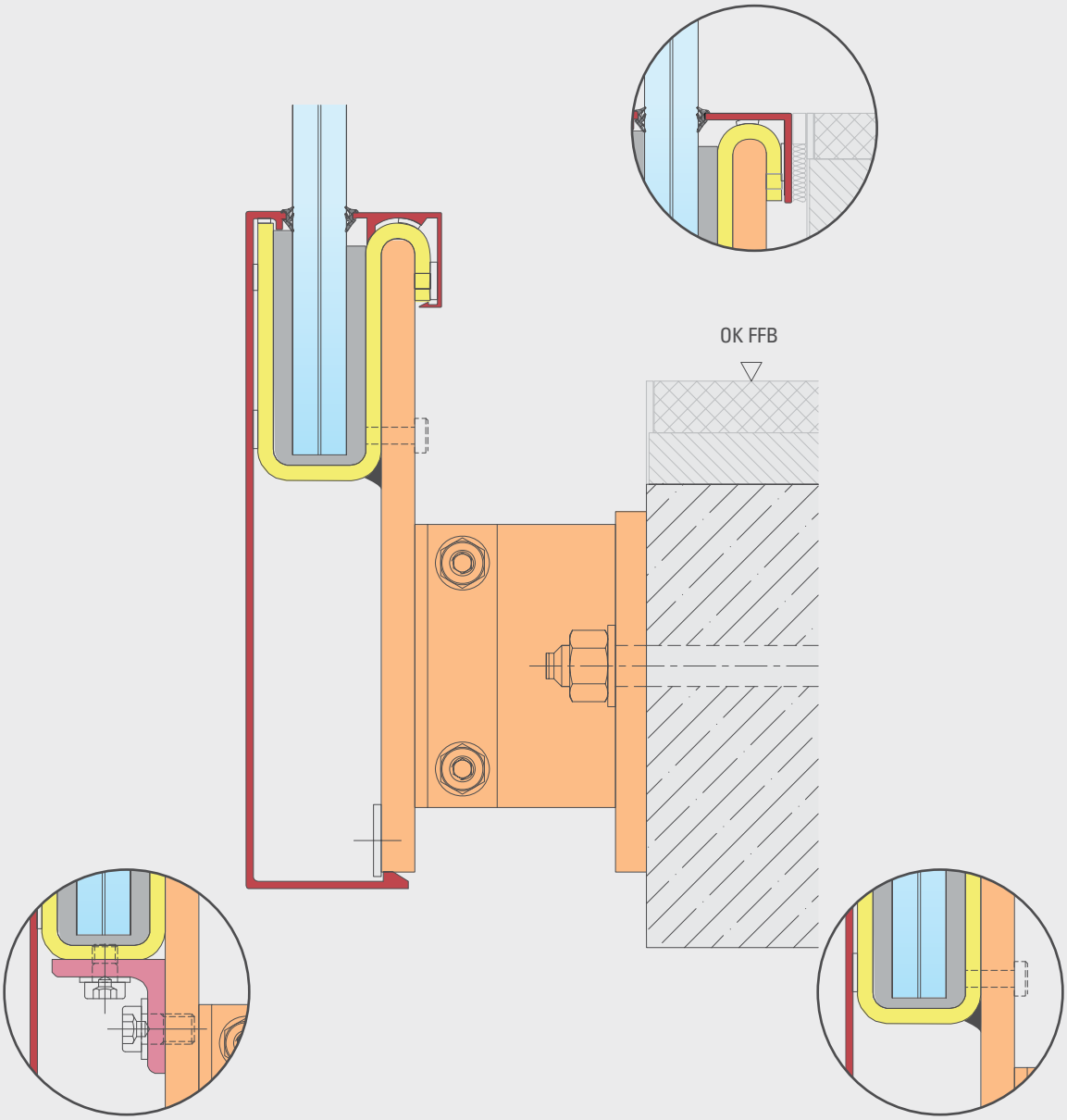
For assembly instructions, see page 84 ff.

System 8

Master plan

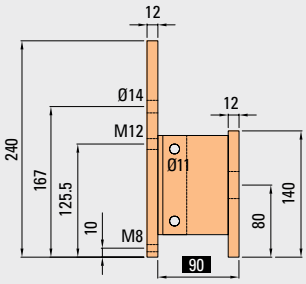
Side connection, bolted or welded

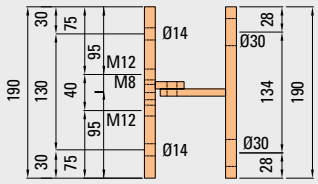
Distance 90 mm to the building structure



System 8

Structural connection element and trim set (distance **90 mm** to the building structure)



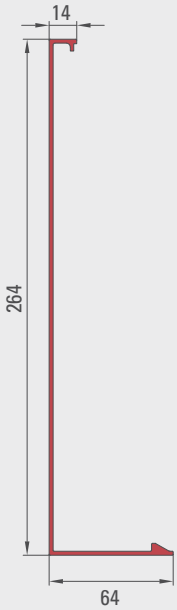


- Material: Steel, S355
- Surface: galvanised

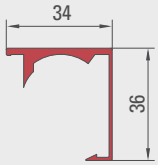
Bl 140 x 12 · Length = 190 mm
Bl 240 x 12 · Length = 190 mm
Bl 29 x 8 · Length = 110 mm
Bl 72 x 8 · Length = 110 mm

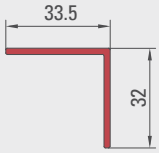
Ø 14: for bolting onto the support profile
M 12: for bolting the bracket
Ø 30: for dowel fastening
M 8: for fastening the trim

Outer trim clip-on profile



Inner trim clip-on profile and connection bracket

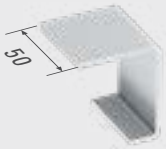


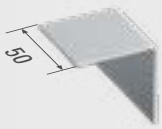


- Material: Aluminium
- Delivery length: 3,000 mm

- Surface
  - "Natural" untreated
  - stainless steel effect (E6EV1)
  - RAL or special colour, powder-coated or anodised

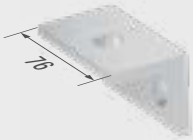
Splice plate

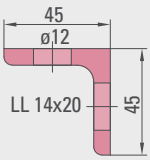




For details about the splice plates see Page 82-83.

Bracket for bolting from underneath



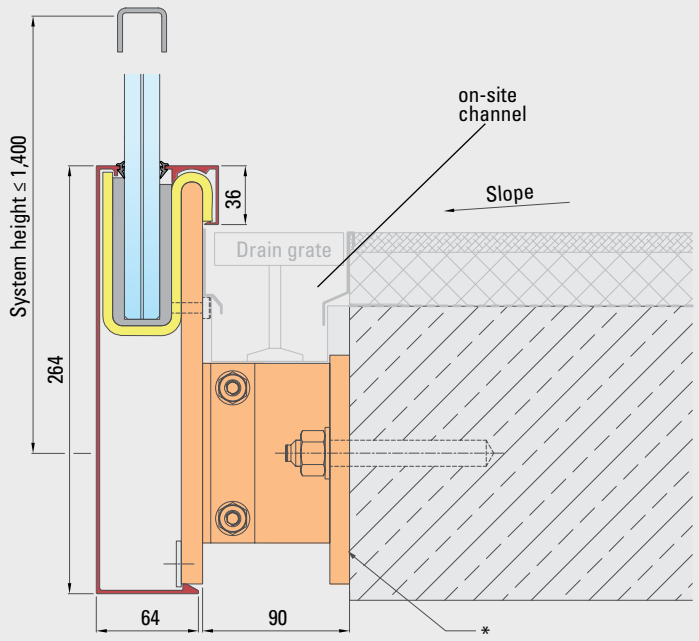


- Material: Steel, S355
- Surface: galvanised

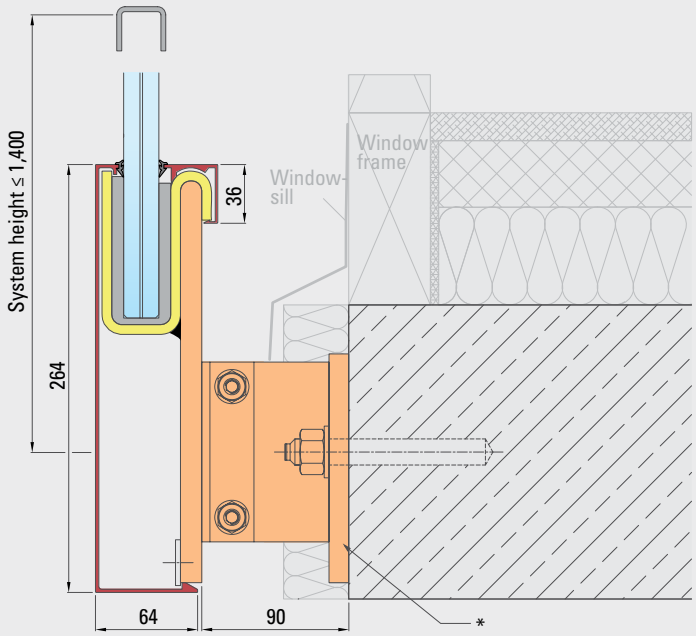
System 8

Application examples

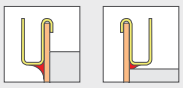
1



2



* Pressure-resistant thermal separation (e.g. Thermostop)



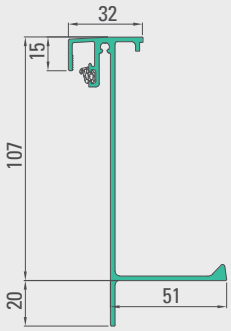
Welding the support profile onto the building connection element see Page 6.

Fastener spacing 400 or 800 mm, see tables Page 64-65.

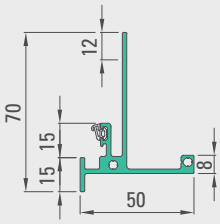
System 8

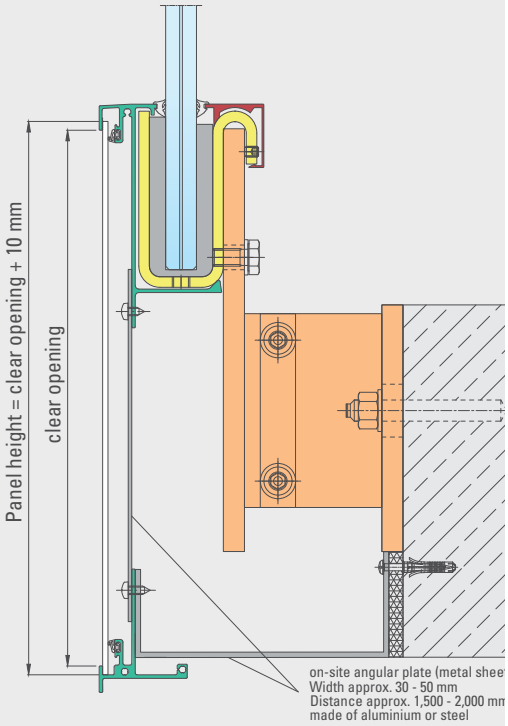
Profiles for on-site structural cladding

Top profile **BVO-A**

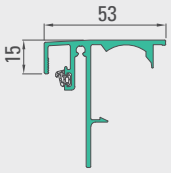


Bottom profile **BVU-A**

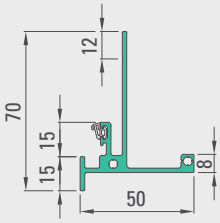


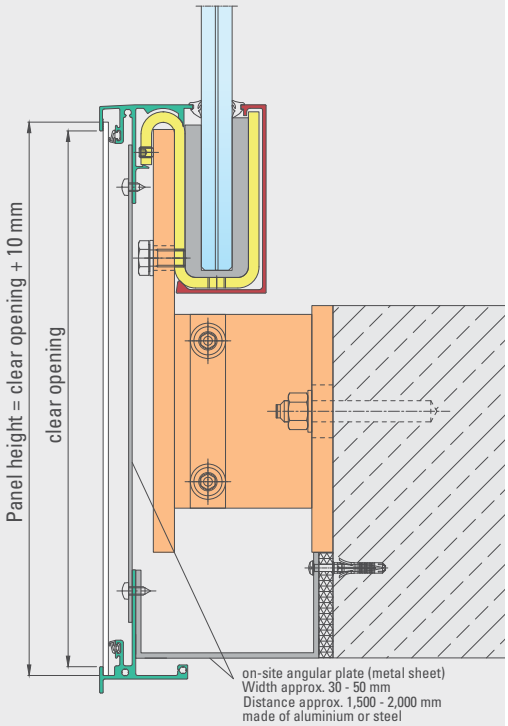


Top profile **BVO-B**



Bottom profile **BVU-A**





Panel thickness 3 – 5 mm.

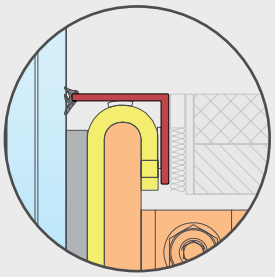
For assembly instructions, see page 84 ff.

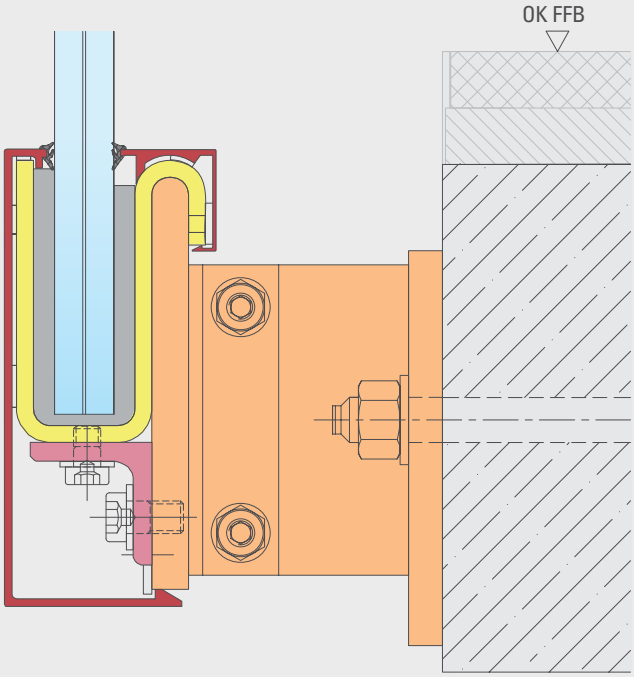
System 9

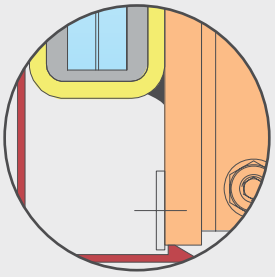
Master plan

Side connection, bolted or welded

Distance 90 mm to the building structure

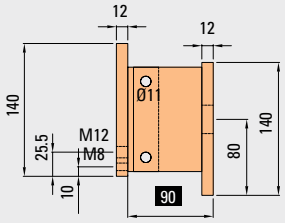


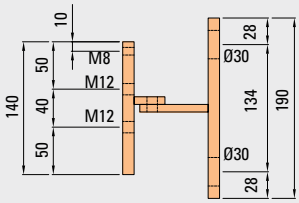




System 9

Structural connection element and trim set (distance **90 mm** to the building structure)



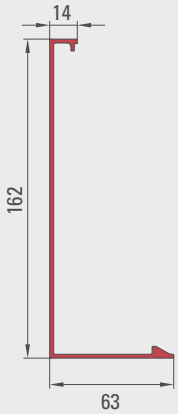


- Material: Steel, S355
- Surface: galvanised

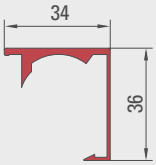
Bl 140 x 12 · Length = 190 mm
Bl 140 x 12 · Length = 140 mm
Bl 29 x 8 · Length = 110 mm
Bl 72 x 8 · Length = 110 mm

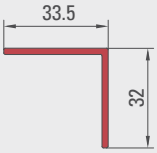
M 12: for bolting the bracket
Ø 30: for dowel fastening
M 8: for fastening the trim

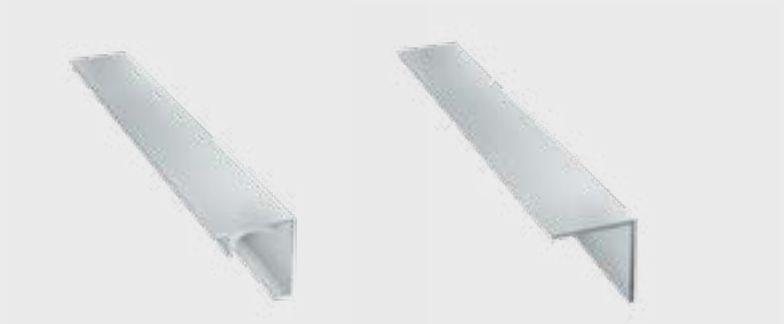
Outer trim clip-on profile



Inner trim clip-on profile and connection bracket



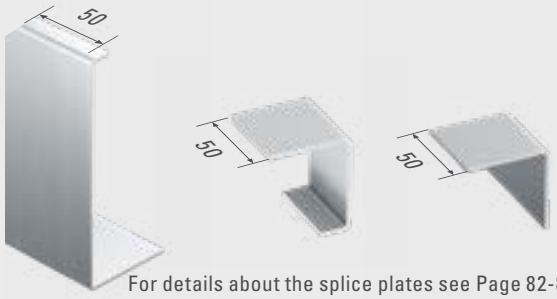




- Material: Aluminium
- Delivery length: 3,000 mm

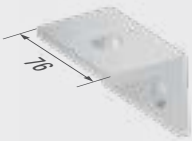
- Surface
  "Natural" untreated
  stainless steel effect (E6EV1)
  RAL or special colour, powder-coated or anodised

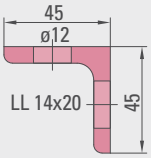
Splice plate



For details about the splice plates see Page 82-83.

Bracket for bolting from underneath

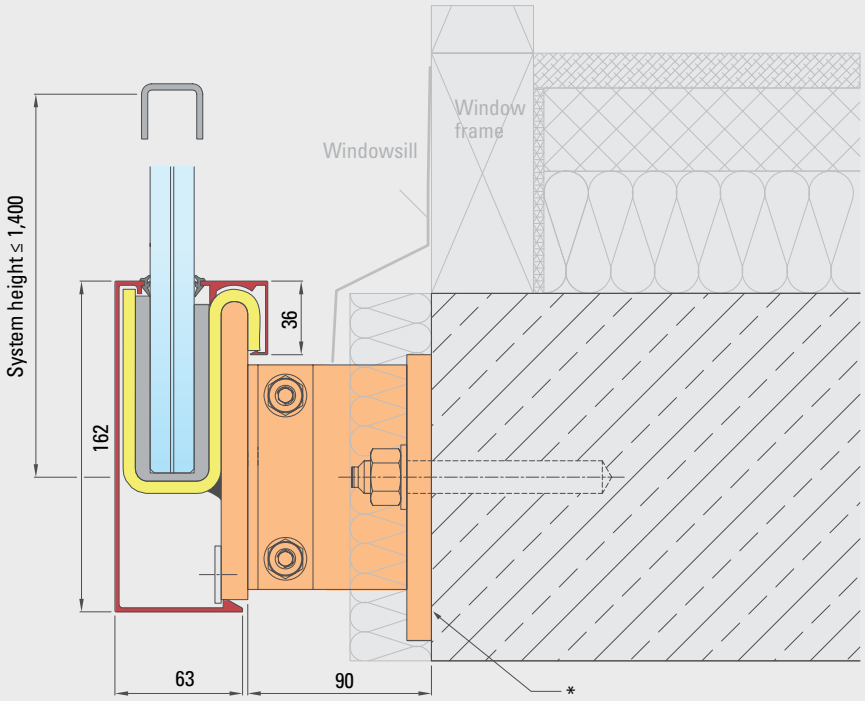




- Material: Steel, S355
- Surface: galvanised

System 9

Application examples



* Pressure-resistant thermal separation (e.g. Thermostop)

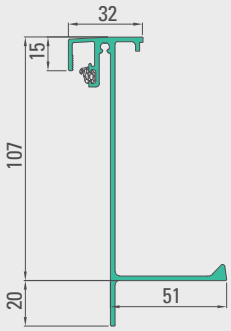
Welding the support profile onto the building connection element see Page 6.

Fastener spacing 400 or 800 mm, see tables Page 64-65.

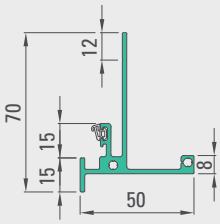
System 9

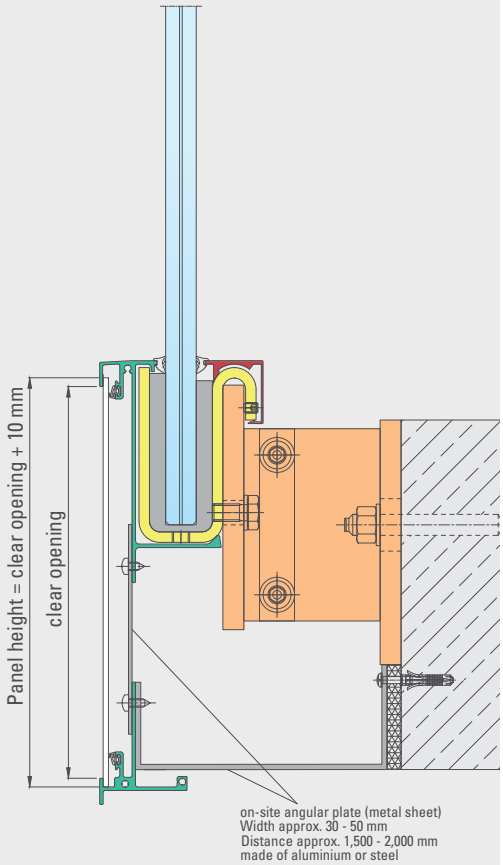
Profiles for on-site structural cladding

Top profile **BVO-A**



Bottom profile **BVU-A**





Panel thickness 3 – 5 mm.

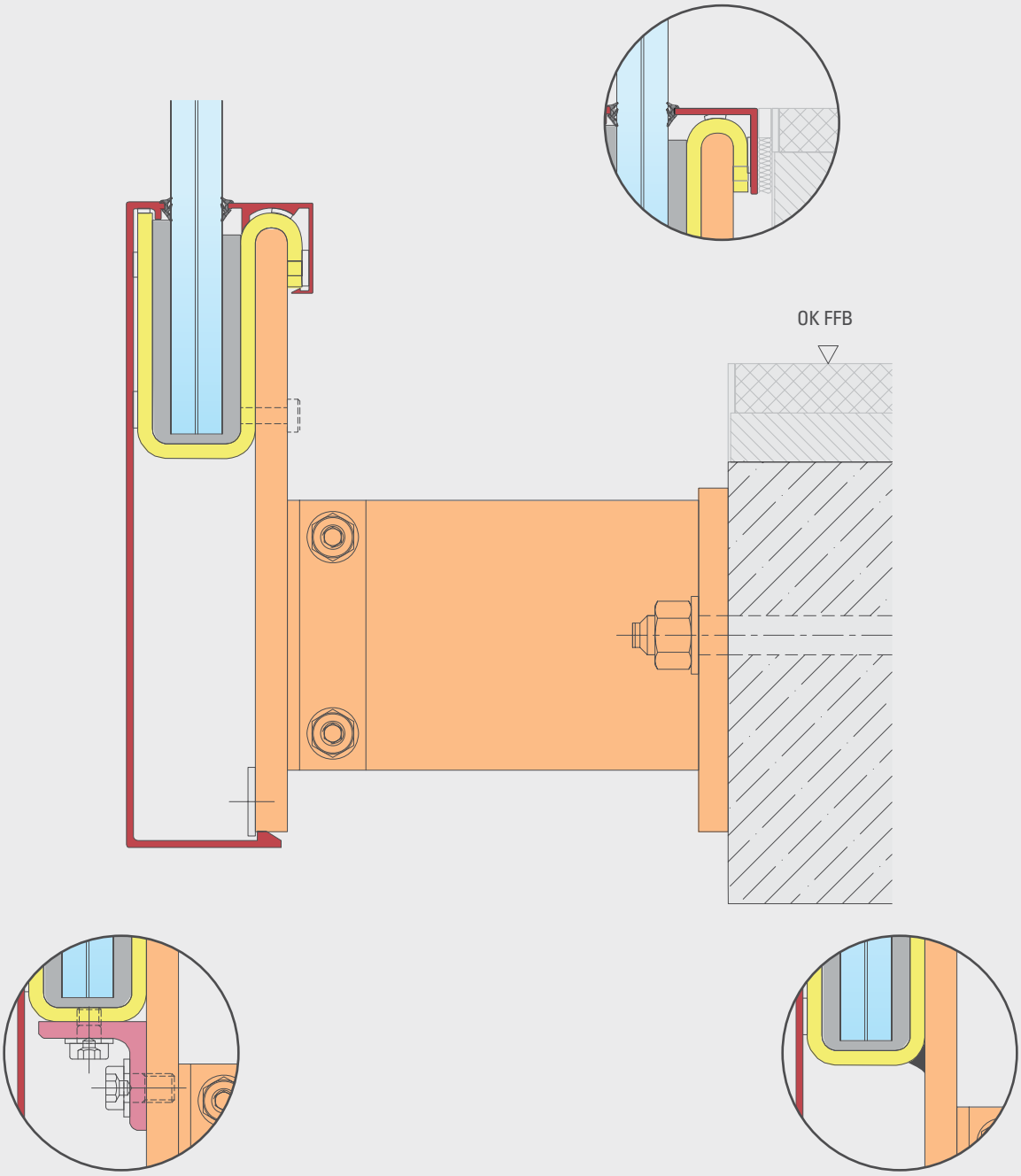
For assembly instructions, see page 84 ff.

System 10

Master plan

Side connection, bolted or welded

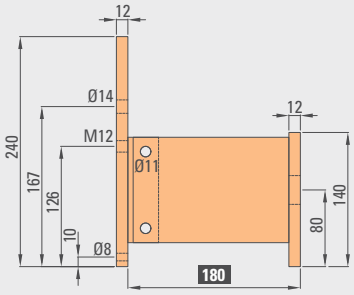
Distance 180 mm to the building structure

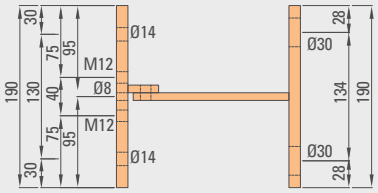


System 10

Structural connection element and trim set (distance **180 mm** to the building structure)

- Material: Steel, S355
- Surface: galvanised

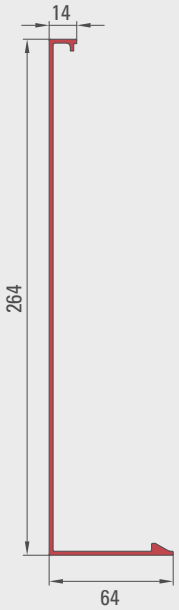




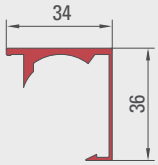
Bl 140 x 12 · Length = 190 mm
Bl 240 x 12 · Length = 190 mm
Bl 29 x 8 · Length = 110 mm
Bl 162 x 8 · Length = 110 mm

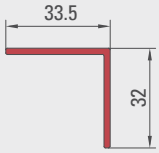
Ø 14: for bolting onto the support profile
M 12: for bolting the bracket
Ø 30: for dowel fastening
M 8: for fastening the trim

Outer trim clip-on profile



Inner trim clip-on profile and connection bracket

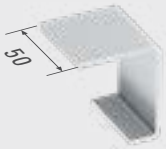


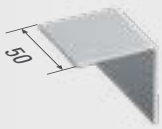


- Material: Aluminium
- Delivery length: 3,000 mm

- Surface
  "Natural" untreated stainless steel effect (E6EV1)
  RAL or special colour, powder-coated or anodised

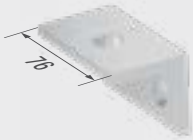
Splice plate

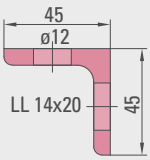




For details about the splice plates see Page 82-83.

Bracket for bolting from underneath

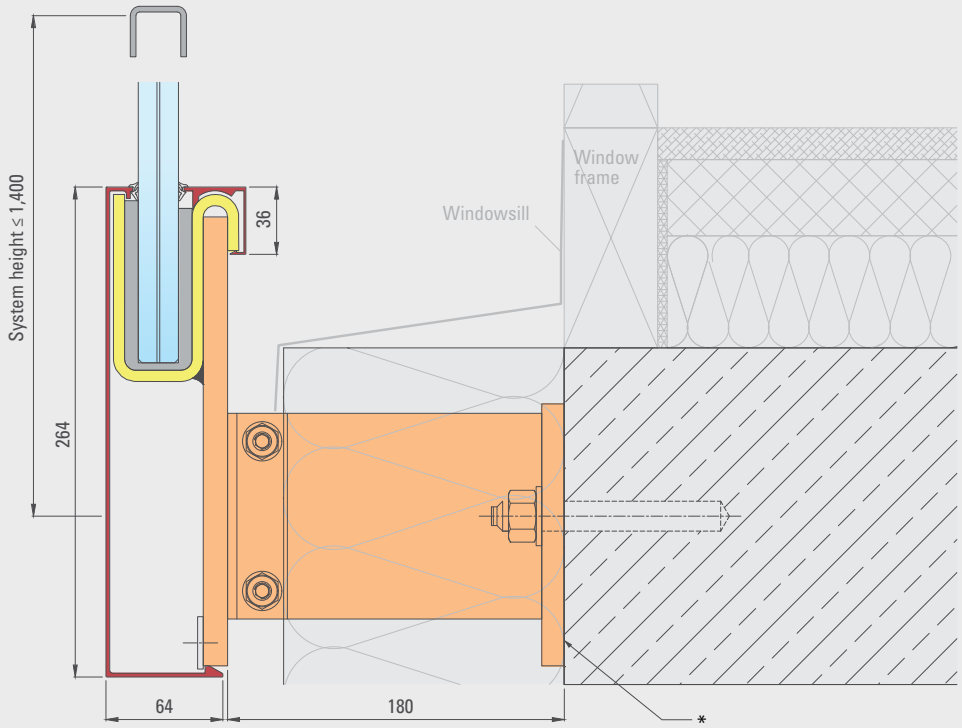




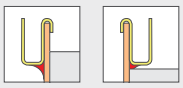
- Material: Steel, S355
- Surface: galvanised

System 10

Application examples



* Pressure-resistant thermal separation (e.g. Thermostop)



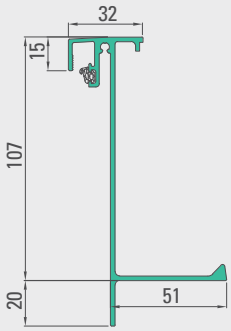
Welding the support profile onto the building connection element see Page 6.

Fastener spacing 400 or 800 mm, see tables Page 64-65.

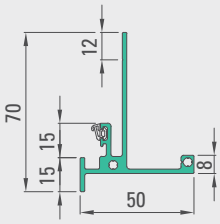
System 10

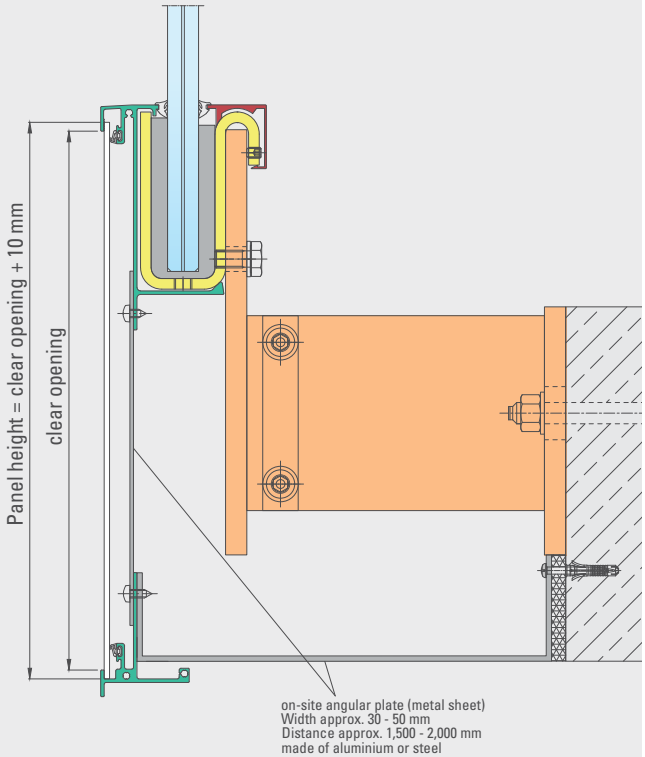
Profiles for on-site structural cladding

Top profile **BVO-A**

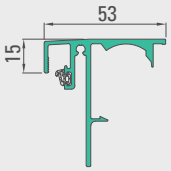


Bottom profile **BVU-A**

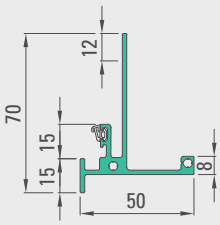


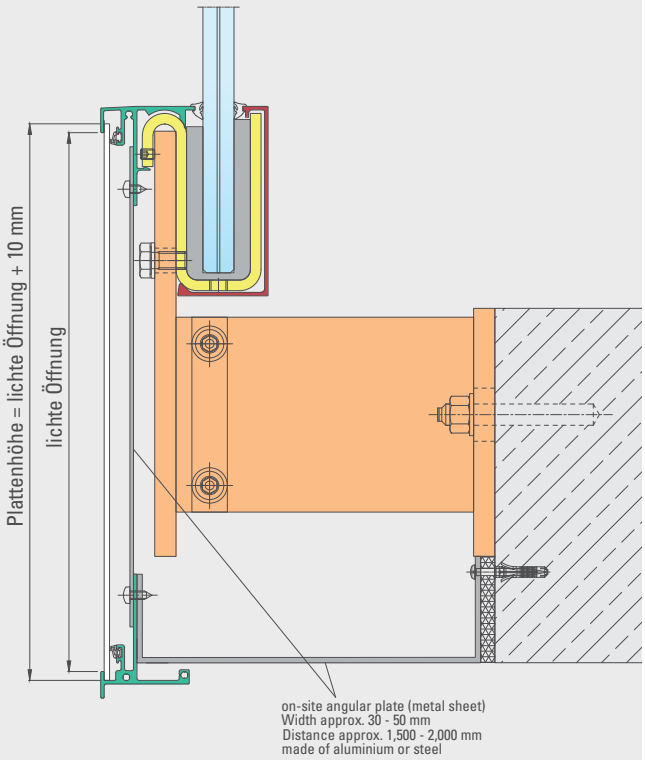


Top profile **BVO-B**



Bottom profile **BVU-A**





Panel thickness 3 – 5 mm.

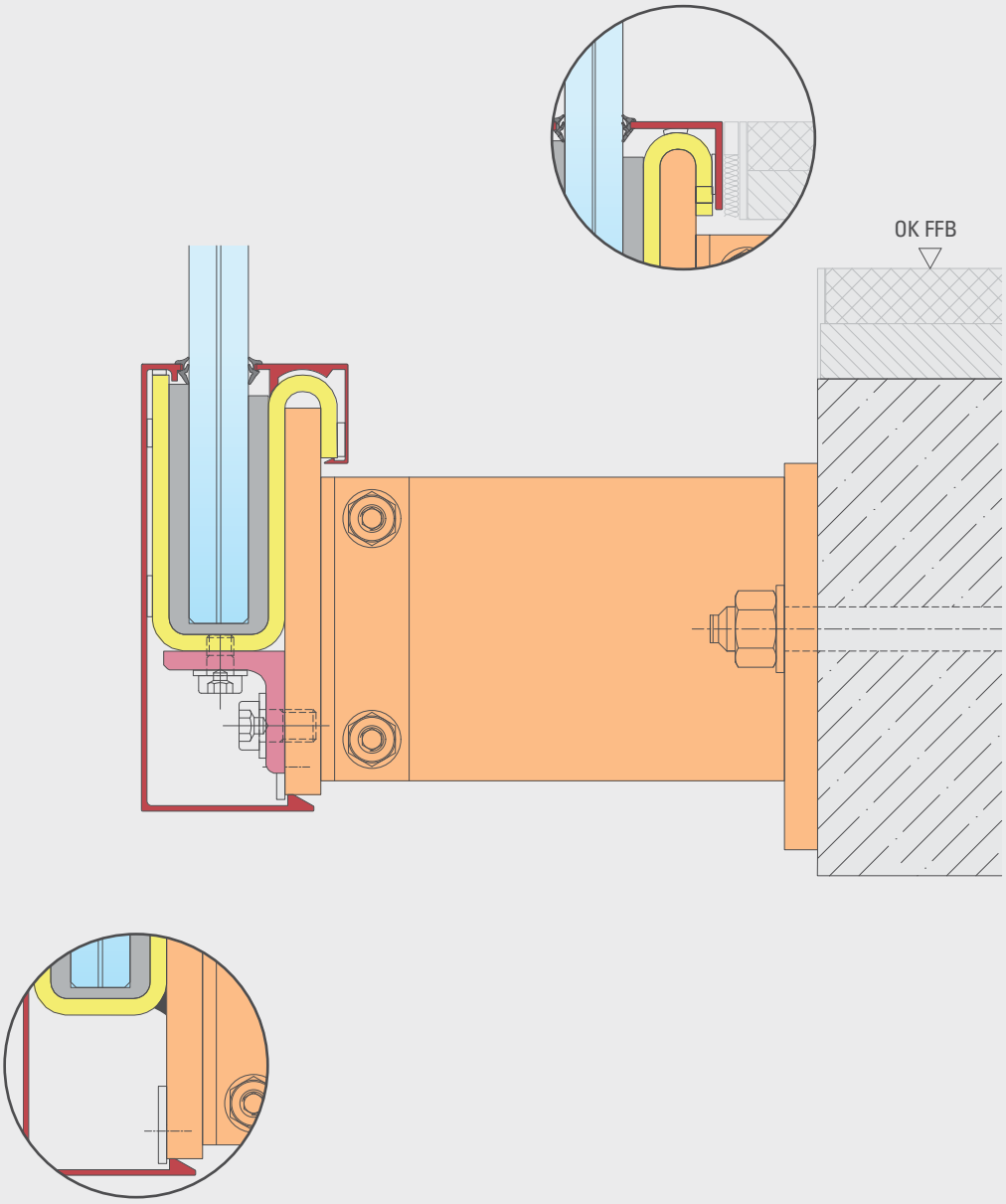
For assembly instructions, see page 84 ff.

System 11

Master plan

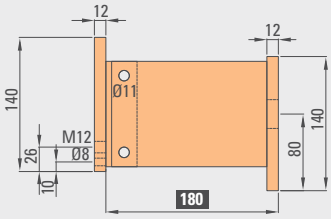
Side connection, bolted or welded

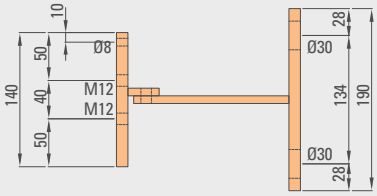
Distance 180 mm to the building structure



System 11

Structural connection element and trim set (distance **180 mm** to the building structure)





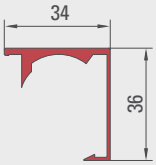
- Material: Steel, S355
- Surface: galvanised

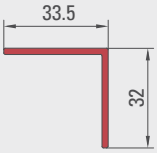
Bl 140 x 12 · Length = 190 mm
Bl 140 x 12 · Length = 140 mm
Bl 29 x 8 · Length = 110 mm
Bl 162 x 8 · Length = 110 mm

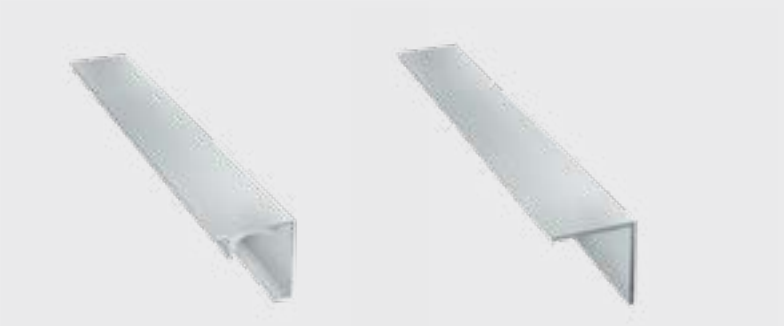
M 12: for bolting the bracket
Ø 30: for dowel fastening
M 8: for fastening the trim

Outer trim clip-on profile

Inner trim clip-on profile and connection bracket



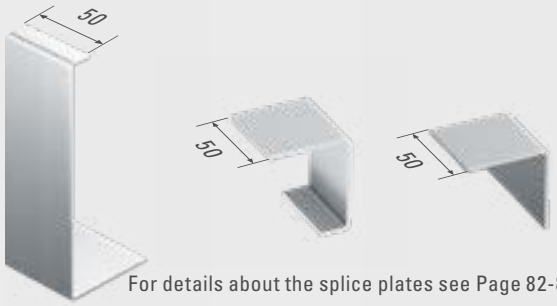




- Material: Aluminium
- Delivery length: 3,000 mm

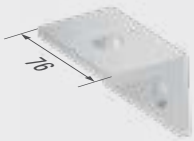
- Surface
  - "Natural" untreated
  - stainless steel effect (E6EV1)
  - RAL or special colour, powder-coated or anodised

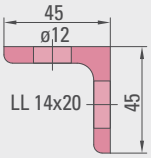
Splice plate



For details about the splice plates see Page 82-83.

Bracket for bolting from underneath

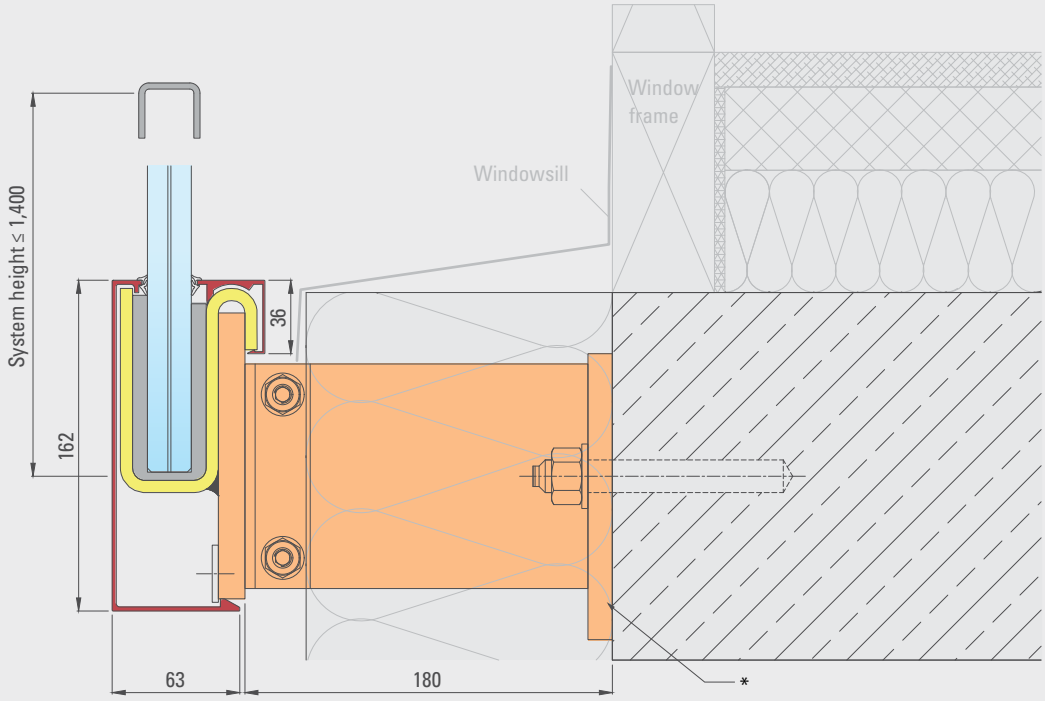




- Material: Steel, S355
- Surface: galvanised

System 11

Application examples



* Pressure-resistant thermal separation (e.g. Thermostop)

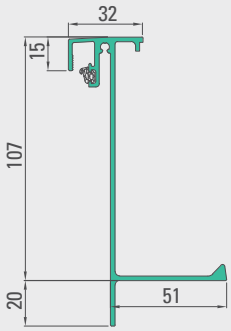
Welding the support profile onto the building connection element see Page 6.

Fastener spacing 400 or 800 mm, see tables Page 64-65.

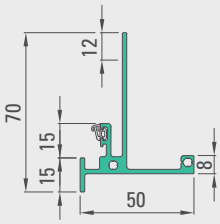
System 11

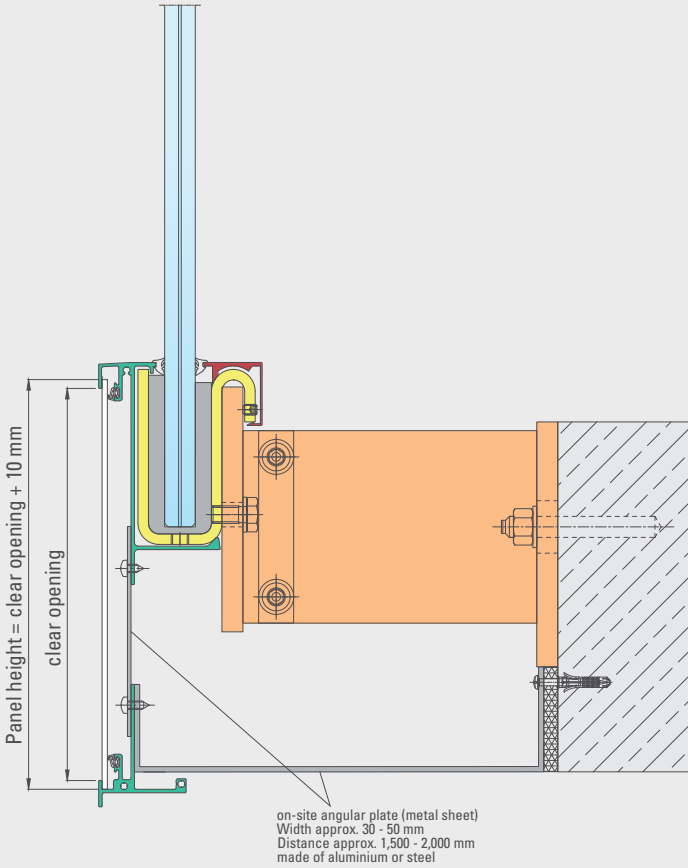
Profiles for on-site structural cladding

Top profile **BVO-A**



Bottom profile **BVU-A**





Panel thickness 3 – 5 mm.

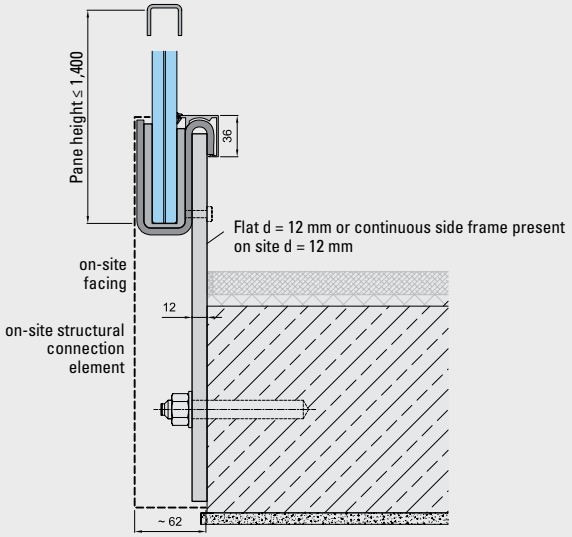
For assembly instructions, see page 84 ff.

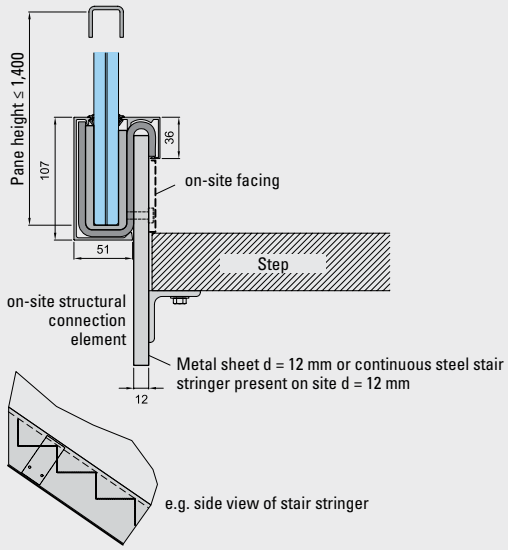
Proposed solutions for on-site connections

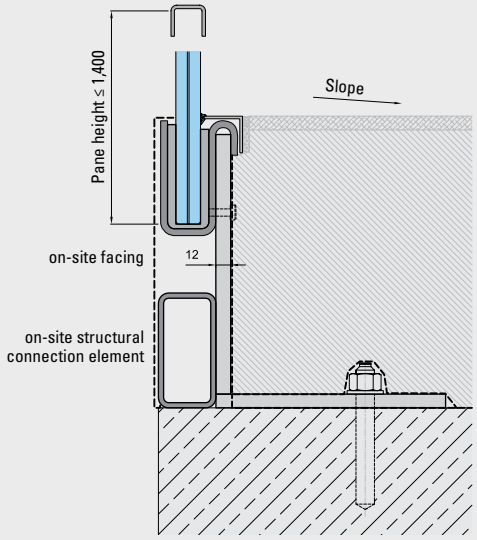
The use of **BALARDO** *steel* structural connection elements 1 to 11 is not essential to comply with the European Technical Assessment (ETA) – the latter is also effective for individual structural connections.

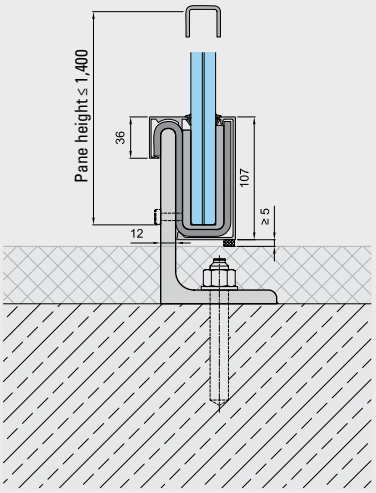
Consequently, all kinds of building connections can be made to suit the specific project. Planners and executors are completely free to choose, however they must structurally calculate these according to the relevant installation situation with regard to load introduction and load transfer. The same also applies to inner and outer trims: These are irrelevant to the system!

Whether in aluminium, stainless steel, plasterboard, wood or other materials – the choice is yours. This is because the on-site cladding has no effect on the general building inspection test certificate (AbP).

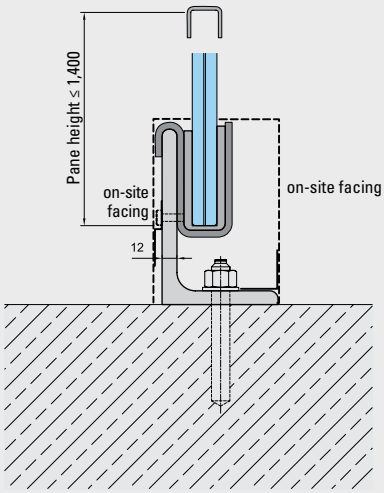


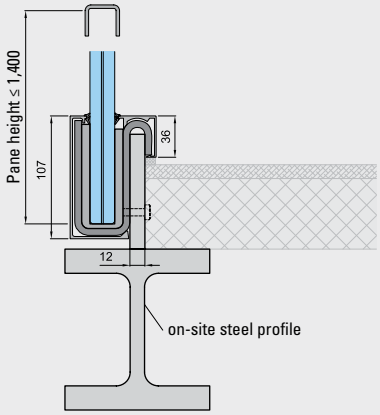


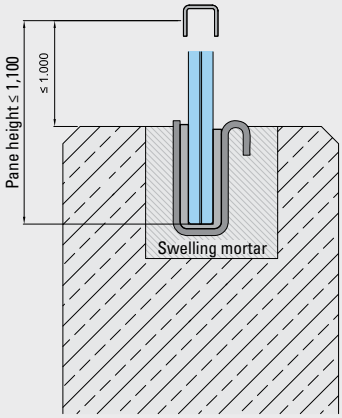


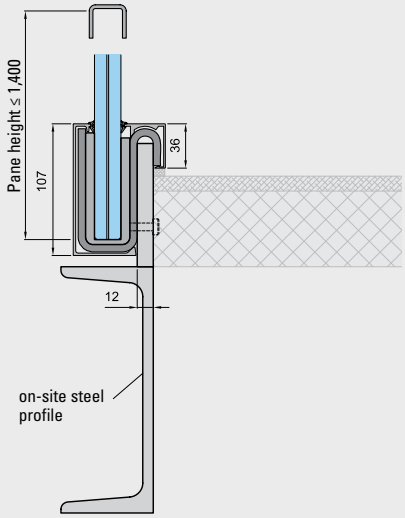


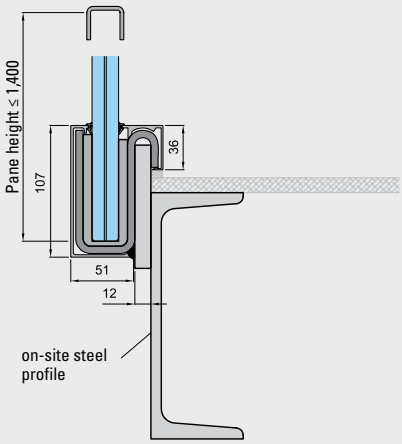
Proposed solutions

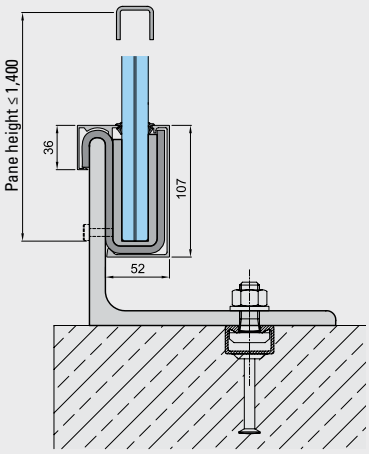






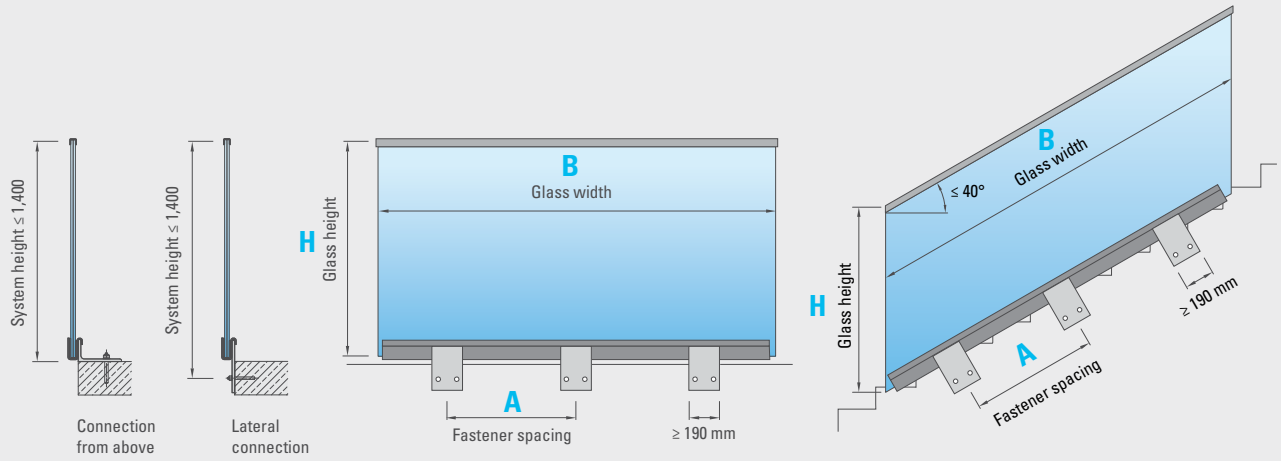






Application and calculation tables

Private sector, top rail load up to **0.5 kN/m**



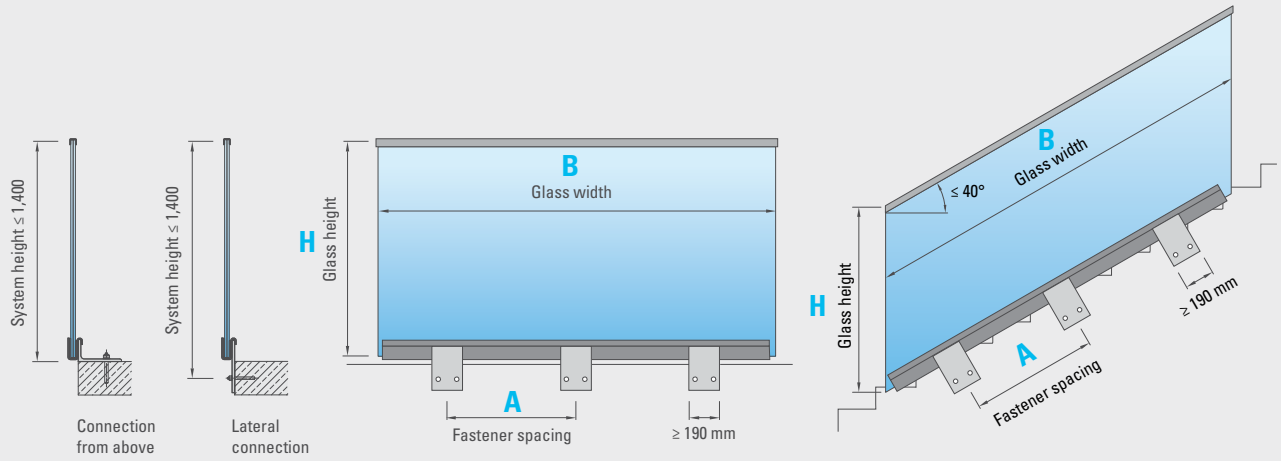
Glass		Fastener spacing A [mm]	max. glass height H [mm]	permissible wind load (kN/m²) at glass height H						
				800	900	1,000	1,100	1,200	1,300	1,400
Level area	LG-Float 2 x 10	≤ 800	1,400	1.75	1.25	0.90	0.60	0.35	0.15	0.00
	LG-TG 2 x 8	≤ 800	1,400	2.90	2.60	1.90	1.50	1.20	0.95	0.75
	LG-TG 2 x 10	≤ 800	1,400	2.90	2.60	2.30	2.10	1.95	1.80	1.50
Stairs	LG-TG 2 x 8	≤ 800	1,200	2.50	1.80	1.35	1.00	0.75	0.50	0.35
	LG-TG 2 x 10	≤ 800	1,400	2.90	2.60	2.30	2.00	1.60	1.30	1.05

Possible without connection to the structure. Instead of load-transferring handrails, glass edge guard profiles or LED hand rails may also be attached. Glass width W up to 6,000 mm possible. Width ratio of adjacent glass panes is not limited.

Load-distributing handrails with attachment to building structure / to load-bearing structural elements necessary! Maximum glass width W = 3,000 mm.
Width ratio of adjacent glass panes in a straight line max. 1:2 or 2:1.

Using LG-heat strengthened soda lime silicate glass or printed/enamelled LG-TG instead of LG-Float is possible.
Maximum glass width with LG-Float is B = 1,000 mm.
Pay attention to the maximum system height of 1,400 mm.

Public area, top rail load up to **1.0 kN/m**



Glass		Fastener spacing A [mm]	max. glass height H [mm]	permissible wind load (kN/m²) at glass height H						
				800	900	1,000	1,100	1,200	1,300	1,400
Level area	LG-TG 2 x 8	≤ 800	1,100	2.05	1.55	0.75	0.25	-	-	-
		≤ 400	1,100	2.25	1.75	0.80	0.30	-	-	-
	LG-TG 2 x 10	≤ 800	1,400	2.05	1.80	1.60	1.50	1.35	1.20	0.85
		≤ 400	1,400	2.25	2.00	1.80	1.65	1.50	1.30	0.95
Stairs	LG-TG 2 x 10	≤ 800	1,300	2.05	1.80	1.60	0.95	0.45	0.10	-
		≤ 400	1,400	2.25	2.00	1.80	1.10	0.60	0.25	0.00

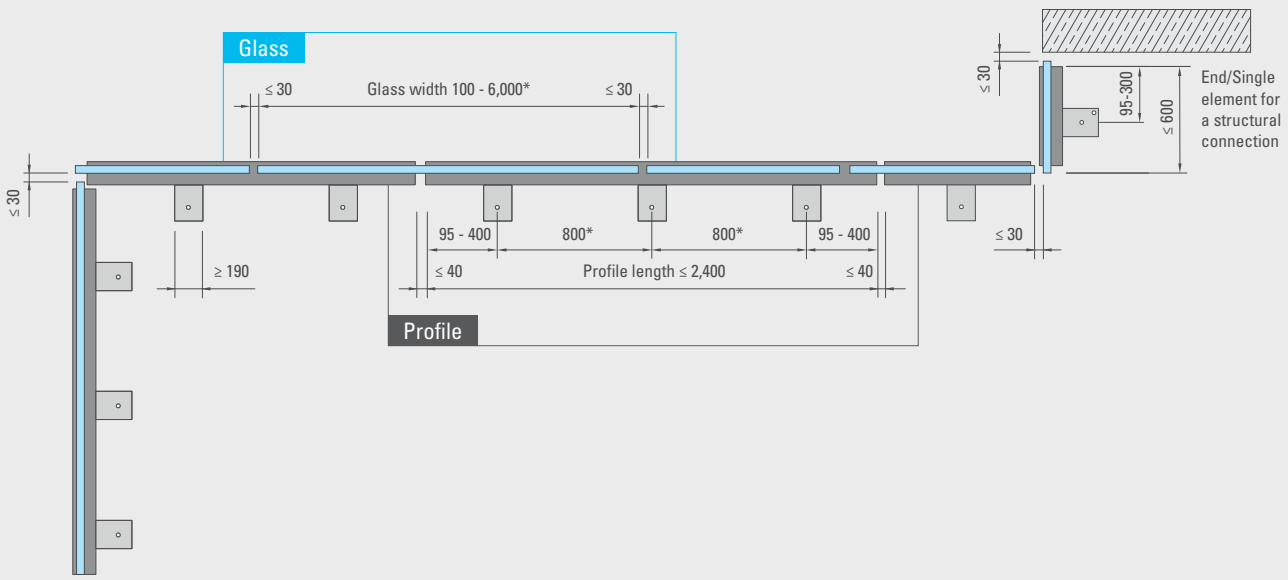
Possible without connection to the structure. Instead of load-transferring handrails, glass edge guard profiles or LED hand rails may also be attached. Glass width W up to 6,000 mm possible. Width ratio of adjacent glass panes is not limited.

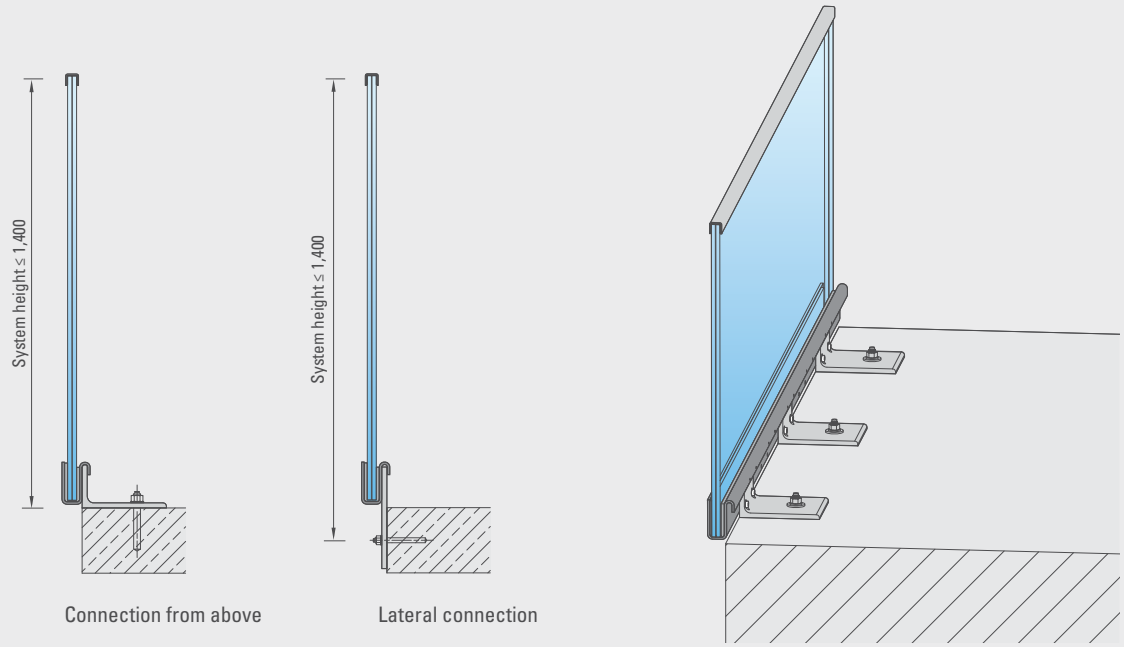
Load-distributing handrails with attachment to building structure / to load-bearing structural elements necessary! Maximum glass width W = 3,000 mm.
Width ratio of adjacent glass panes in a straight line max. 1:2 or 2:1.

Using LG-heat strengthened soda lime silicate glass or printed/enamelled LG-TG instead of LG-Float is possible.
Maximum glass width with LG-Float is B = 1,000 mm.
Pay attention to the maximum system height of 1,400 mm.

Level area system dimensions

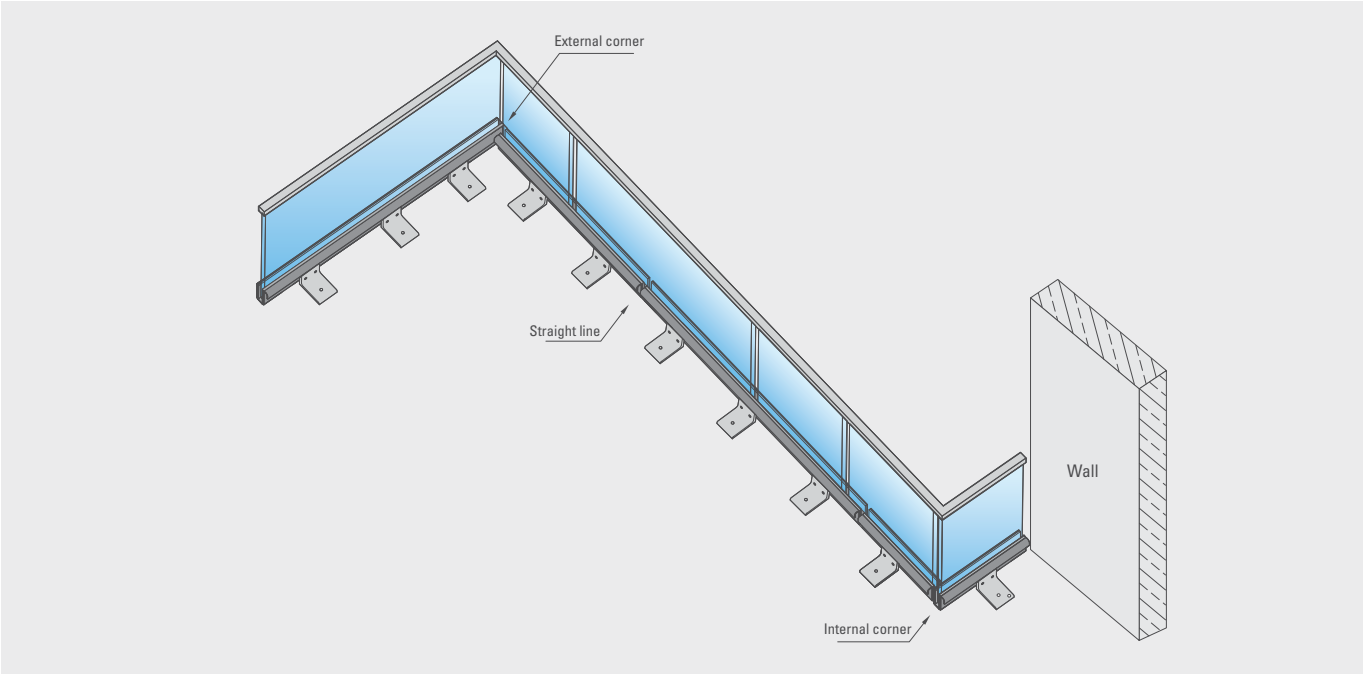
Glass and profile

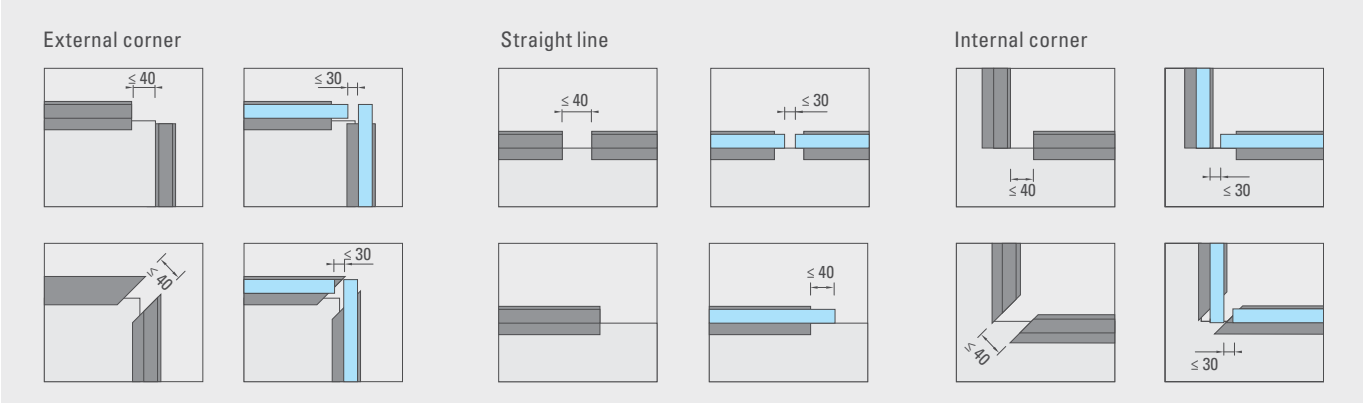


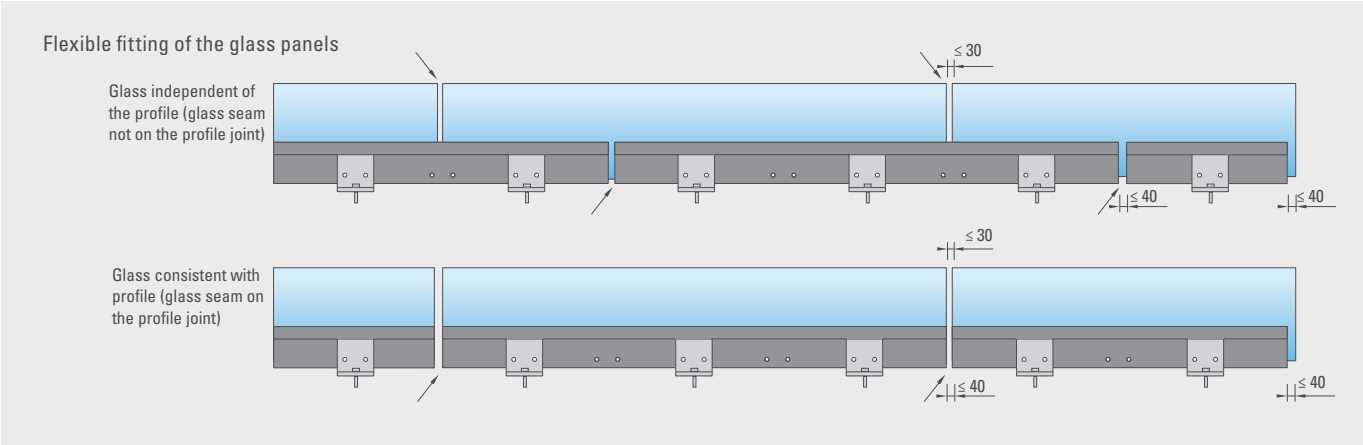


* Application and calculation tables, see Page 64-65.

Profile joint / glass joint



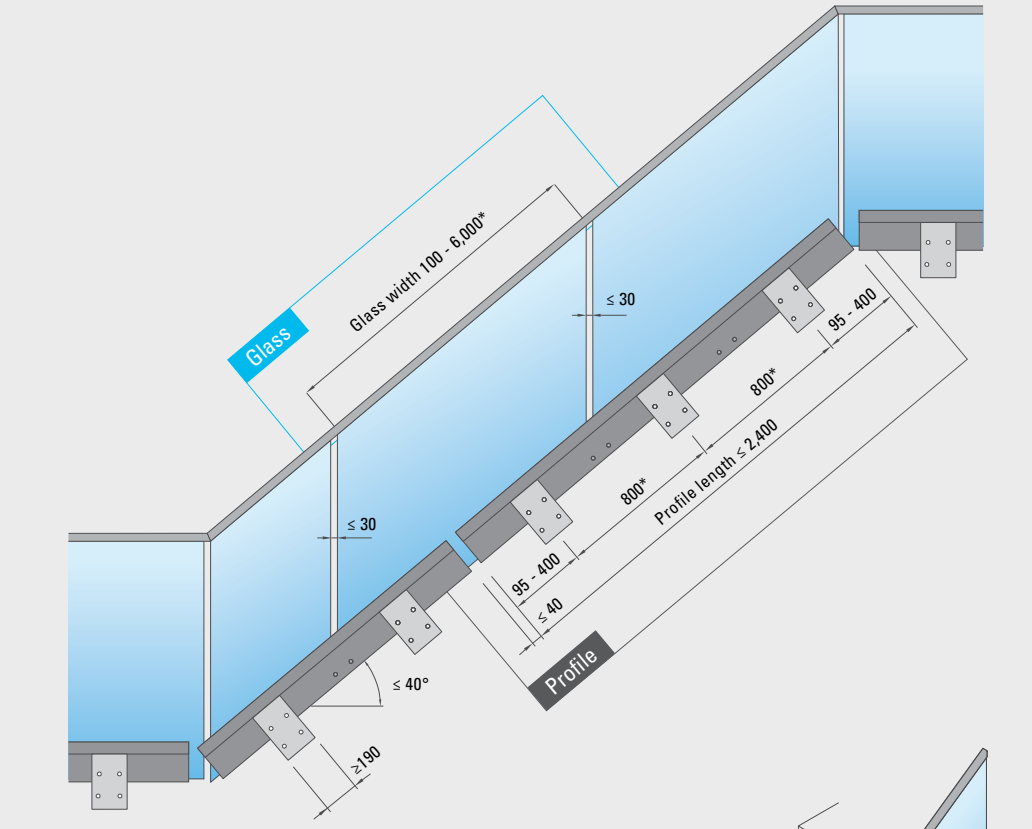


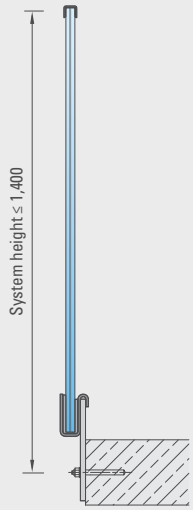


Open, accessible glass edges must be constructively protected according to DIN 18008-4, e.g. with the vertical glass edge guard profile Page 73.

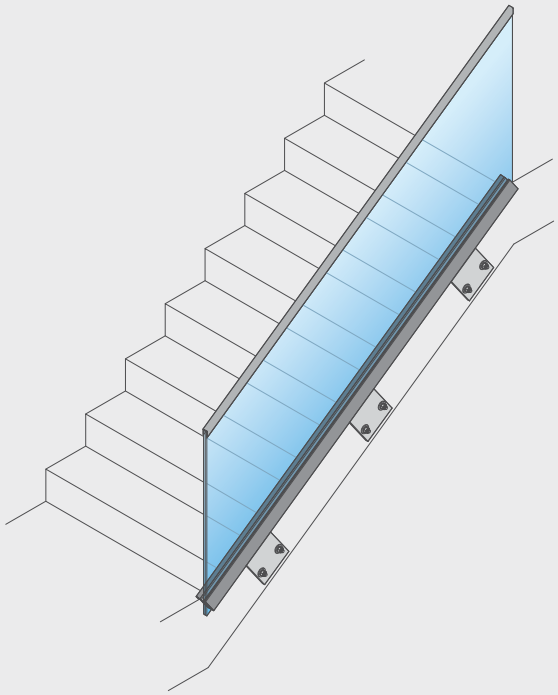
Stair system dimensions

Glass and profile



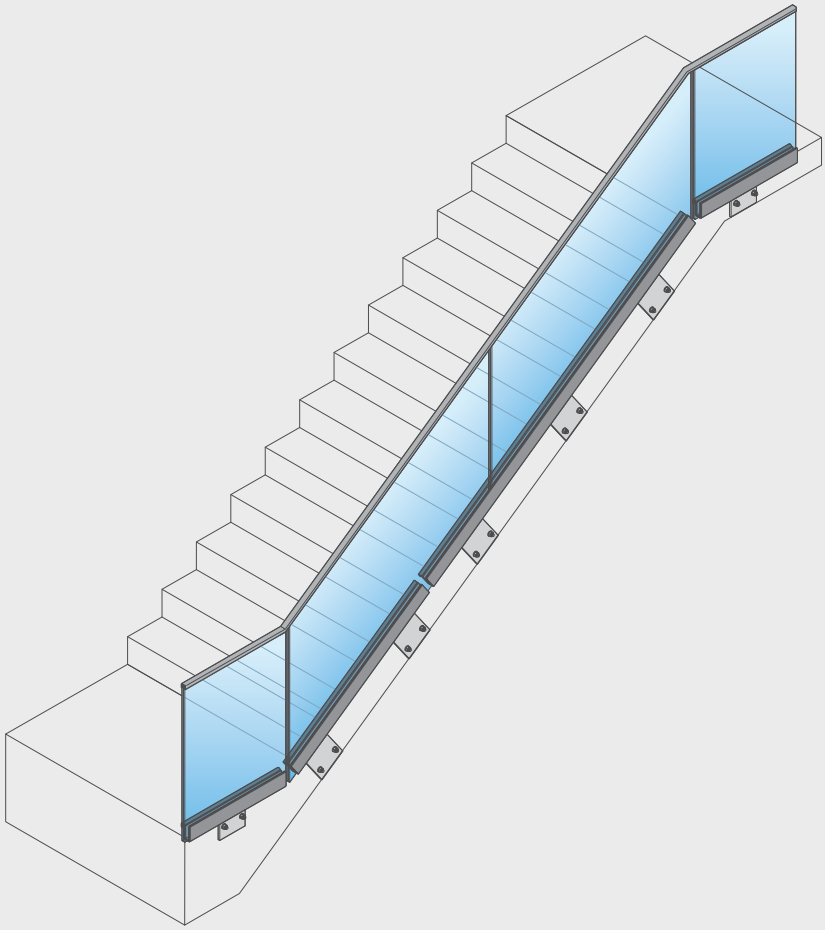


Lateral connection

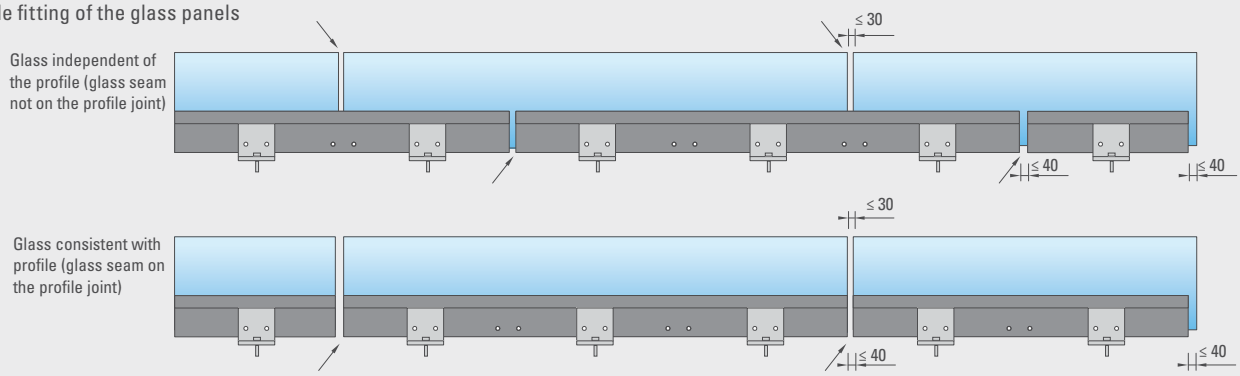


* Application and calculation tables, see Page 64-65.

Profile joint / glass joint



Flexible fitting of the glass panels



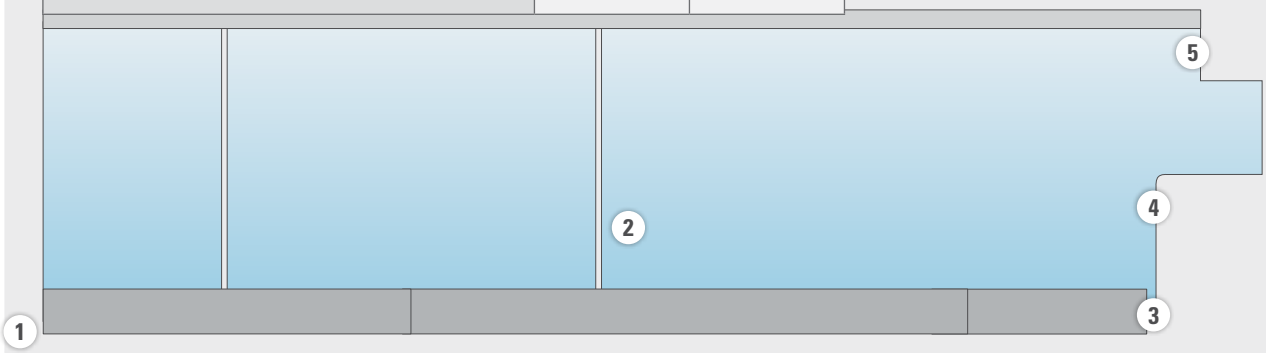
Open, accessible glass edges must be constructively protected according to DIN 18008-4, e.g. with the vertical glass edge guard profile Page 73.

Glass construction / application

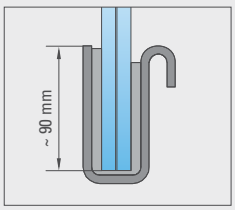
Laminated safety glass (LG) made of	Glass constructions	
Float (Float glass)		2 x 10 mm
Heat strengthened soda lime silicate glass		2 x 10 mm
TG (single-pane safety glass)	2 x 8 mm	2 x 10 mm

With 1.52 mm laminated layer made of PVB

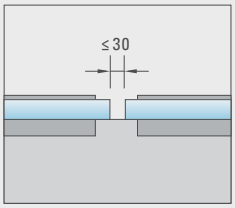
PVB: Polyvinyl butyral film glass edges ground or polished. Glass and profile joints must be protected from penetrating moisture.



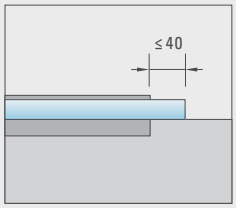
1 Glass inset



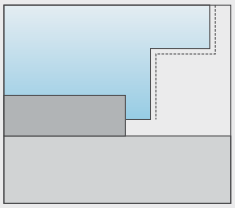
2 Glass joint



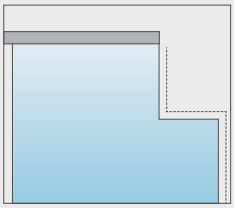
3 Glass overhang



4 Glass cutout



5 Glass cutout



Printing / Enamelling

LG-TG panes may be printed / enamelled.

The printed / enamelled glass panes are dimensioned using the certificates for LG-Float panes with the same thickness and height.

Filler and end panes 100 - 500 mm wide must be attached at the top to ensure load transfer.

Handrail joint:

750 mm from the glass joint in a straight line, in case of non-rigid handrail attachment.

100 mm from the glass joint in a straight line, in case of rigid handrail attachment.

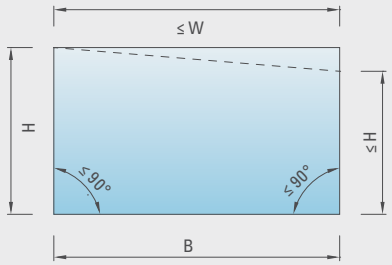
Using LG-heat strengthened soda lime silicate glass instead of LG-Float is possible.

* Open, accessible glass edges must be constructively protected in accordance with DIN 18008-4, e.g. with the vertical glass edge guard profile Page 73. For glass dimensions see application and calculation tables, Page 64-65.

Glass panes / model panes

Rectangular / trapezoidal panes

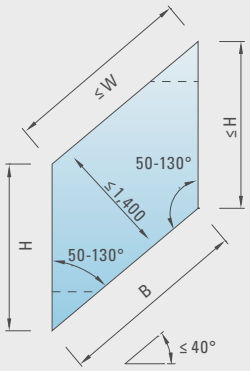
LG - TG / heat strengthened soda lime silicate glass / Float



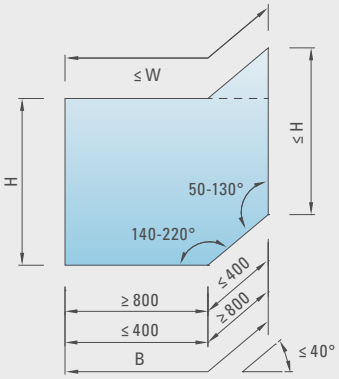
Glass width	W = 500 - 6,000 mm
max. glass height	H = 1,400 mm*

Sloped glass panes / model panes

LG-TG



parallelogram-shaped

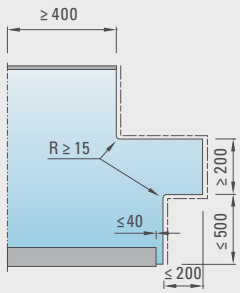


angled transition

Glass width	W = 500 - 3,000 mm
max. glass height	H = 1,400 mm*

permitted glass cutouts

LG-TG 2x10



In the bottom section, the cutouts are only permitted up to a size of 200 x 500 mm. For the cutouts in the top section there are no restrictions.

Protect all glass edges accessible from the traffic areas by adjacent components with a distance of no more than 30 mm or with edge guards .

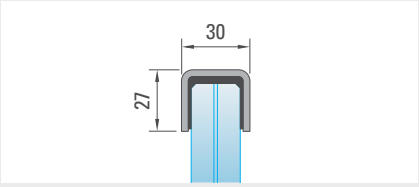
The glass panes made of LG-TG with glass cut-out are dimensioned using the certificates for LG-Float panes with no cutout with the same thickness and height.

* For glass dimensions see application and calculation tables, Page 64-65.
Open, accessible glass edges must be constructively protected in accordance with DIN 18008-4, e.g. with the vertical glass edge guard profile Page 73.

Load-distributing stainless steel handrails

U-profile

U 30 x 27 mm, d = 3 mm



- incl. rubber push-on profile
- Delivery length: 3,000 mm, 5,000 mm
- Material: Stainless steel 1.4301 and 1.4404
- Surface: polished

90° corner

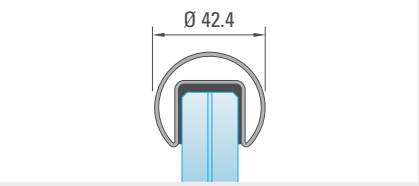
External dimensions 200 x 200 mm

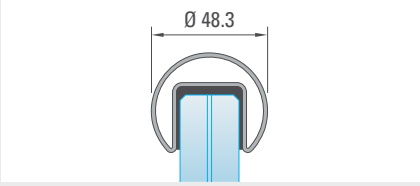
End piece

500 mm (closed on one side)

Grooved pipes

Ø 42.4 mm, Ø 48.3 mm





- incl. rubber push-on profile
- Delivery length: 3,000 mm, 5,000 mm
- Material: Stainless steel 1.4301
- Surface: polished

Handrail connector

Corner connector 90°

Handrail end plug

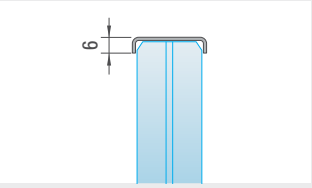
Wall connection

If necessary, secure the handrail against lifting by bonding it with group E sealants according to DIN 18545-2.
Pay attention to processing and bonding instructions. PVB compatibility must be checked.

Glass edge guard profiles

Stainless steel

h = 6 mm, d = 1 mm

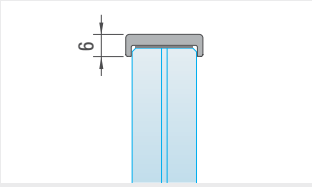


- incl. adhesive fastening
- Delivery length: 1,300 mm, 3,000 mm

- Material: Stainless steel 1.4301
- Surface: polished

Aluminium

h = 6 mm, d = 1.5 mm



- incl. adhesive fastening
- Delivery length: 1,300 mm, 3,000 mm

- Material: Aluminium (EN AW - 6063 T66)
- Surface: Natural untreated

90° corner

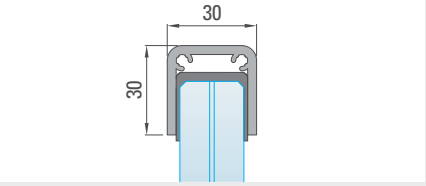
External dimensions 200 x 200 mm


horizontal


vertical

Aluminium U-profile

U 30 x 30 mm, d = 3 mm

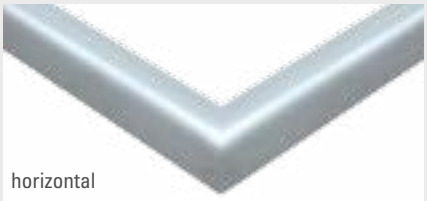


- incl. rubber push-on profile
- Delivery length: 3,000 mm, 5,000 mm
- Connecting pins see Accessories p.81

- Material: Aluminium (EN AW - 6063 T66)
- Surface: Natural untreated
  Stainless steel look polished

90° corner

External dimensions 200 x 200 mm


horizontal


vertical

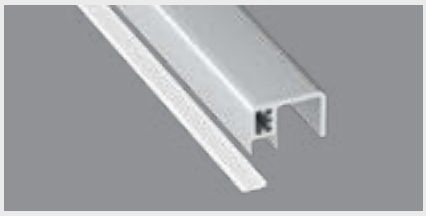
End piece

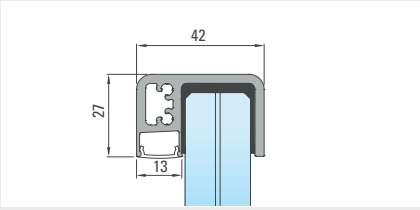
500 mm (closed on one side)

If necessary, secure the handrail against lifting by bonding it with group E sealants according to DIN 18545-2.
Pay attention to processing and bonding instructions. PVB compatibility must be checked.

LED handrail*

Lighting downwards





- incl. rubber push-on profile
- Delivery length: 3,000 mm, 5,000 mm
- Connecting pins see Accessories p.81

- Material: Aluminium (EN AW-6063 T66)
- Surface: Natural untreated
  Stainless steel look polished

90° corner

External dimensions 200 x 200 mm


External corner

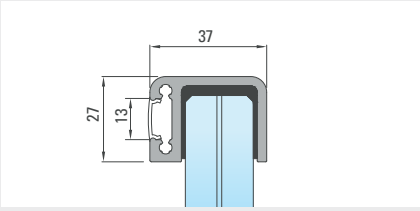

Internal corner


vertical

End piece

500 mm (closed on one side)

Lighting on the side



- incl. rubber push-on profile
- Delivery length: 3,000 mm, 5,000 mm
- Connecting pins see Accessories p.81

- Material: Aluminium (EN AW-6063 T66)
- Surface: Natural untreated
  Stainless steel look polished

90° corner

External dimensions 200 x 200 mm


External corner


Internal corner

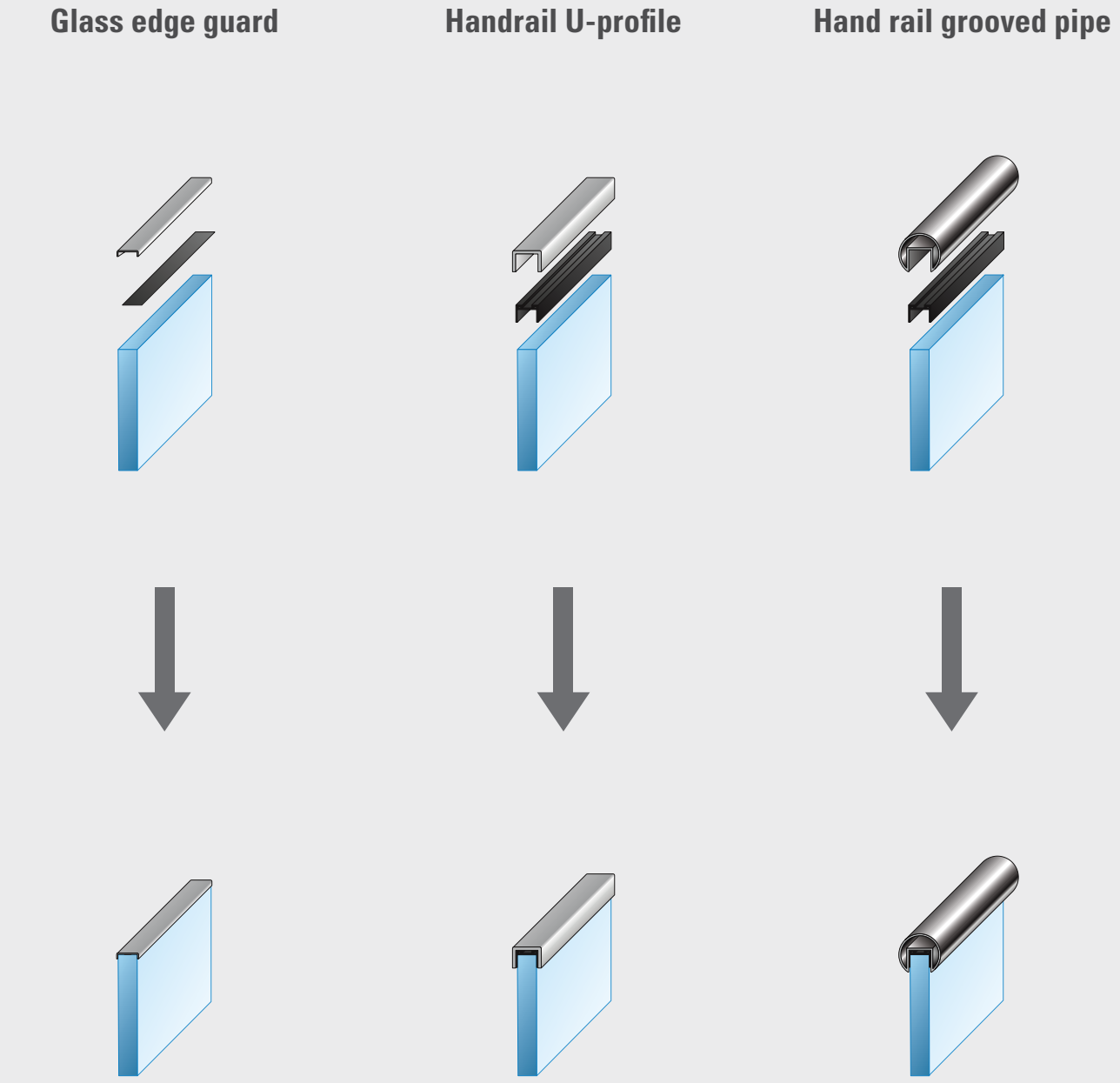

vertical

End piece

500 mm (closed on one side)

* not load-distributing
If necessary, secure the handrail against lifting by bonding it with group E sealants according to DIN 18545-2.
Pay attention to processing and bonding instructions. PVB compatibility must be checked.

Handrail assembly



Evidence of the load-distributing handrail connection on the building on site.

BALARDO *firstglass*

The edge guard made of glass

SHOW OFF A TRANSPARENT GLASS EDGE – The permanently laminated transparent glass edge BALARDO *firstglass* redefines transparency on glass railings!

Your benefit: No visible metal edge guard profiles! Just pure glass!
Discover new possibilities in frameless glass architecture.

On request

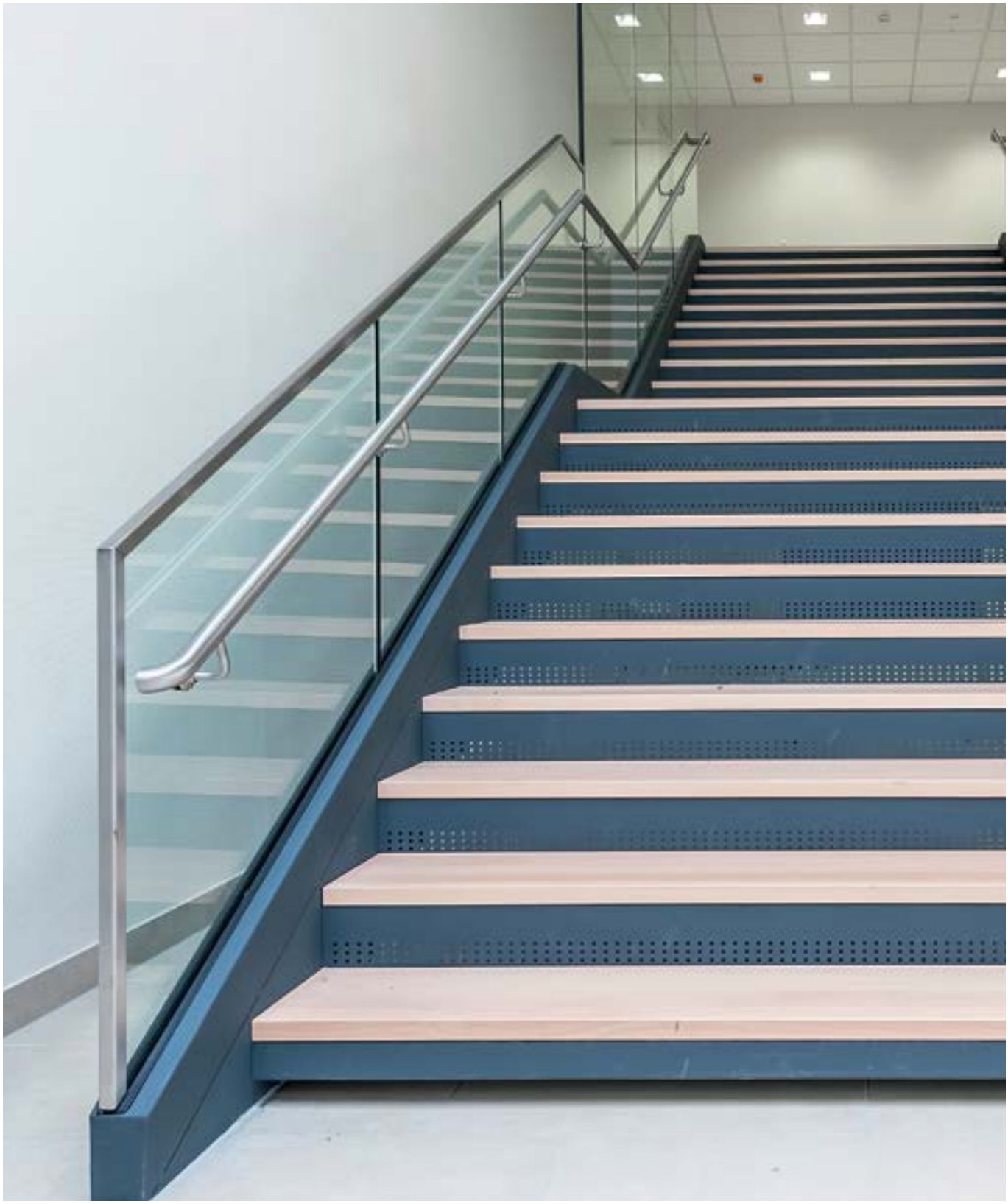
Ideal for single panes

Glass width: 300 - 6,000 mm

DIN 18008-4 tested

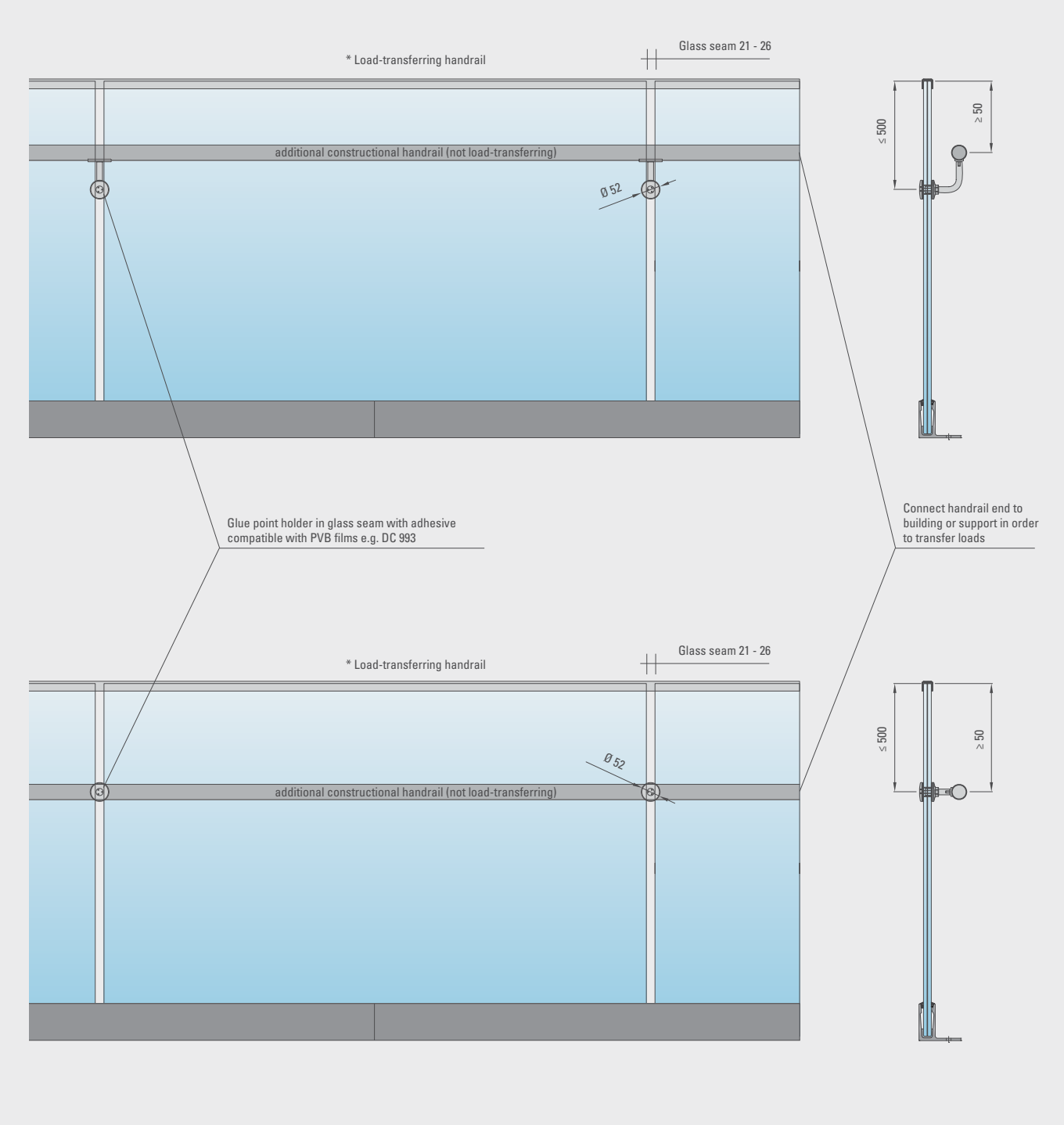
Only with GLASSLINE!

Additional constructional handrail



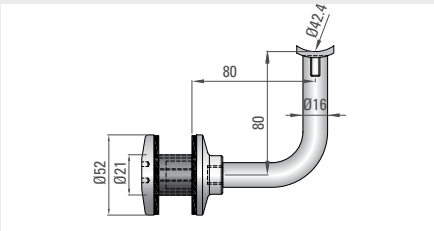
Additional constructional handrail

Application examples



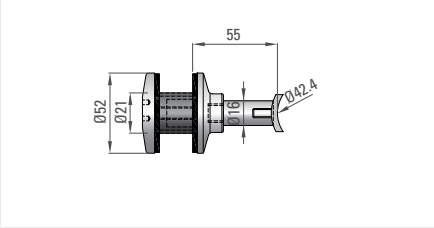
* Load-transferring handrail essential. The building law application / approval must be agreed with the responsible authorities on a property-specific basis. The constructional handrail has no fall-protection function and must be calculated and executed according to the requirements. If necessary, secure the handrail against lifting by bonding it with group E sealants according to DIN 18545-2. PVB compatibility must be observed.

Curved handrail holder



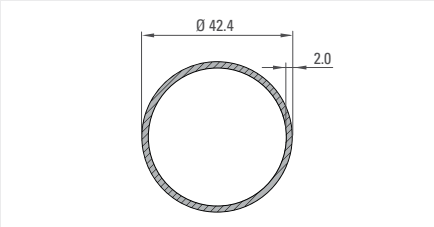
- Point holder: Ø 52 mm
- Material: Stainless steel 1.4404
- Surface: turned bright

Straight handrail holder



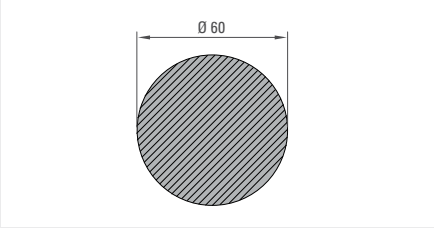
- Point holder: Ø 52 mm
- Material: Stainless steel 1.4404
- Surface: turned bright

Stainless steel handrail



- Round pipe: Ø 42.4 mm x 2.0 mm
- Material: Stainless steel 1.4404
- Surface: polished
- Delivery length: 6,000 mm

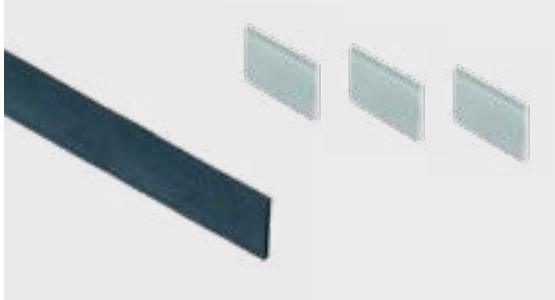
Wooden handrail



- Wood: Ø 60 mm
- Material: Steamed beech
- Surface: polished and varnished
- Delivery length: 3,000 mm

Accessories

EPDM wedge strip and aluminium wedge elements



- For wedge system assembly
- Thickness: 4 mm (standard)
  3 mm and 5 mm as an offset

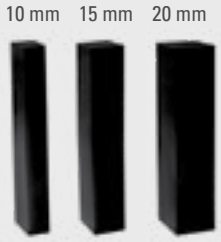
EPDM pressure profile and POM rod

- For rod system assembly
- Pressure profile thickness:
  9 mm for LG 2 x 10 mm or 11 mm for LG 2 x 8 mm (standard)
  8 mm and 10 mm as an offset
- POM rod thickness:
  Ø 8 mm for LG 2 x 10 mm or Ø 10 mm for LG 2 x 8 mm (standard)
  Ø 7, 9 and 11 mm as an offset

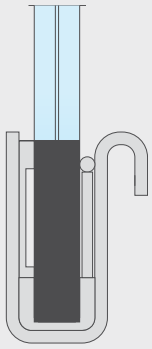
Assembly tool

- For knocking in the aluminium wedges or POM rods

Glass spacer for glass seam



- Material: EPDM
- for glass thickness: 2 x 8 mm, 2 x 10 mm
- Glass seam width: 10 mm, 15 mm, 20 mm
- Height: 80 mm
- Self-adhesive on one side
- Packing unit: 10 units



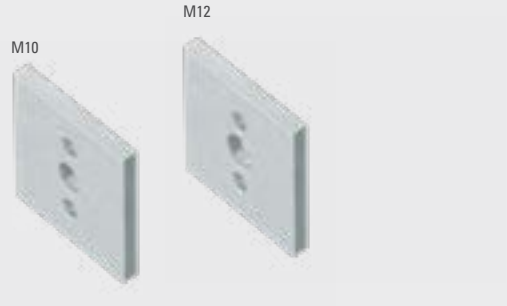
Spirit level with 2 magnets

- For aligning the support profile see Assembly instructions from Page 88

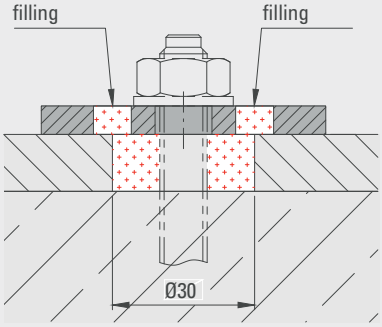
Hilti HIT injection mortar

- For injecting the filler panes
- 300 ml cartridge

Filler pane

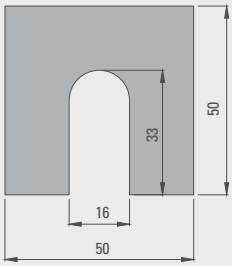


- Material: Steel, S235
- Surface: galvanised
- Dimensions: 60 x 60 mm
- Thickness: 6 mm
- Drill hole: Ø12 mm for M10
  Ø14 mm for M12



Shims

- Material: Aluminium
- Dimensions: 50 x 50 mm
- Slotted hole: 16 x 33 mm
- Thicknesses: 1 mm, 2 mm, 5 mm
- Packing unit: 10 units



Connecting pins Ø4 x 20 mm

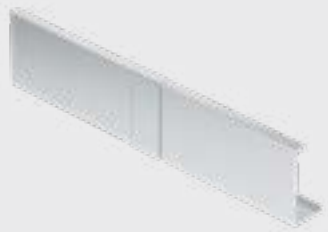
- Material: Stainless steel 1.4301
- with M4 x 10 mm thread
- for aluminium U-profile, LED handrail and structural cladding
- Packing unit: 10 units

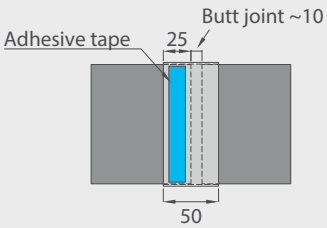
Threadlocker

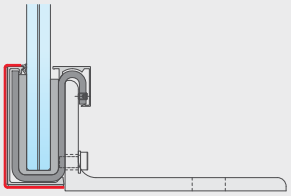
- 10 ml bottle
- 50 ml bottle

Splice plates for outer trim

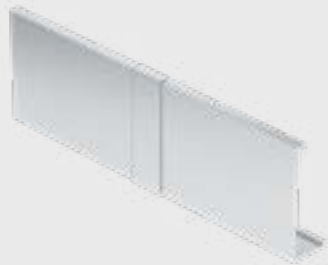
B1 for systems 1 and 2.A-2.C

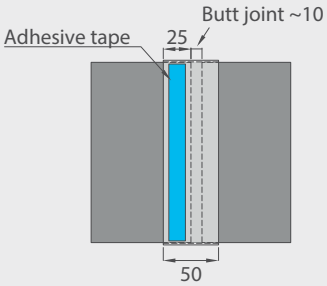


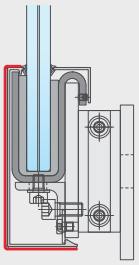




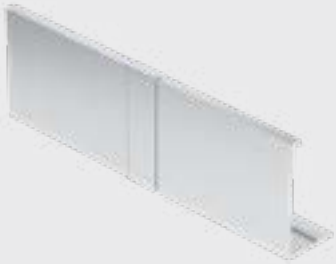
B2 for systems 5, 6, 9 and 11

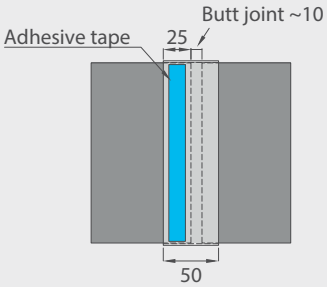


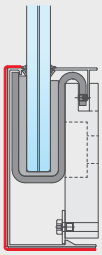




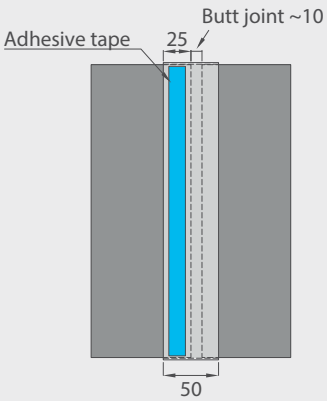
B3 for system 3

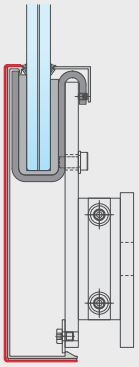






B4 for systems 4, 7, 8 and 10

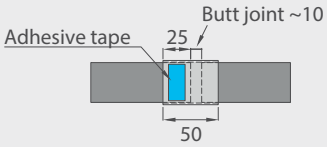


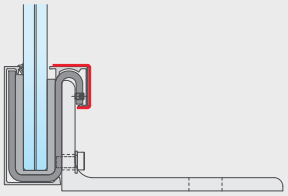


Secure splice plates also mechanically on site. Colour differences may occur with anodised profiles.

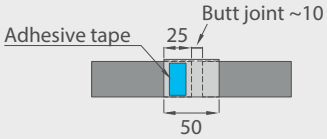
Splice plates for inner trim

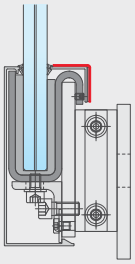
C1 for systems 1 - 11 (except 3)



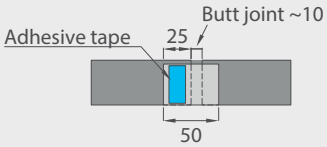


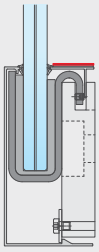
C2 for systems 1 - 11 (except 3)





C3 for system 3

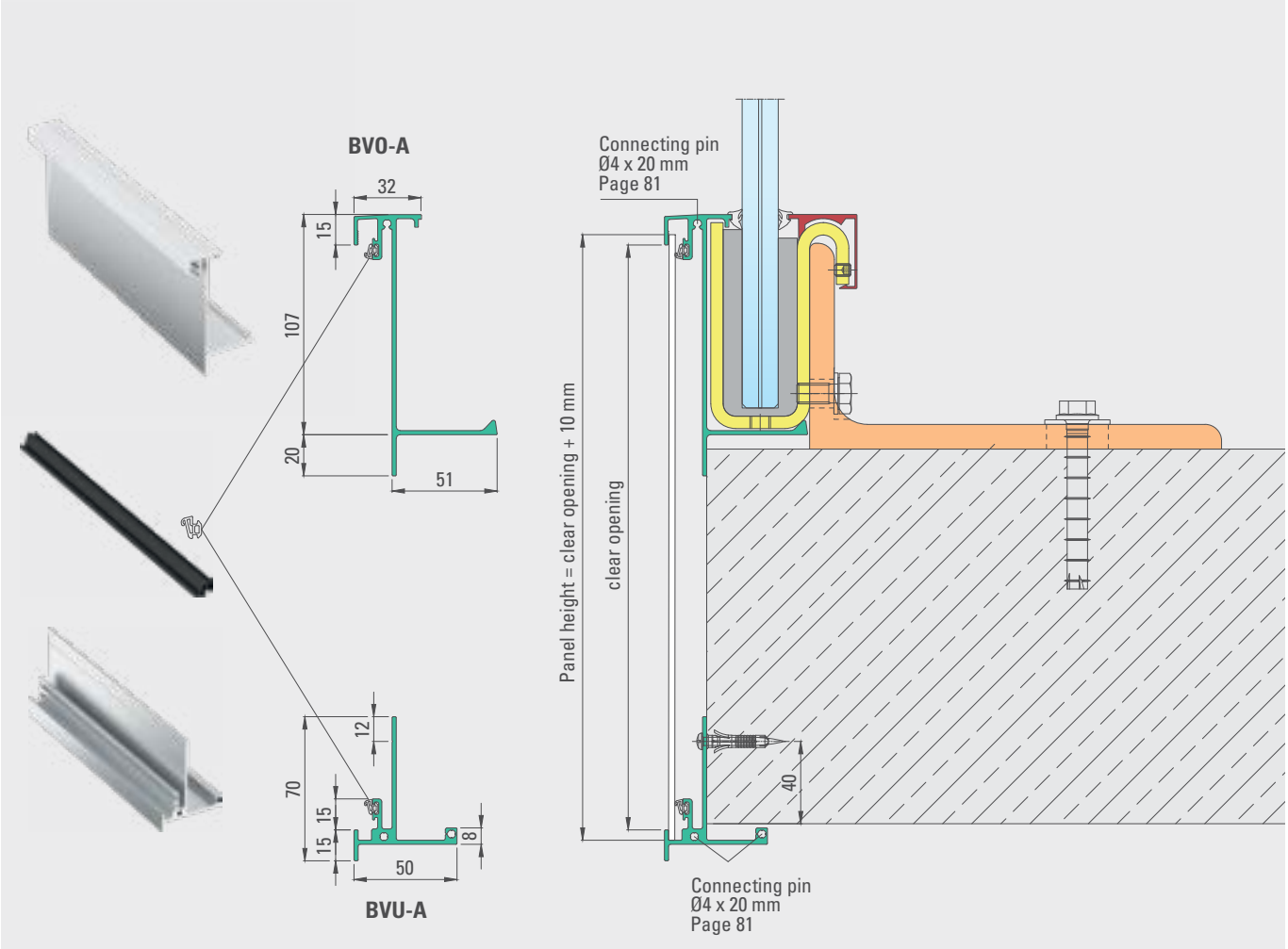




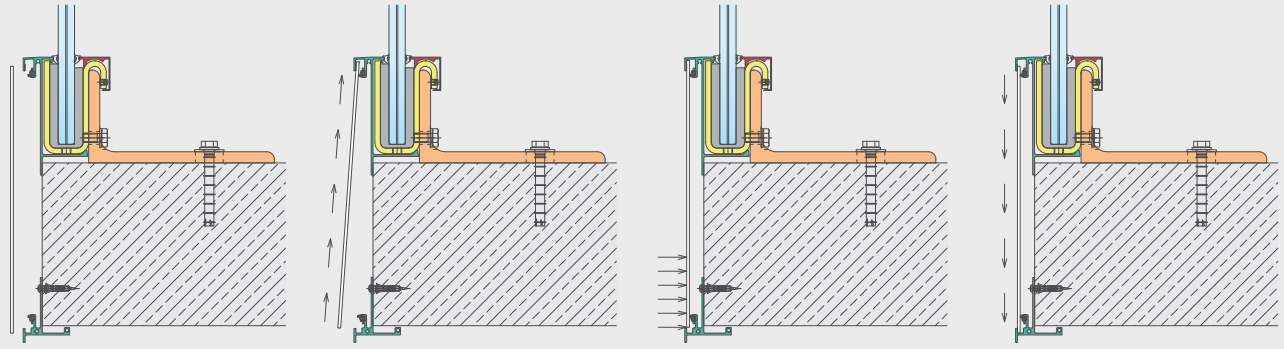
Secure splice plates also mechanically on site. Colour differences may occur with anodised profiles.

Structural cladding for panel thickness 3-5 mm

Material: Aluminium / delivery length: 3,000 mm. Surfaces: Natural untreated / stainless steel effect (E6EV1)

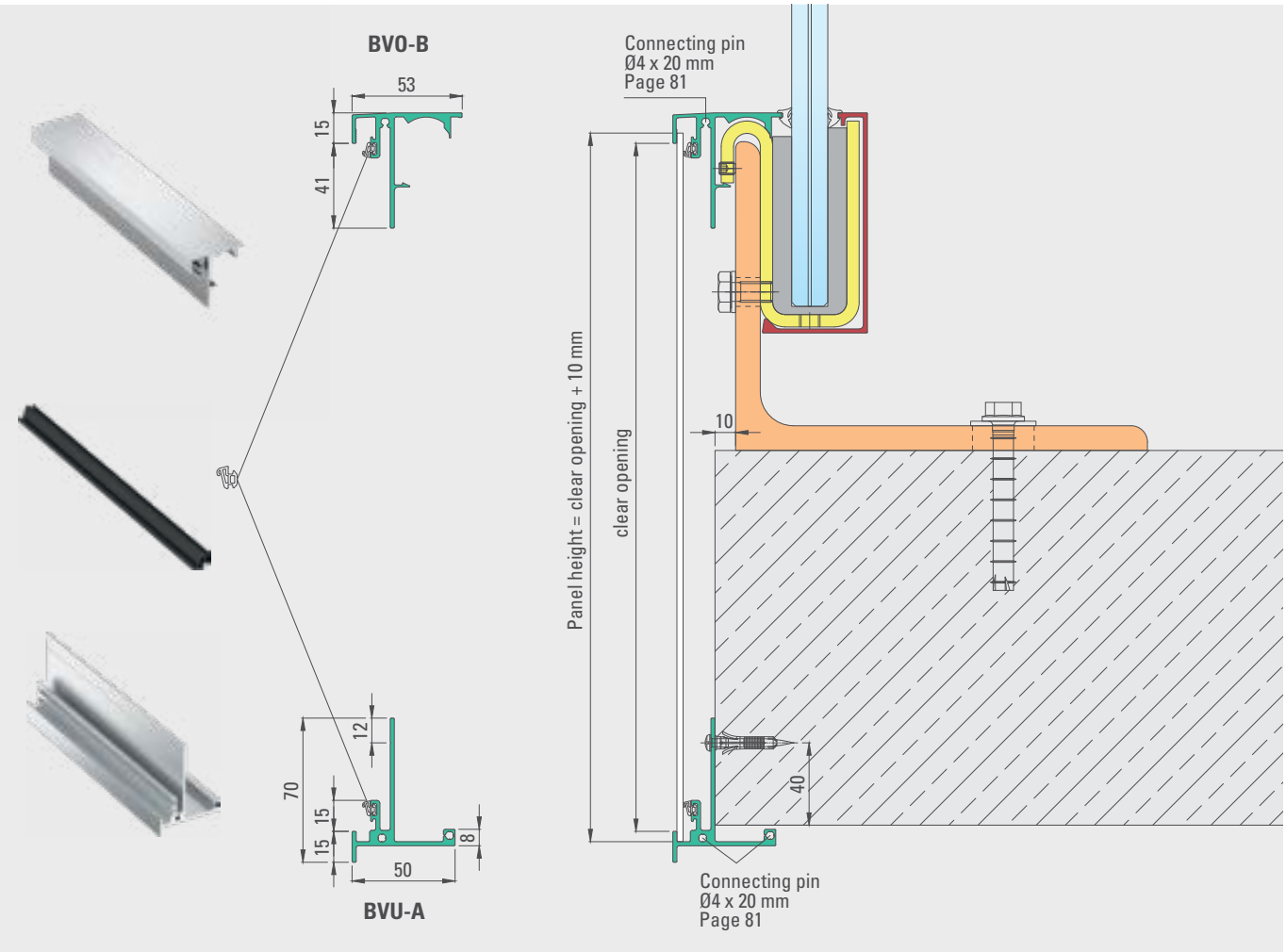


Assembly of the on-site panels

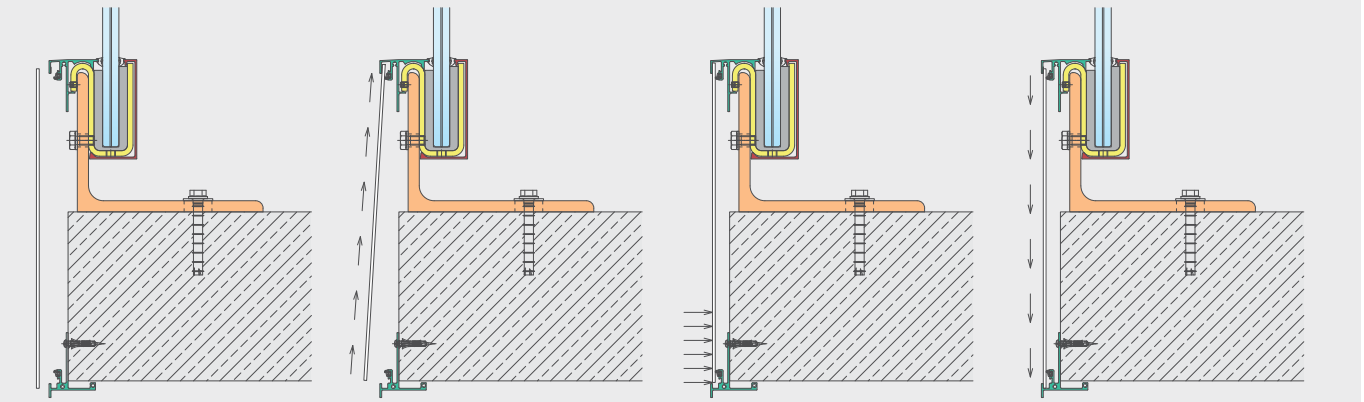


Structural cladding for panel thickness 3-5 mm

Material: Aluminium / delivery length: 3,000 mm. Surfaces: Natural untreated / stainless steel effect (E6EV1)

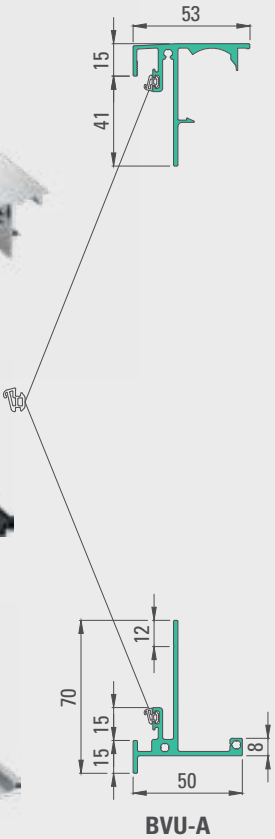


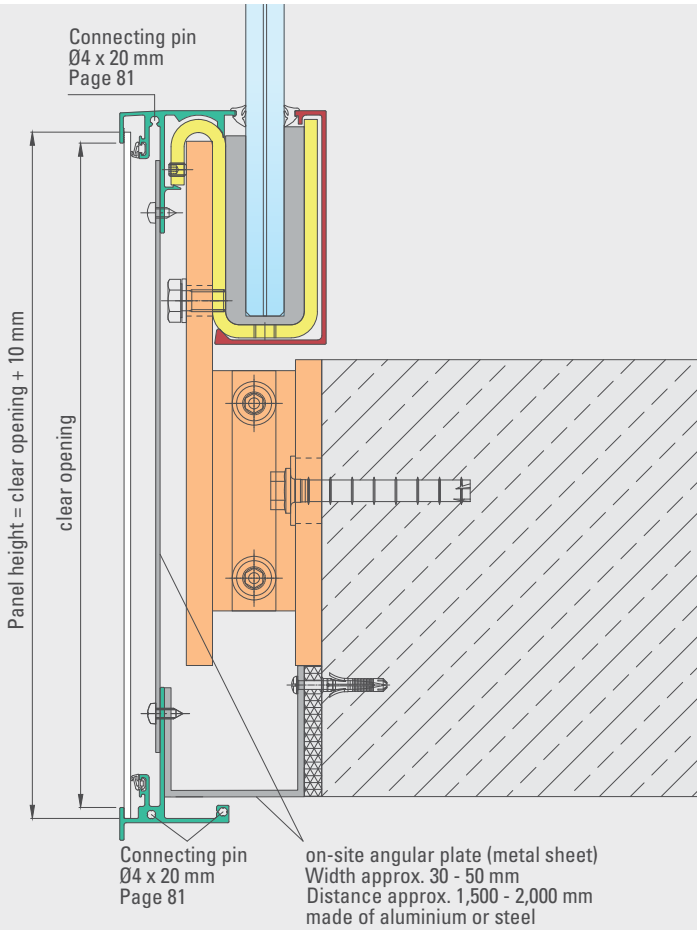
Assembly of the on-site panels



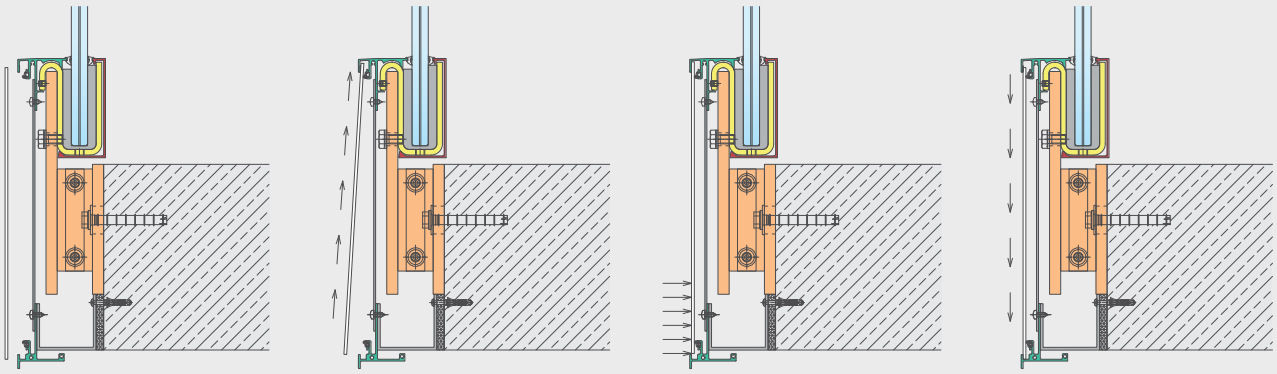
Structural cladding for panel thickness 3-5 mm

Material: Aluminium / delivery length: 3,000 mm. Surfaces: Natural untreated / stainless steel effect (E6EV1)



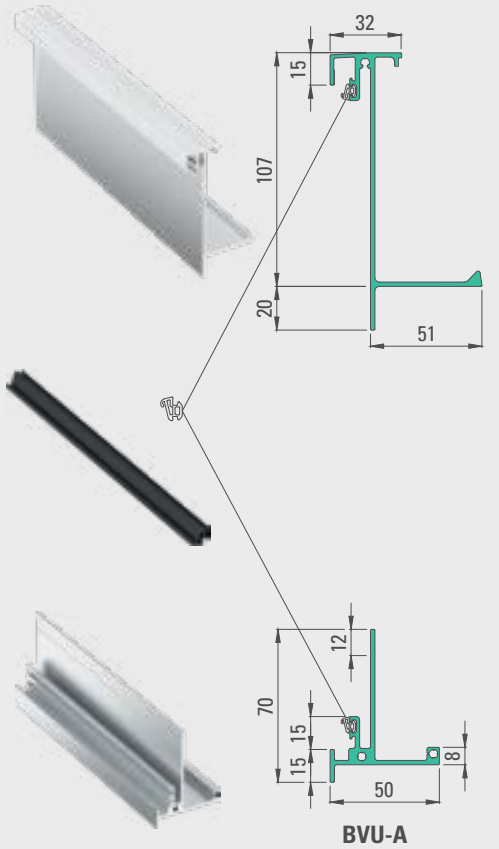


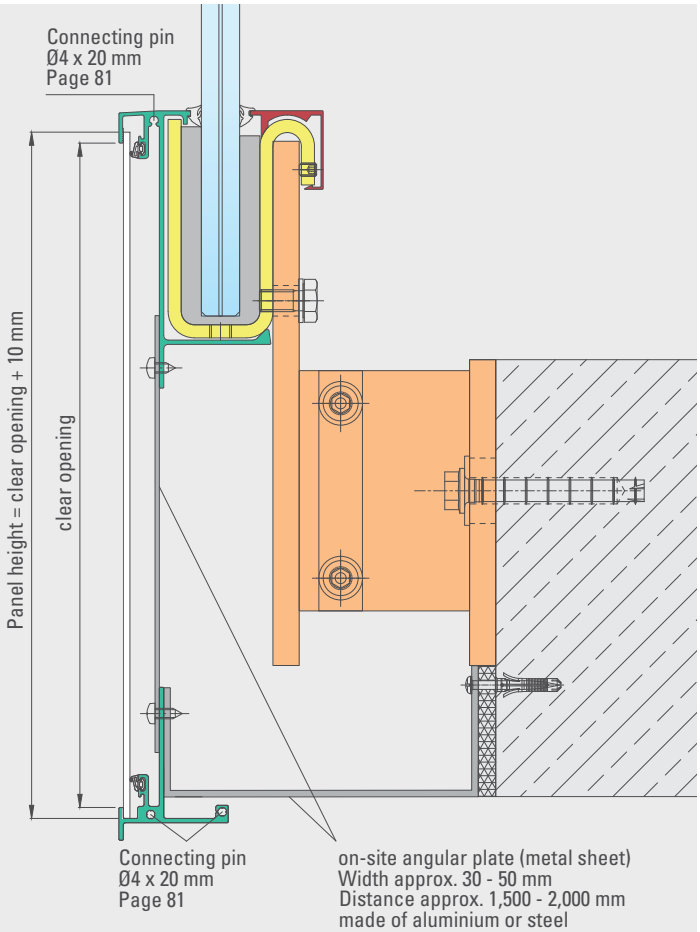
Assembly of the on-site panels



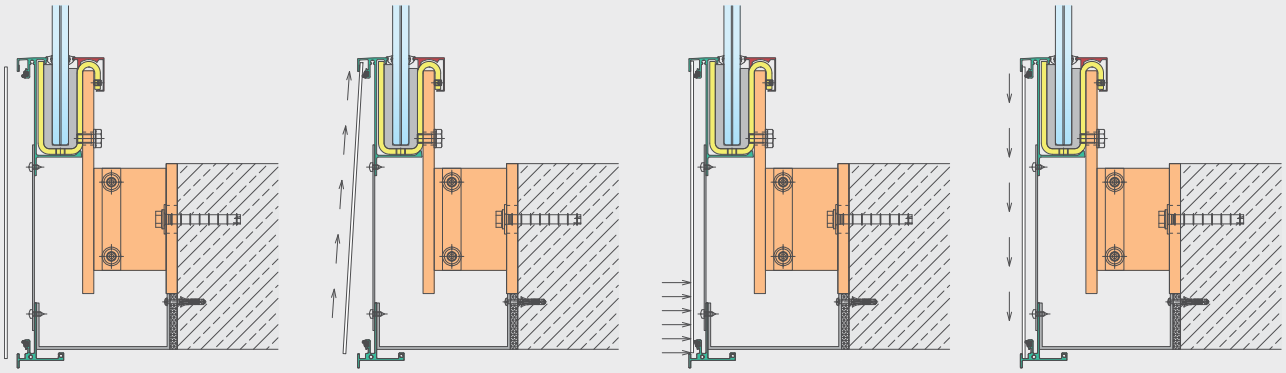
Structural cladding for panel thickness 3-5 mm

Material: Aluminium / delivery length: 3,000 mm. Surfaces: Natural untreated / stainless steel effect (E6EV1)

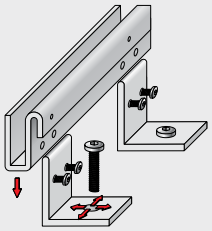




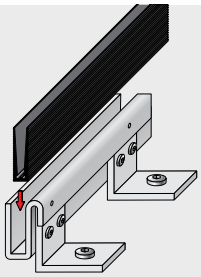
Assembly of the on-site panels



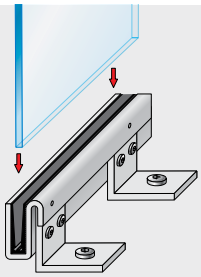
Wedge system assembly instructions



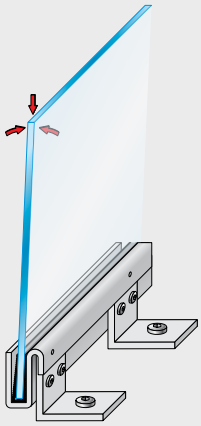
1 Alignment and assembly of the structural connection elements and the support profile.



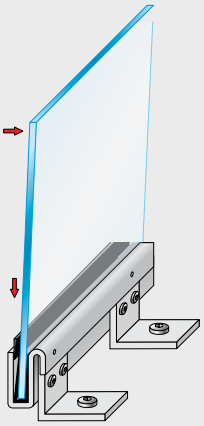
2 Insert clamping shoe (short side inside / long side outside).



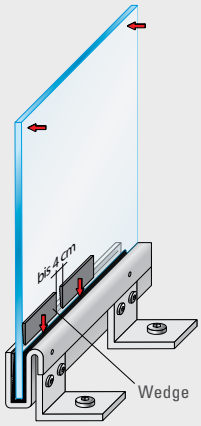
3 Insert glass panes.



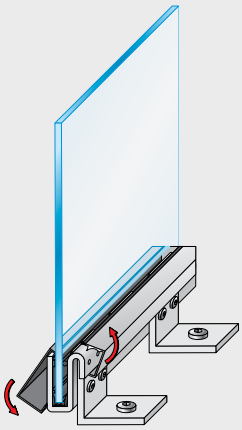
4 Move the pane back and forth from the top under pressure. Gap between glass pane and BALARDO support profile approx. 3-10 mm.



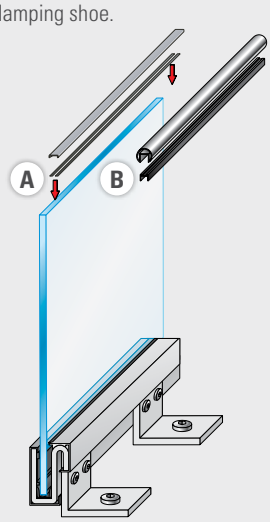
5 Insert wedge strip outside on the fall side between support profile and clamping shoe.



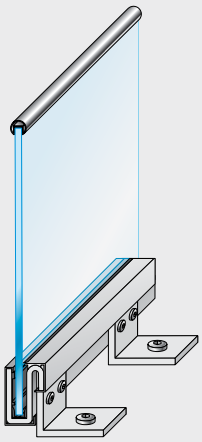
6 Insert aluminium wedges. Press glass outwards, push aluminium wedge pieces in firmly and knock in with the setting tool. Gap between the wedges: up to 4 cm.



7 Glue in lining strips. Clip in outer and inner trim and insert seals.



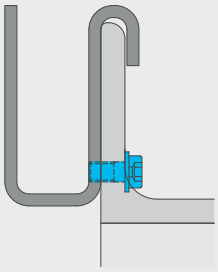
8 Fit glass edge guard profile (A) or handrail (B).



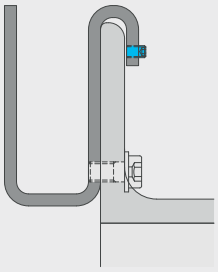
9 Done

▶ Assembly video at **www.glassline.de/montagevideos**

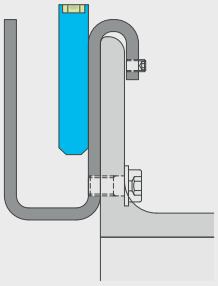
Wedge system assembly instructions



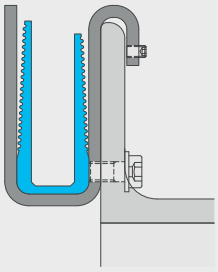
1 Fasten BALARDO support profile to structural connection element.



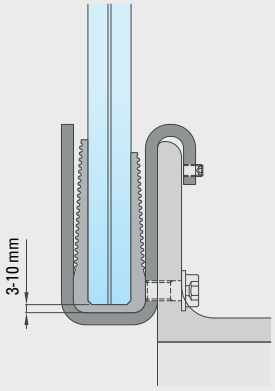
2 Insert the locking bolt to secure the position.



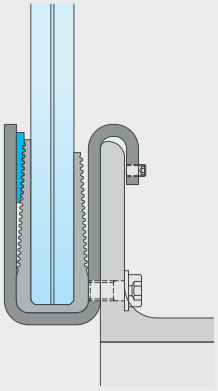
3 Align the BALARDO support profile on the inside with the aid of the structural connection element and then fasten the structural connection element firmly to the building.



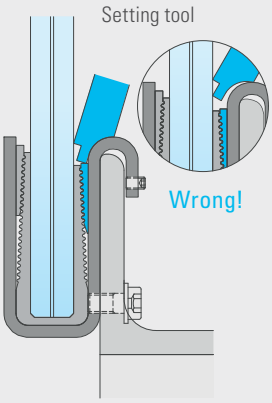
4 Insert EPDM clamping shoe (short side inside / long side outside).



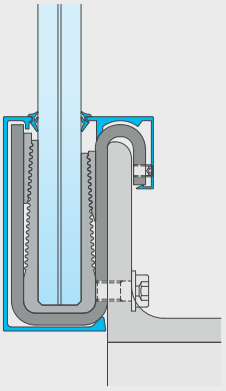
5 Insert glass panes. Gap between glass pane and BALARDO support profile approx. 3-10 mm.



6 Insert wedge strip between support profile and clamping shoe

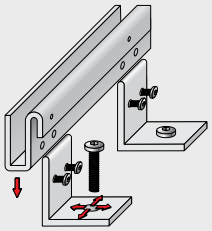


7 Insert aluminium wedges. Press glass outwards, push aluminium wedges in firmly and knock in with the setting tool. Gap between the wedges: up to 4 cm.

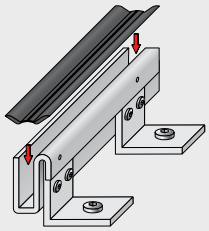


8 Glue in lining strips. Clip in outer and inner trim and insert seals. Done!

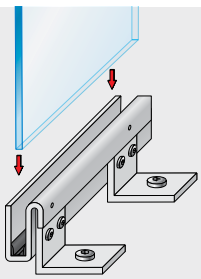
Rod system assembly instructions



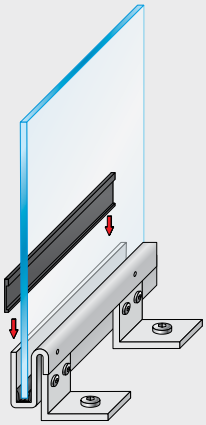
1 Alignment and assembly of the structural connection elements and the support profile.



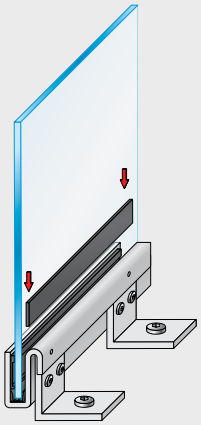
2 Insert clamping shoe.



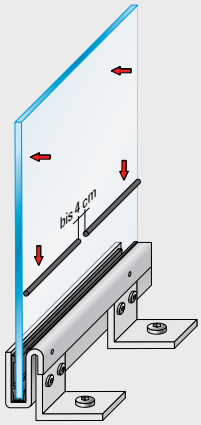
3 Insert glass panes.



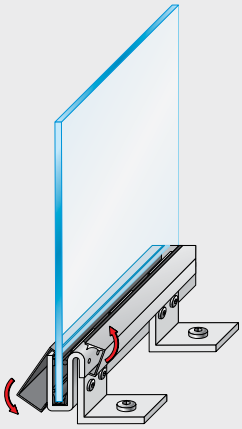
4 Place EPDM pressure profile onto the clamping shoe.



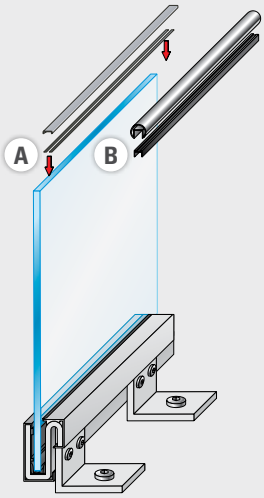
5 Insert EPDM spacer.



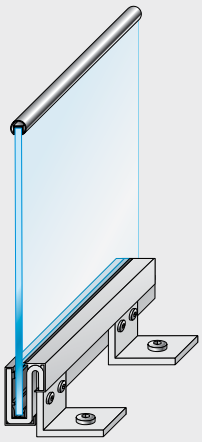
6 Insert POM rod (round). Press glass outwards, push POM rod in firmly and knock in with the setting tool.



7 Glue in lining strips. Clip in outer and inner trim and insert seals.



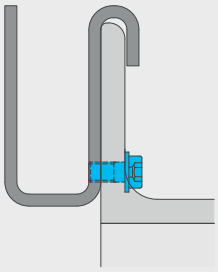
8 Fit glass edge guard profile (A) or handrail (B).



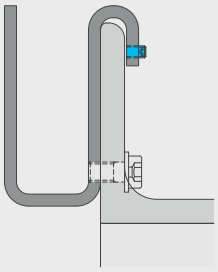
9 Done!

▶ Assembly video at **www.glassline.de/montagevideos**

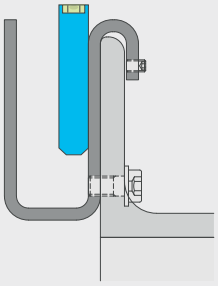
Rod system assembly instructions



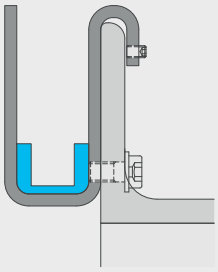
1 Fasten BALARDO support profile to structural connection element.



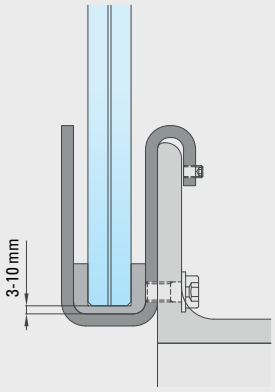
2 Insert the locking bolt to secure the position.



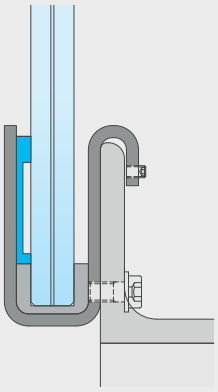
3 Align the BALARDO support profile on the inside with the aid of the structural connection element and then fasten the structural connection element firmly to the building.



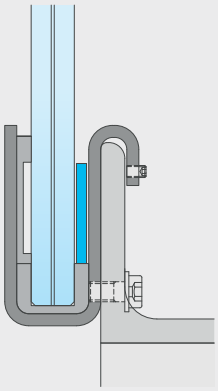
4 Insert EPDM clamping shoe.



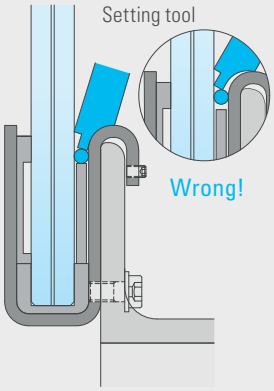
5 Insert glass panes. Gap between glass pane and BALARDO support profile approx. 3-10 mm.



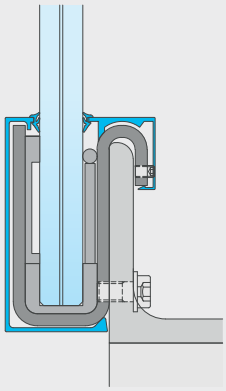
6 Place EPDM pressure profile onto the clamping shoe.



7 Insert EPDM spacer.

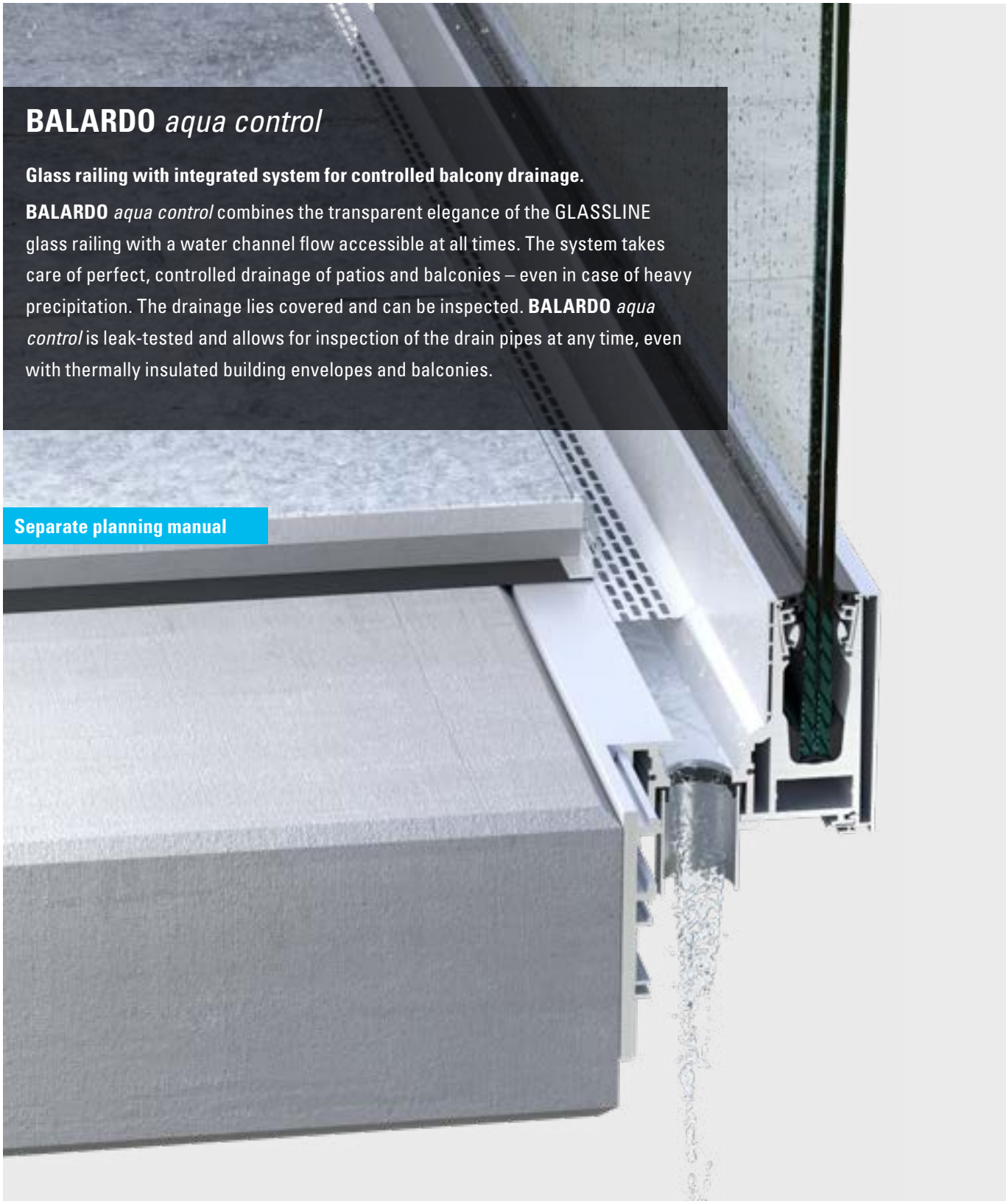


8 Insert POM rod (round). Press glass outwards, push POM rod in firmly and knock in with the setting tool to the depth of the setting tool.
Spacing: up to 4 cm



9 Glue in lining strips. Clip in outer and inner trim and insert seals. Done!

Other BALARDO systems



BALARDO *aqua control*

Glass railing with integrated system for controlled balcony drainage.

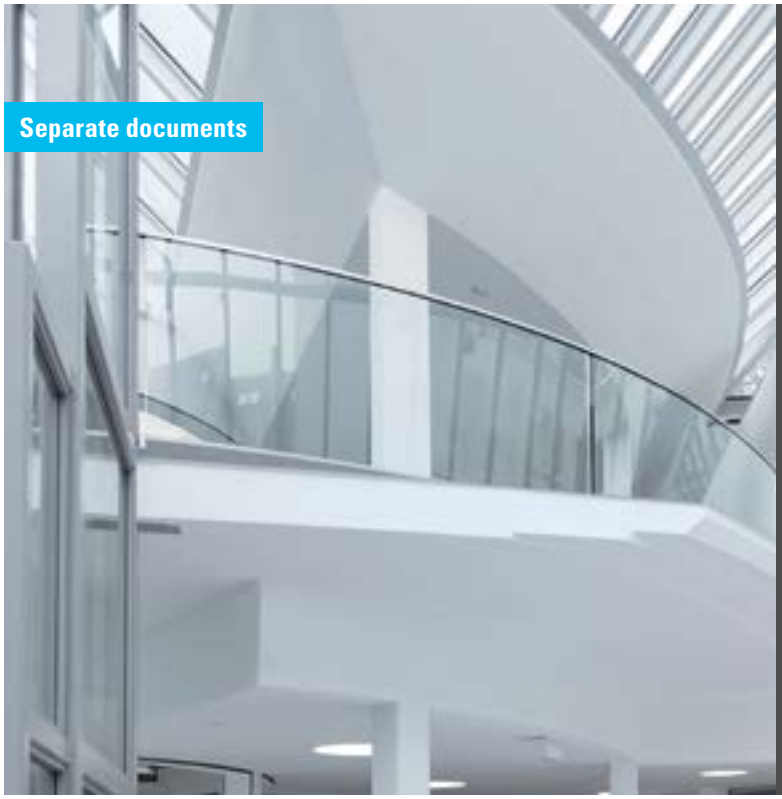
BALARDO *aqua control* combines the transparent elegance of the GLASSLINE glass railing with a water channel flow accessible at all times. The system takes care of perfect, controlled drainage of patios and balconies – even in case of heavy precipitation. The drainage lies covered and can be inspected. **BALARDO** *aqua control* is leak-tested and allows for inspection of the drain pipes at any time, even with thermally insulated building envelopes and balconies.

Separate planning manual

BALARDO *glasswall*

Floor-to-ceiling glazing with fall-protection function

Ultimate transparency and permeability from the floor to the ceiling is ensured by **BALARDO** *glasswall*. The floor-to-ceiling fall-proof glazing system from GLASSLINE opens up unimaginable design freedom for architecture flooded with light, both for public and private building projects. For use either as partition walls, staircase glazing, for galleries or in sports facilities. Thanks to its remarkable transparency including tested safety, **BALARDO** *glasswall* conveys aesthetic openness and expansiveness in any installation situation.



BALARDO *wave*

The system for curvy architecture

With curved floor and handrail profiles, the system adopts elegantly arched building shapes and implements these with the aesthetic properties of glass in highly transparent railings. Whether in public or private buildings, indoors or outdoors, BALARDO *wave* ensures an atmospheric light feeling in aluminium and steel design.

BALARDO *steel*

Name

Company

Number, street

Postcode/Town

Phone Fax

Email

Building project

Different delivery address:

Number, street

Postcode/Town

Comments

☐ **Product enquiry**

☐ **Order**

The quick contact method:

- Copy form
- Fill out
- Fax to

+49 (0) 6291/6259-11

or send by email to

info@glassline.de

Your enquiry/order will be processed as soon as possible.

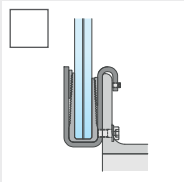
(Please fill in all fields)

System profile (please enter) _____ **linear metres**

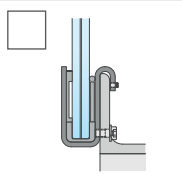
System profile (please tick)

- ☐ **galvanised, drilled**
- ☐ **galvanised, undrilled**
- ☐ **ungalvanised, drilled**
- ☐ **ungalvanised, undrilled**

Assembly system (please tick)



Wedge system



Rod system

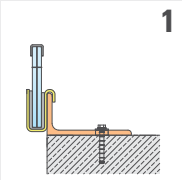
Glass thickness (please tick)

2 x 8 mm ☐

2 x 10 mm ☐

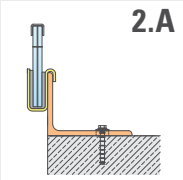
Systems structural connection elements (please enter)

1



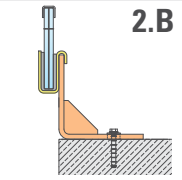
_____ **Units**

2.A



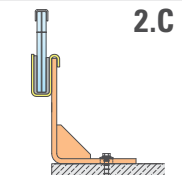
_____ **Units**

2.B



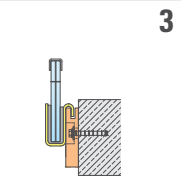
_____ **Units**

2.C



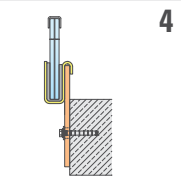
_____ **Units**

3



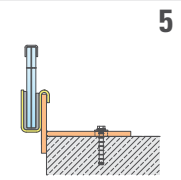
_____ **Units**

4



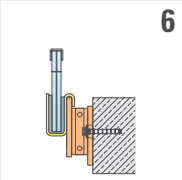
_____ **Units**

5



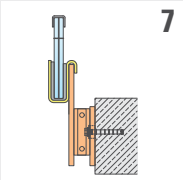
_____ **Units**

6



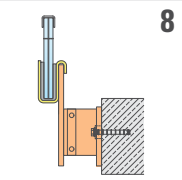
_____ **Units**

7



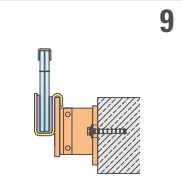
_____ **Units**

8



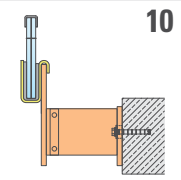
_____ **Units**

9



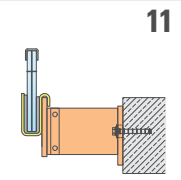
_____ **Units**

10



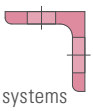
_____ **Units**

11



_____ **Units**

Support bracket

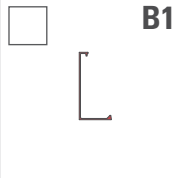


For systems 3, 4, 6 – 11

_____ **Units**

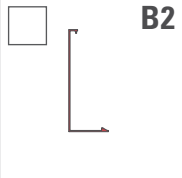
Outer trims (please tick)

☐ **B1**



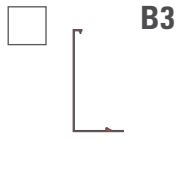
For systems
1, 2.A–2.C

☐ **B2**



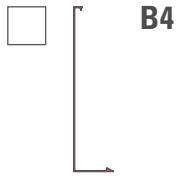
For systems
5, 6, 9, 11

☐ **B3**



For system
3

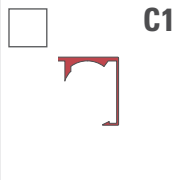
☐ **B4**



For systems
4, 7, 8, 10

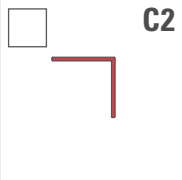
Inner trims (please tick)

☐ **C1**



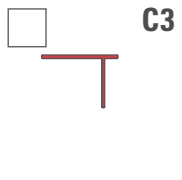
For systems
1 - 11 (except 3)

☐ **C2**



For systems
1 - 11 (except 3)

☐ **C3**



For system
3

Surface (please tick or fill in)

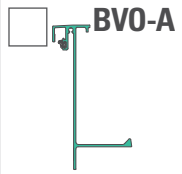
Natural untreated ☐

Stainless steel effect (E6EV1) ☐

RAL _____ ☐

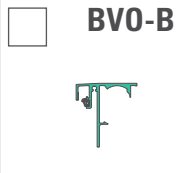
Structural cladding at top (please tick)

☐ **BVO-A**



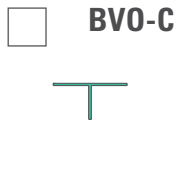
For systems
1 - 11

☐ **BVO-B**



For systems
2.A–2.C, 4, 7, 8, 10

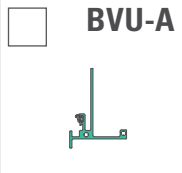
☐ **BVO-C**



For systems
1, 2.A–2.C, 4, 5

Structural cladding at bottom

☐ **BVU-A**



For systems
1-11

Surface (please tick)

Natural untreated ☐

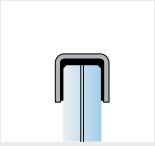
Stainless steel effect (E6EV1) ☐

Handrail (please tick)

Load-distributing

Stainless steel

U 30 x 27 mm



☐ 1.4301
☐ 1.4404

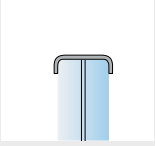
Grooved pipe

☐ Ø 42.4 mm
☐ Ø 48.3 mm

Glass edge guard

Stainless steel

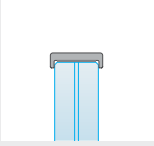
Height 6 mm



☐

Aluminium

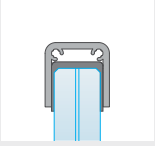
Height 6 mm



☐

Aluminium U-profile

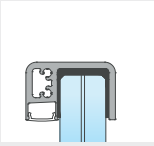
U 30 x 30 mm



☐

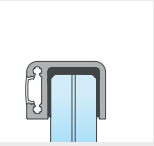
LED handrail

U 42 x 27 mm



☐

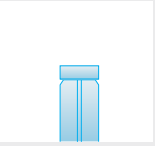
U 37 x 27 mm



☐

BALARDO

firstglass



☐

Accessories

☐ **Assembly tool**

☐ **Filler pane**

☐ **M10** _____ **Units**
☐ **M12** _____ **Units**

☐ **Hilti-HIT injection mortar**

☐ **Spirit level**

☐ **Glass spacer**

☐ **10 mm** _____ **Units**
☐ **15 mm** _____ **Units**
☐ **20 mm** _____ **Units**

☐ **Connecting pins**

☐ **Splice plates**

☐ **for outer trim**
☐ **for inner trim**

☐ **Threadlocker**

☐ **Shims**

☐ **1 mm** _____ **Units**
☐ **2 mm** _____ **Units**
☐ **5 mm** _____ **Units**

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Phone +49 (0) 6291 6259-0
Fax +49 (0) 6291 6259-11
info@glassline.de
www.glassline.de

System solutions for sophisticated frameless glass architecture as well as secure attachment of fixtures to ETICS.

As a leading supplier, GLASSLINE develops, manufactures and sells high-quality system solutions in the fields of point fixing systems, all-glass balustrades, frameless canopy constructions and systems with thermal separation for securely fastening add-on elements to building shells.

· All drawings are example applications. The company GLASSLINE accepts no guarantee or liability for a transferrable application.
· Technical and design changes are reserved.
· Secure all bolted connections permanently against loosening, e.g. by bonding.
· The project-specific application as well as the certificates for load introduction and load transfer are to be checked or made on site.