GYPSE GLASS BE

DESIGN AND WORKSHOP

Q3 - 2022

DOC-0001205156-A
16/06/2022

TECHNAL®

GYPSE GLASS

3rd Quarter 2022

BE

The product concept

The Gypse Glass railing system was developed with the purpose of protecting people who stay or walk in their vicinity against the risk of accidental falls.
In compliance with Portuguese Standard NP4491, being tested in an accredited laboratory and suitable for applications in residential use, service provision and public reception areas.
In addition, specific base rails have been tested in compliance with ASTM standard (in an accridited laboratory).

■ STRUCTURE
The connection to the concrete is ensured through two footing possibilities, simple or advanced:
- Continuous base rail 65mm in depth and 120mm in height, with connections at 180º using stainless steel pins. (U-shaped)
- Continuous base rail 120 / 124mm deep and 120mm high, with connections at 180º using stainless steel pins. (L-shaped)

■ FIXATION
Suitable elements must be used for the fixation with the slab, with a minimum section of M10 and a maximum distance from each other of 250mm, and a height at the edge of the slab of no less than 40mm. However, the fixation system varies depending on the density and/or thickness of the material where the guard will be installed.

■ APPLICATION
The base profile allow four methods of application: embedded in the slab, face-mounted on the slab, top-mounted on the slab and top-mounted on the slab with foot.
The maximum height of protection above the floor finish level varies between 1.00 m for "U" base rail shape and 1.20 m for "F" base rail shape.

Possibility of infill of 13.52mm and from 17.52mm to 27.52mm, in any of the applications (note: for 13.52mm application, it is subject to structural verification of the glass).
The system has two complementary anodized aluminum trim profiles for a better finish.

■ ACCESSORIES
Accessories in ABS, PVC and EPDM.
Tops in anodised aluminum.

■ TOOLS
Application of glazing shims.

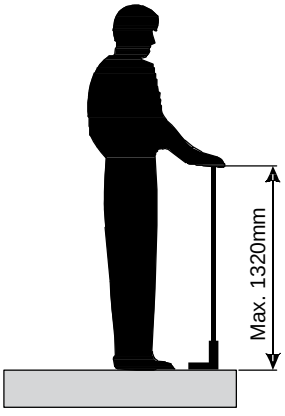
Norms and Standards

Norms and standards

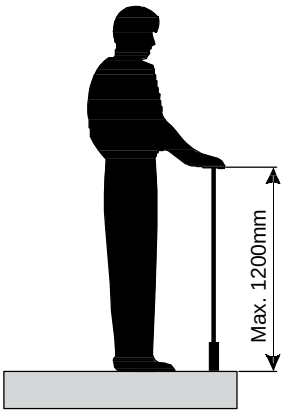
British Standard BS 6180:2011

According to the British standard BS 6180:2011, the balustrades must be tested with the loads defined for the places and type of use foreseen, namely:

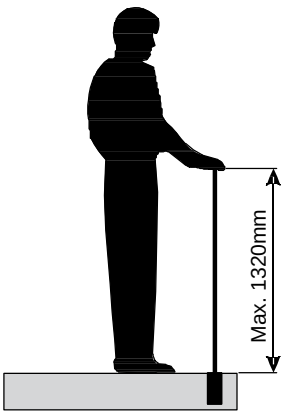
Type of occupancy for part of the building or structure	Examples of specific use	Horizontal uniformly distributed line load (kN/m)	Uniformly distributed load applied to the infill (kN/m^2)	A point load applied to part of the infill (kN)
Domestic and residential activities	· All areas within or serving exclusively one single family dwelling including stairs, landings, etc. but excluding external balconies and edges of roofs.	0.36	0.5	0.25
	· Other residential, i.e houses of multiple occupancy and balconies, including Juliette balconies and edges of roofs in single family dwellings.	0.74	1.0	0.5
Office and work areas not included elsewhere, including storage areas.	· Areas not susceptible to overcrowding in office and institutional buildings, also industrial and storage buildings except as given above.	0.74	1.0	0.5
Areas without obstacles of moving people and not susceptible to overcrowding	· Stair, landings, corridors, ramps	0.74	1.0	0.5
	· External balconies including Juliette balconies and edges of roofs. Footways and pavements within building curtilage adjacent to basement/ sunken areas.	0.74	1.0	0.5



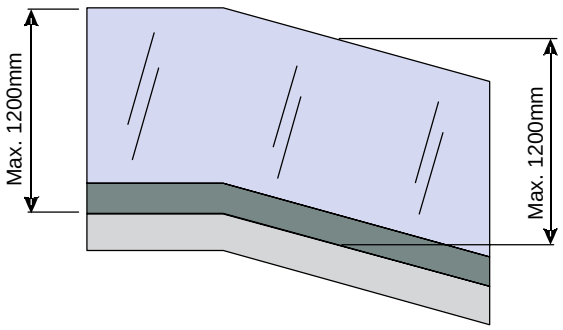
"F" Rail

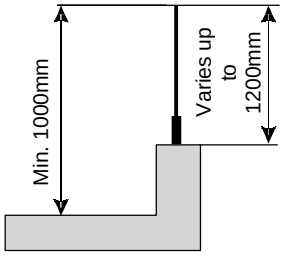


"U" Rail Exposed



"U" Rail Embedded





"U" Rail Exposed

* If the support element allows kneeling or sitting, the height h must be greater than 530mm

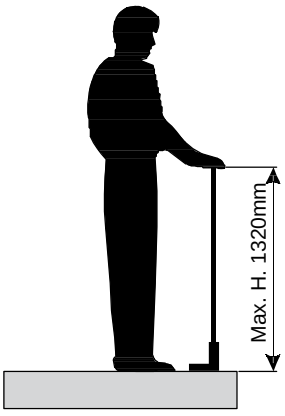
Norms and Standards

Norms and standards

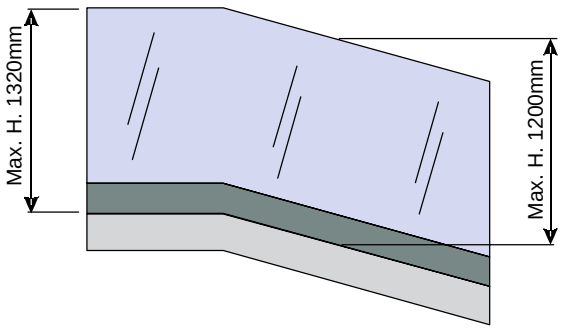
American Standard ASTM E 2353-16, E 985-00

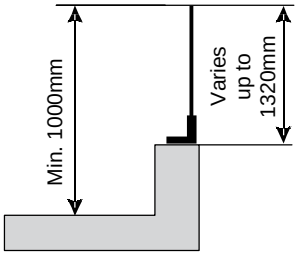
According to the American standard ASTM E 2353-16, E 985-00, the balustrades must be tested with the loads defined for the places and type of use foreseen, namely:

Type of occupancy for part of the building or structure	Examples of specific use	Horizontal uniformly distributed line load (kN/m)	Uniformly distributed load applied to the infill (kN/m^2)	A point load applied to part of the infill (kN)
Residential building	· Where the railing system is installed in one or two-family dwelling units.	0.29	0.5	0.89
Public assembly building	· Where the railing system is installed in public assembly buildings with rooms and spaces designed for use by 50 or more persons simultaneously.	0.73	1.5	1.33
	· Where the railing system is installed in public assembly buildings with the area protected by the railing system only accessible, that is without any physical restrictions to maintenance personnel.	0.29	1.0	0.89



"F" Rail

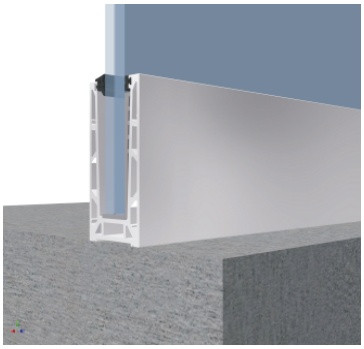




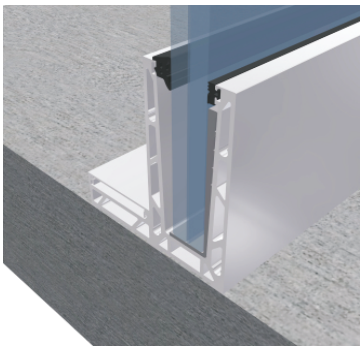
"F" Rail

* If the support element allows kneeling or sitting, the height h must be greater than 500mm

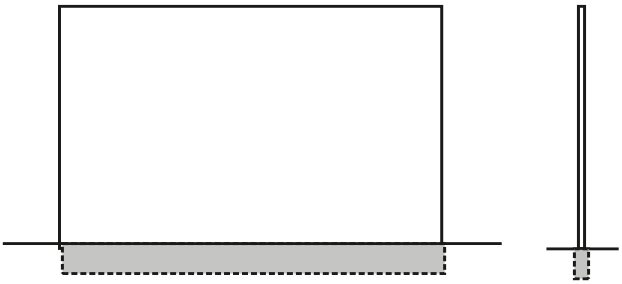
Typologies

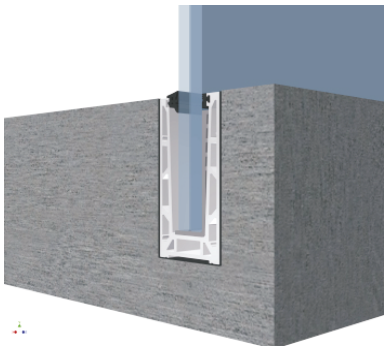


Top-mounted on the slab (simple)

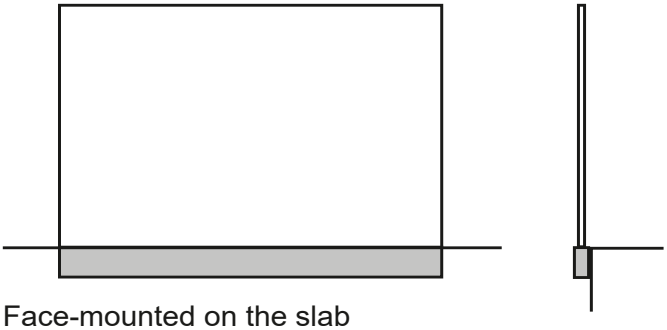


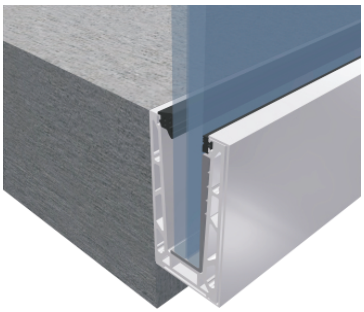
Top-mounted on the slab with foot (advanced)





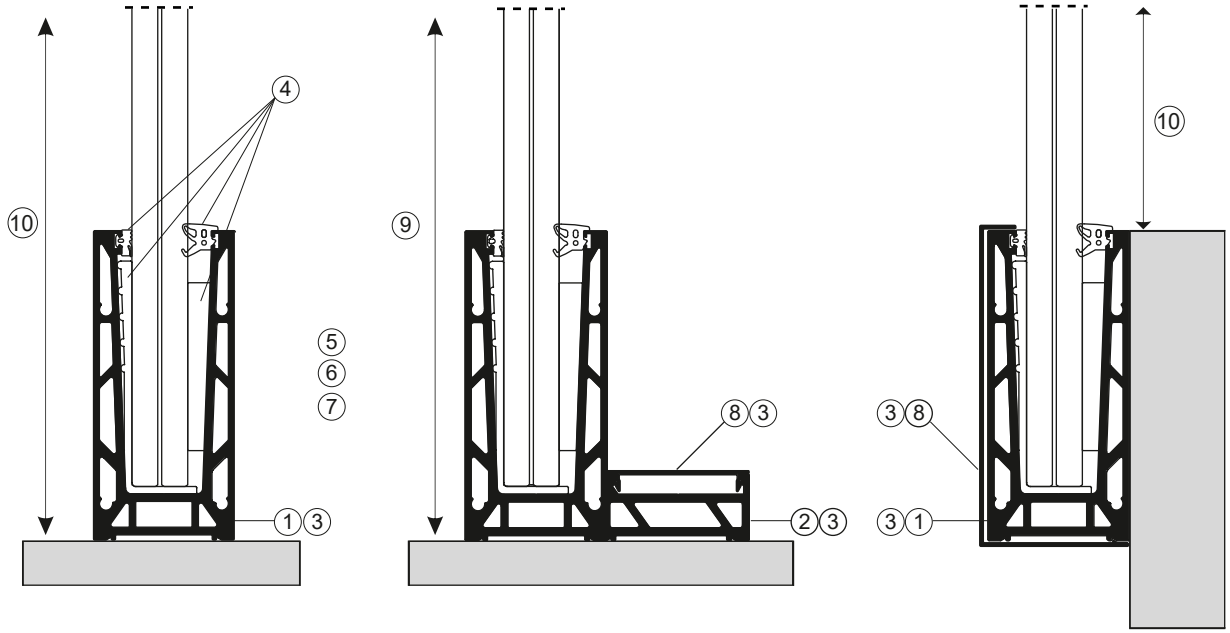
Embedded in the slab





Face-mounted on the slab

Product description



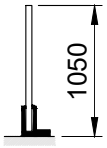
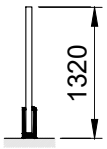
Face-mounted on the slab
*This application allows to have maximum free height (10) of 1.20m from FFL and minimum glass thickness 17.52mm

Section types

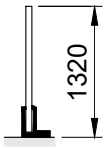
1. Continuous base rail are 65mm/69mm deep with 120mm high, with connections at 180º using stainless steel pins.
2. Continuous base rail 120 / 124mm deep and 120mm high, with 180º joints using stainless steel pins.
3. AW6060/6063 extruded aluminum profiles.
4. Accessories in ABS, PVC and EPDM.
5. Ventilation of the glass collar and drainage channels for water drainage.
6. Possibility of application on the slab, embedded in the slab or in front of the slab.
7. Filling from 17.52 to 27.52mm, in any of the applications (and specifically for 13.52 and 15.52 mm, glass must be verified structurally).
8. Aluminum end caps to be adapted when needed.
9. Maximum protection height above floor finish level 1320mm.
10. Maximum protection height above floor finish level 1200mm.

Performances

Tests according to BS 6180:2011

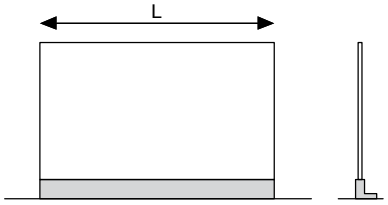
Test Ref. ID	Concentrated Load (Top Rail)	Linear Load (Top Rail)	Distributed Load	Impact Test	Glass (mm)	Glass composition	Typology
TBW VC162.a	0.5 kN	0.74 kN/m	1.5 KPa	✓	13.52	6mm Clear tempered glass 1.52mm Sentry glass interlayer 6mm Clear tempered glass	
TBW VL119	0.89 kN	0.74 kN/m	2 KPa	✓	21.52	10mm Clear tempered glass 1.52mm Sentry glass interlayer 10mm Clear tempered glass	

Tests according to ASTM E 2353-16

Test Ref. ID	Concentrated Load (Top Rail)	Linear Load (Top Rail)	Distributed Load	Impact Test	Glass (mm)	Glass composition	Typology
TBW VC162.b	1.7 kN	0.74 kN/m	2 KPa	✓	21.52	10mm Clear tempered glass 1.52mm Sentry glass interlayer 10mm Clear tempered glass	

Top-mounted on the slab with foot

(F-shaped)



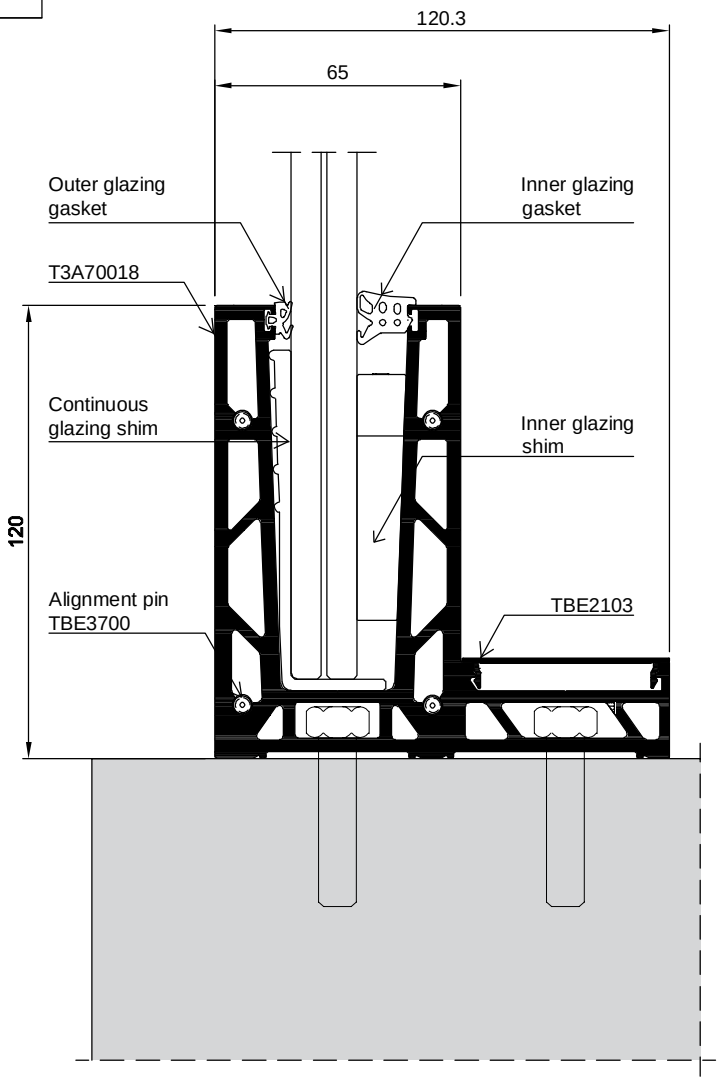
Profile		Qty.
T3A70018	Base rail (F-shaped)	L
TBE2103	Cover cap	L
TBE4000[a] or TBE4002	Continuous glazing shim	L
XU25252*	Handrail for 17.52mm glass	L
XU30302*	Handrail for 21.52mm glass	L

Gasket		Qty.
X4010007[a] or X0190008	Outer glazing gasket	L
TBE5011[a] or TBE5012 or TAS0018	Inner glazing gasket	L

Profile		Qty.
TBE3800[a] or TBE3801 or TBE3802	Inner glazing shim	5/m
TBE3700	Alignment pin	4/6.5m
TBE3601[a] or TBE3602 or TBE3603	Wall connection bracket	2

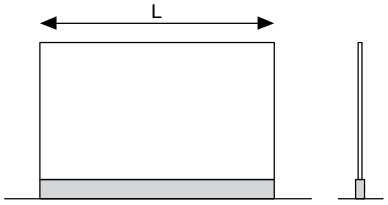
* Optional

a) Reference varies with infill thickness - refer to Page No.30



Top-mounted on the slab

(U-shaped)



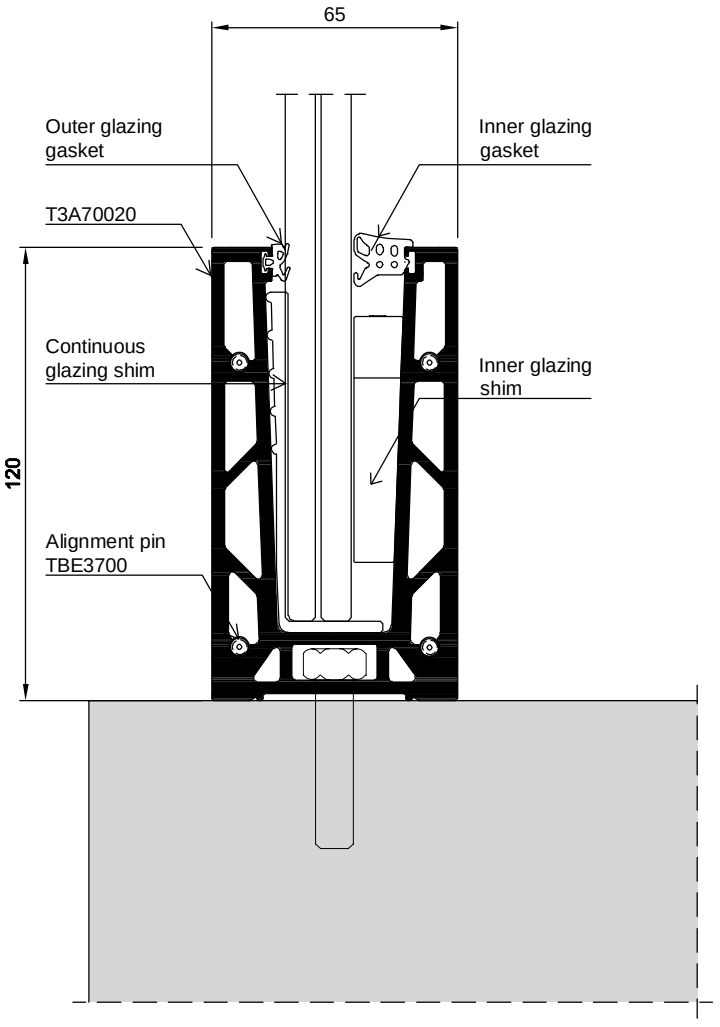
Profile		Qty.
T3A70020	Base rail (U-shaped)	L
TBE4000[a] or TBE4002	Continuous glazing shim	L
XU25252*	Handrail for 17.52mm glass	L
XU30302*	Handrail for 21.52mm glass	L

Gasket		Qty.
X4010007 or X0190008	Outer glazing gasket	L
TBE5011[a] or TBE5012 or TAS0018	Inner glazing gasket	L

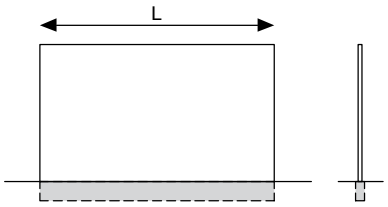
Profile		Qty.
TBE3800[a] or TBE3801 or TBE3802	Inner glazing shim	5/m
TBE3700	Alignment pin	4/6.5m
TBE3601[a] or TBE3602 or TBE3603	Wall connection bracket	2

* Optional

a) Reference varies with infill thickness - refer to Page No.30



Embedded in the slab



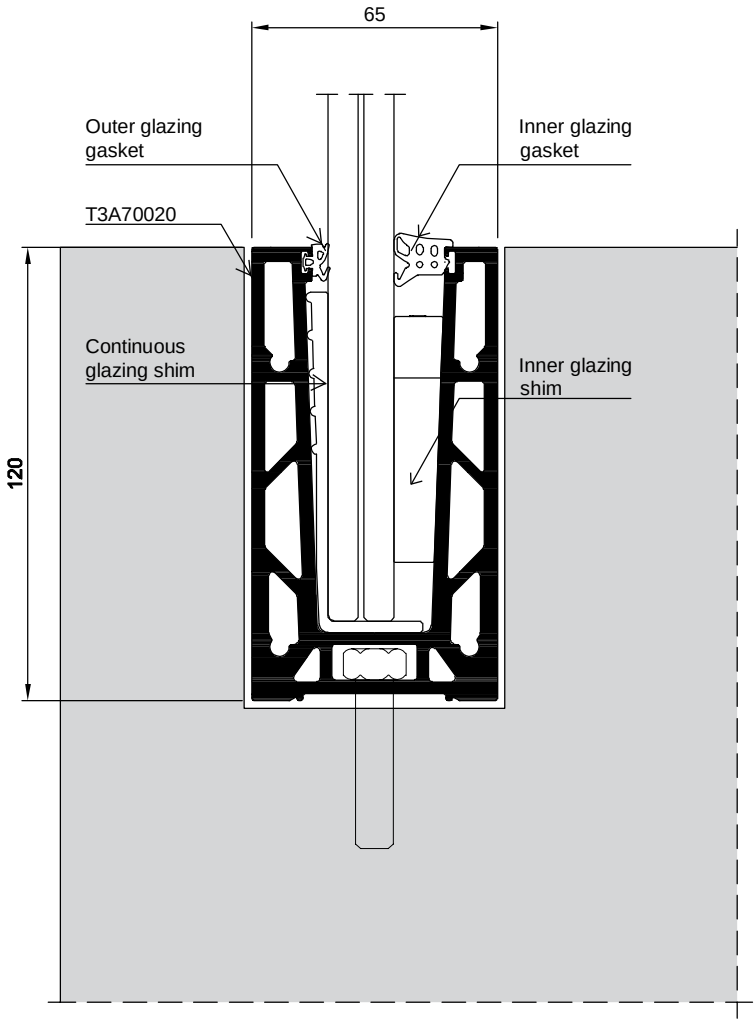
Profile		Qty.
T3A70020	Base rail (U-shaped)	L
TBE4000[a)] or TBE4002	Continuous glazing shim	L
XU25252*	Handrail for 17.52mm glass	L
XU30302*	Handrail for 21.52mm glass	L

Gasket		Qty.
X4010007 or X0190008	Outer glazing gasket	L
TBE5011[a)] or TBE5012 or TAS0018	Inner glazing gasket	L

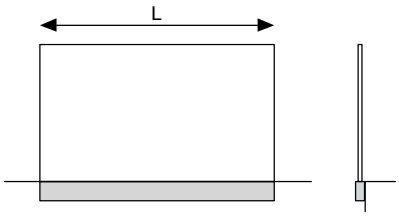
Profile		Qty.
TBE3800[a)] or TBE3801 or TBE3802	Inner glazing shim	5/m
TBE3601[a)] or TBE3602 or TBE3603	Wall connection bracket	2

* Optional

a) Reference varies with infill thickness - refer to Page No.30



Base profile in front of the slab



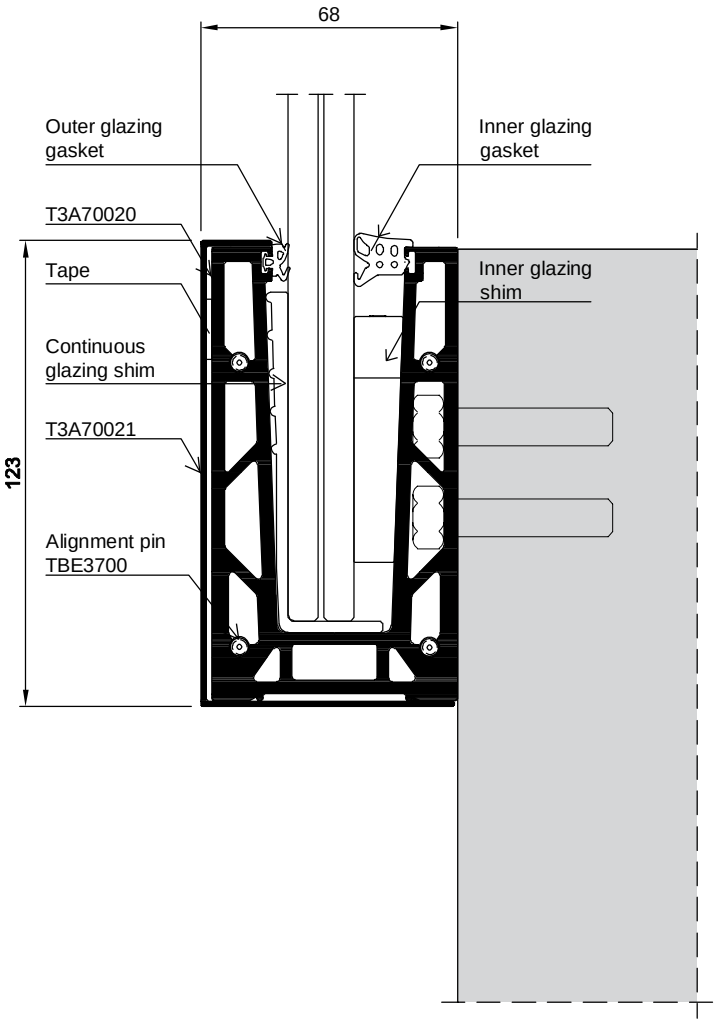
Profile		Qty.
T3A70020	Base rail (U-shaped)	L
T3A70021	Cover cap	L
TBE4000[a)] or TBE4002	Continuous glazing shim	L
XU25252*	Handrail for 17.52mm glass	L
XU30302*	Handrail for 21.52mm glass	L

Gasket		Qty.
X4010007 or X0190008	Outer glazing gasket	L
TBE5011[a)] or TBE5012 or TAS0018	Inner glazing gasket	L

Profile		Qty.
TBE3800[a)] or TBE3801 or TBE3802	Inner glazing shim	5/m
X4010067	Cover tape	L
TBE3700	Alignment pin	4/6.5m
TBE3601[a)] or TBE3602 or TBE3603	Wall connection bracket	2

* Optional

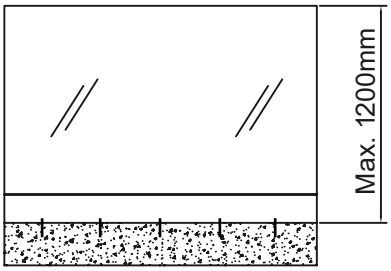
a) Reference varies with infill thickness - refer to Page No.30

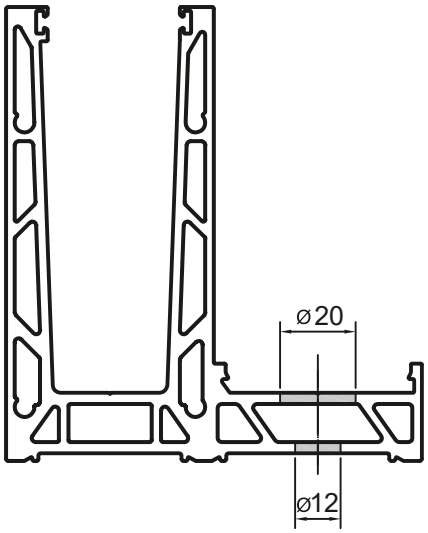


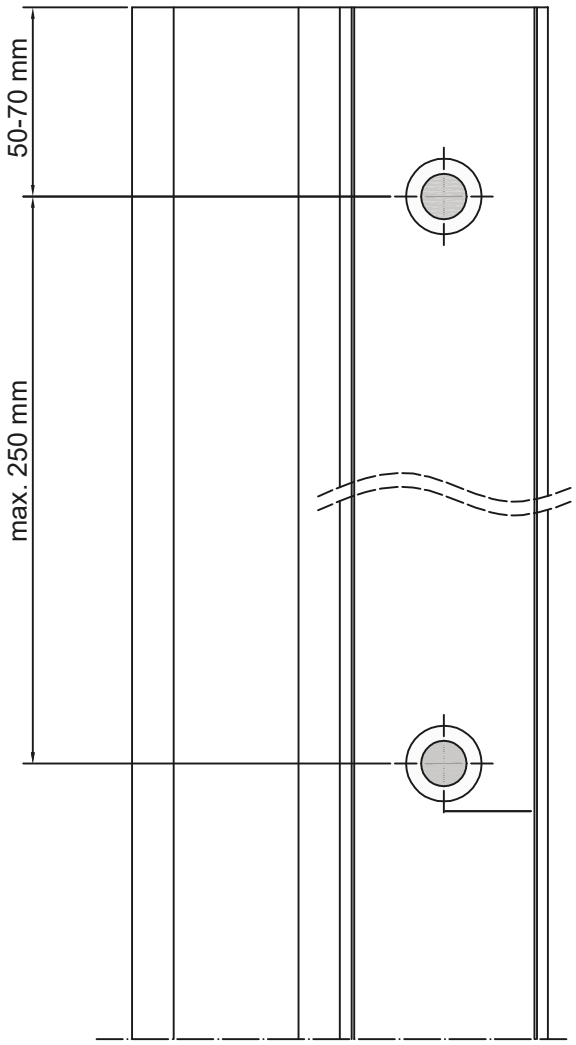
Base rail machining

Machining of the profile TBE2102, T3A70018 and T3A70019

For top-mounted applications with foot

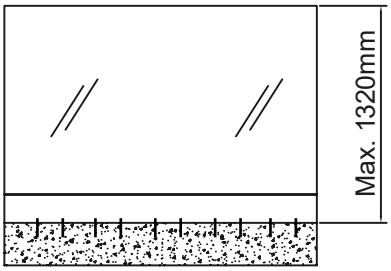


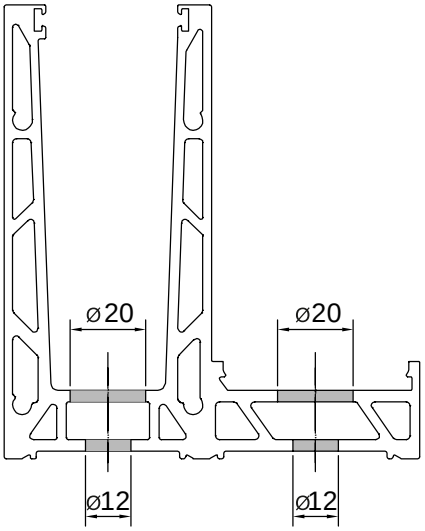


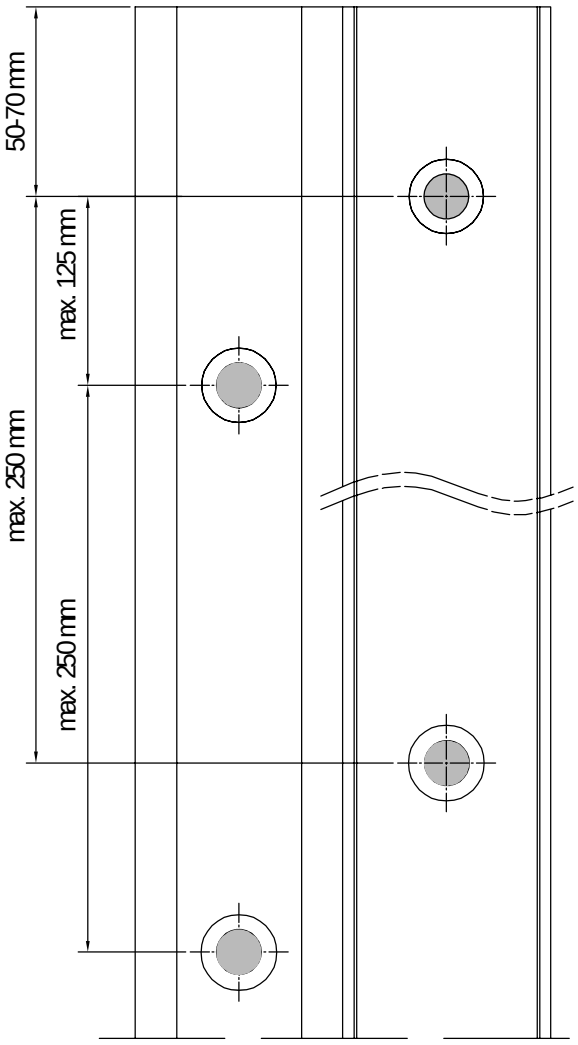


Base rail machining

Machining of the profile T3A70018 and T3A70019
For top-mounted applications with foot

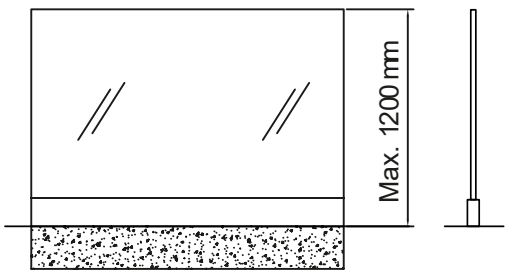


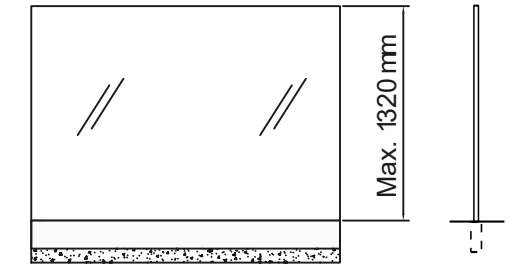


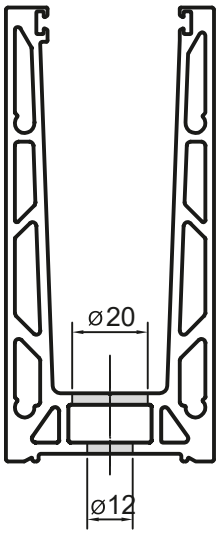


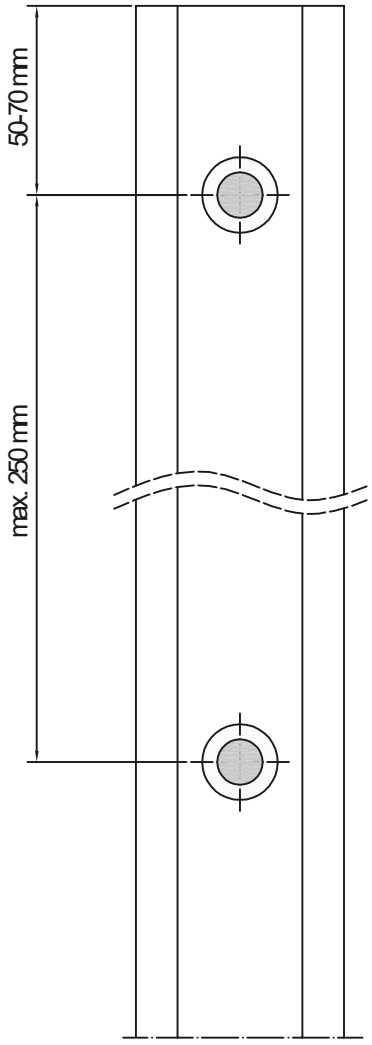
Base rail machining

Machining of the profile T3A70020
For top-mounted and embedded applications.



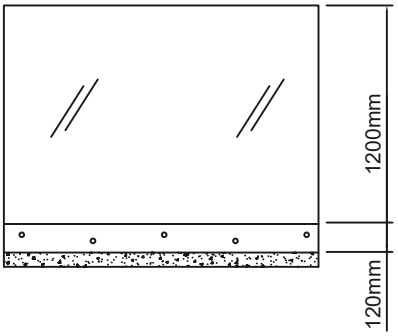




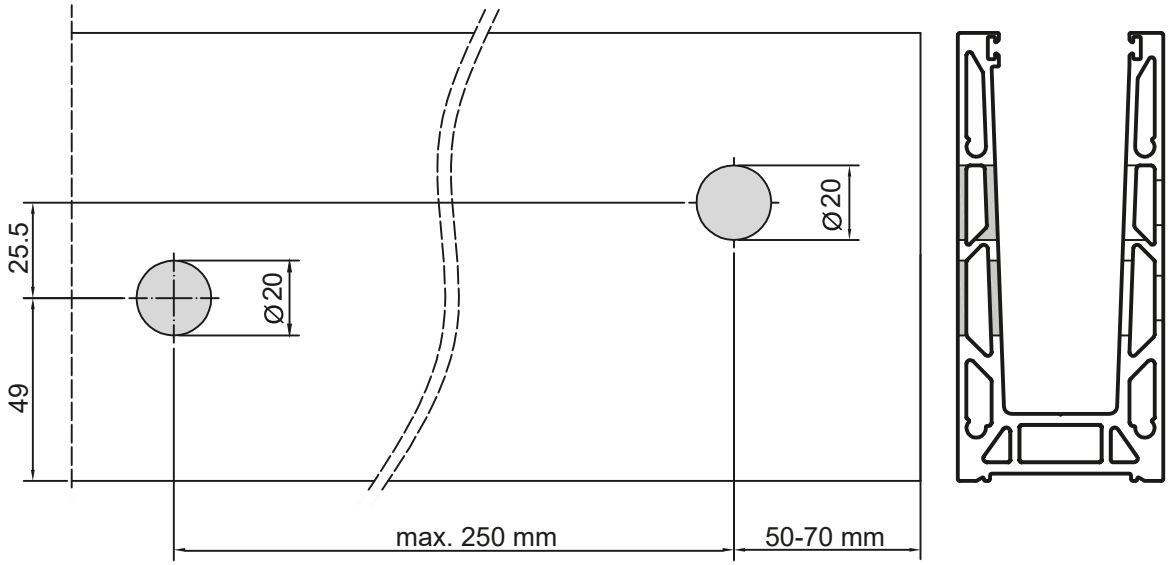


Base rail machining

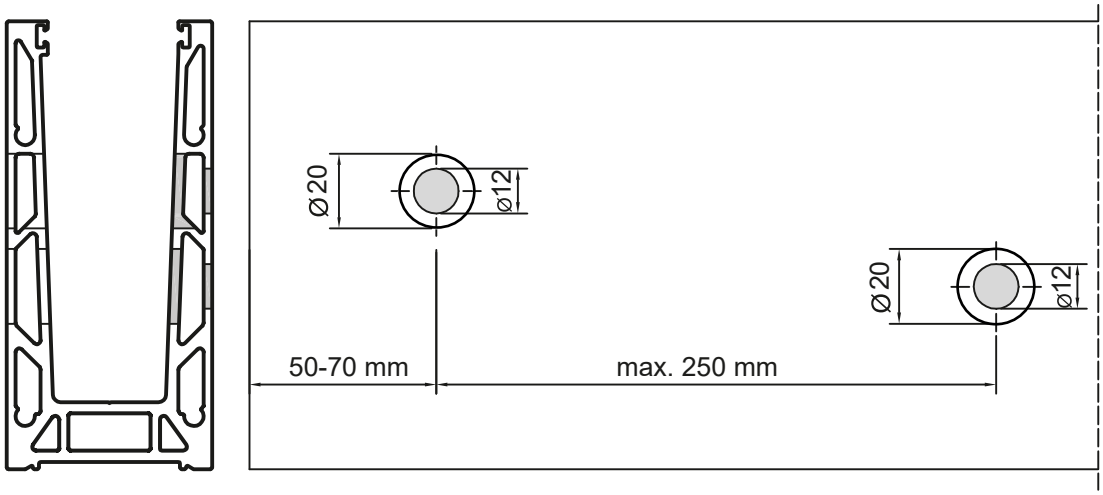
Machining of the profile T3A70020
For face-mounted application.



Exterior side drilling



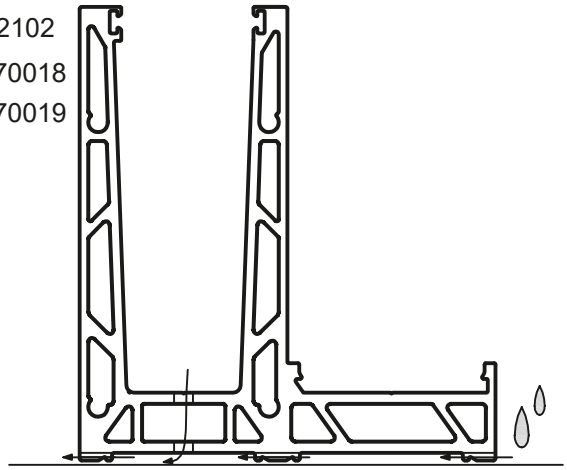
Interior side drilling.

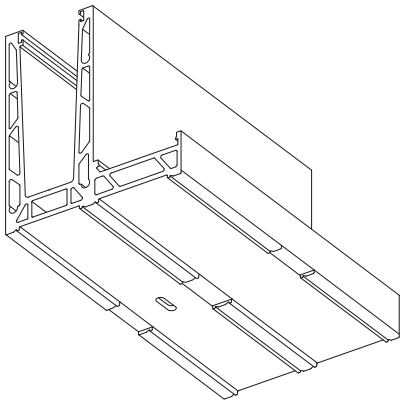


Base rail machining

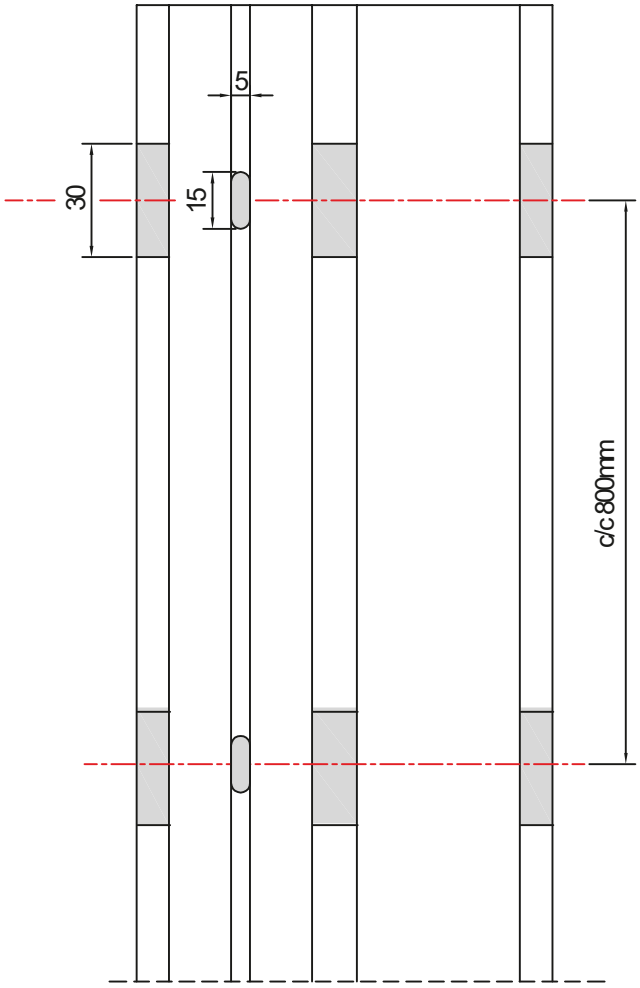
Ventilation of the glass field and drainage.

TBE2102
T3A70018
T3A70019



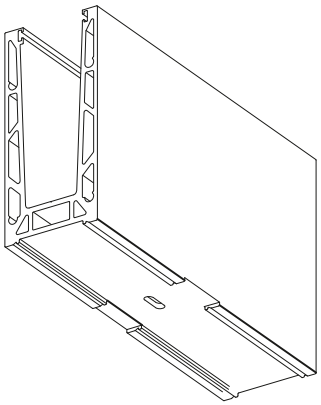


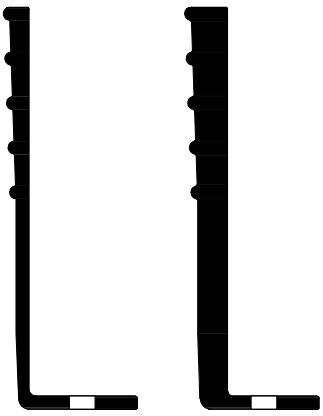
TBE4000 TBE4002



Base rail machining

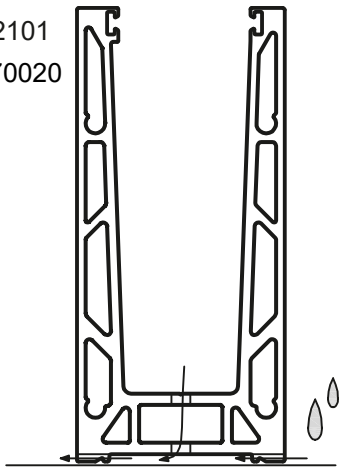
Ventilation of the glass field and drainage.

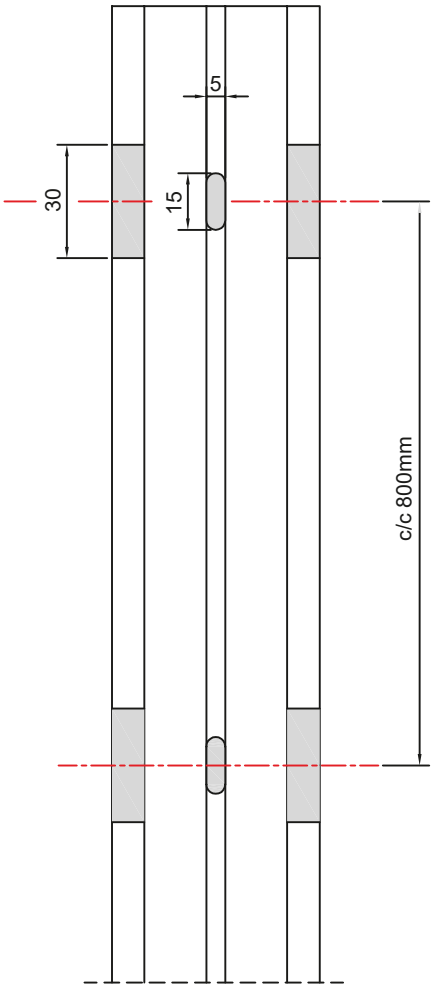




TBE4000 TBE4002

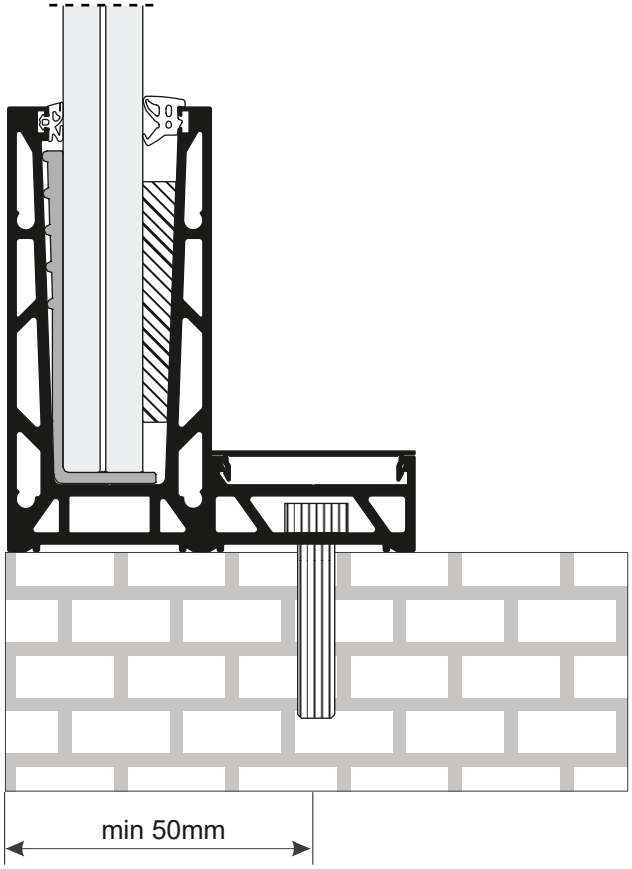
TBE2101
T3A70020





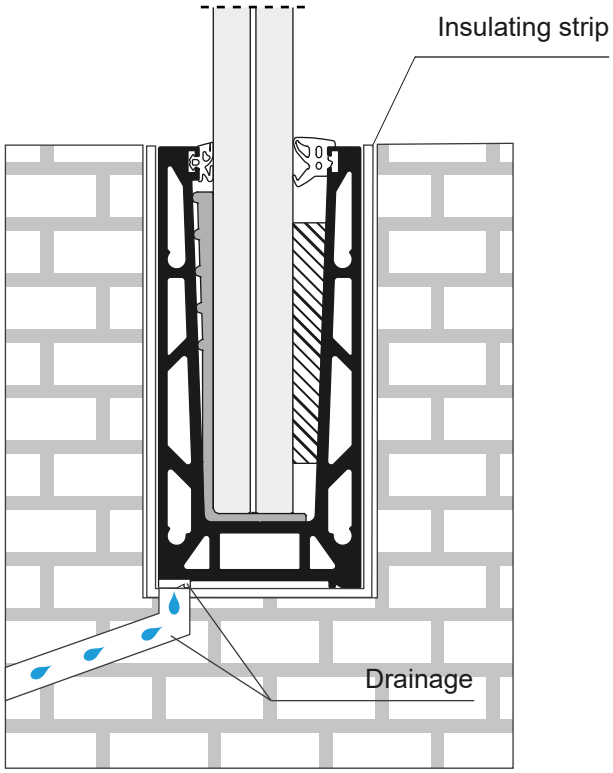
Assembly details

- Aluminum
- Fixation
- EPDM sealant
- Slab / stone
- PVC gasket
- ABS glass shim



- Whenever the T3A70020 aluminum profile is embedded in a structure made of steel, cement, concrete or any other material potentially corrosive or aggressive to aluminum, a band in neoprene, EPDM or other suitable insulating material must be placed.

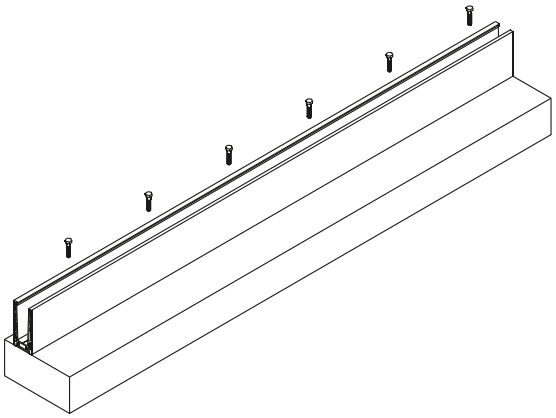
- Applied for drainage slots in the aluminum profile, insulating strip and in the drainage channels of the surrounding.

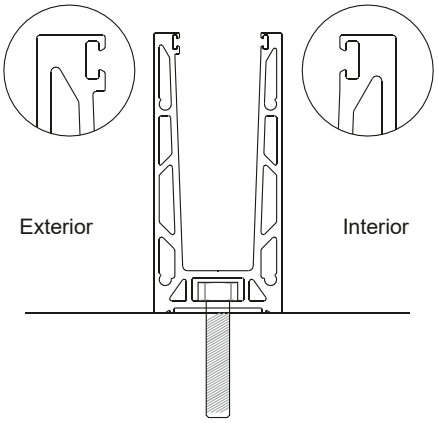


Assemly details

Fixing the base rail to the structure

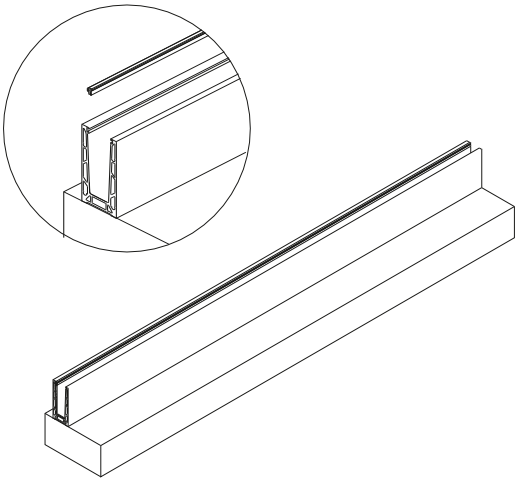
a) Applicable to TBE2101, TBE2102, T3A70018, T3A70019 and T3A70020 profiles
b) Check that the base profile is positioned correctly (inside / outside)
c) Maximum distance between fixings 250mm
d) Adapt the type of fixation/bushing/anchoring to the material that constitutes the sup port base (structure; metal, slab, masonry,...)

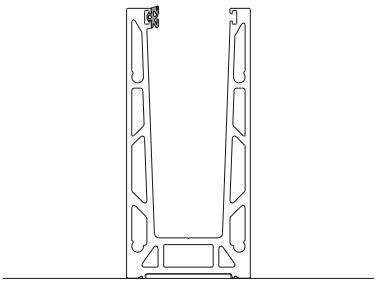




Positioning of the outer glazing gasket X0190008

a) Applicable on TBE2101, TBE2102, T3A70018, T3A70019 and T3A70020 profiles
b) Cut the X190008 joint with an additional 5% of the total balustrade width.
c) Check that the gasket is properly fitted in the groove of the base profile, with the lip down.

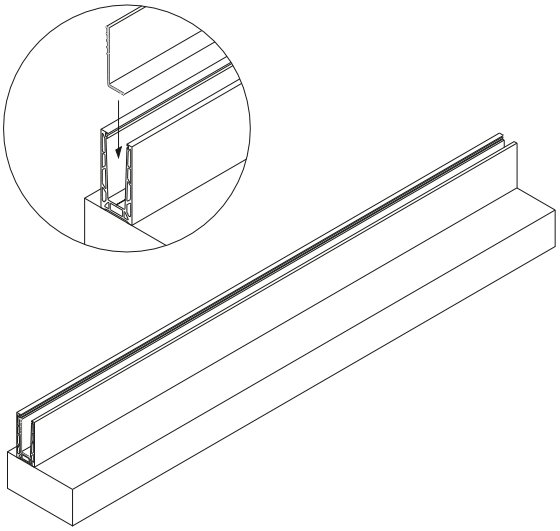


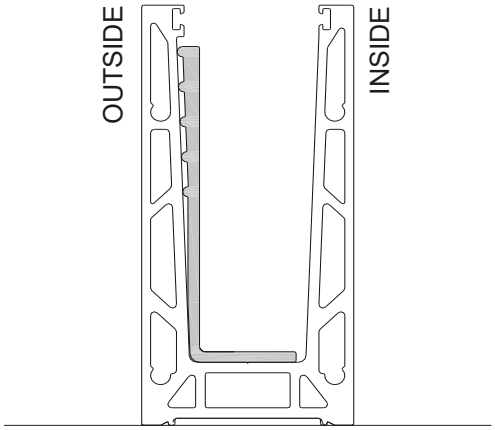


Assembly details

Installation of the TBE4000/TBE4002 continuous glazing shim

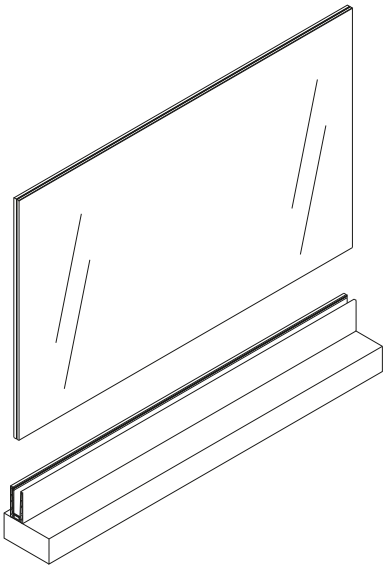
a) Applicable on TBE2101, TBE2102, T3A70018, T3A70019 and T3A70020 profiles
b) Ensure that the shim is properly supported on the base of the profile, without collision with the fastening elements to the structure.

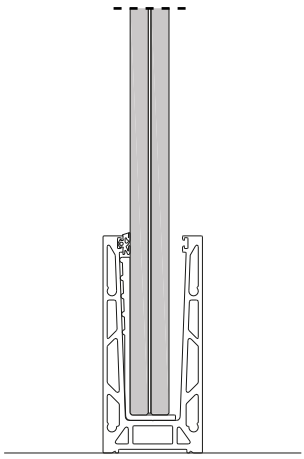




Glass installation

a) Apply the glass, supporting it on the base of the TBE4000 shim and leaning it against the outer glass gasket X0190008.

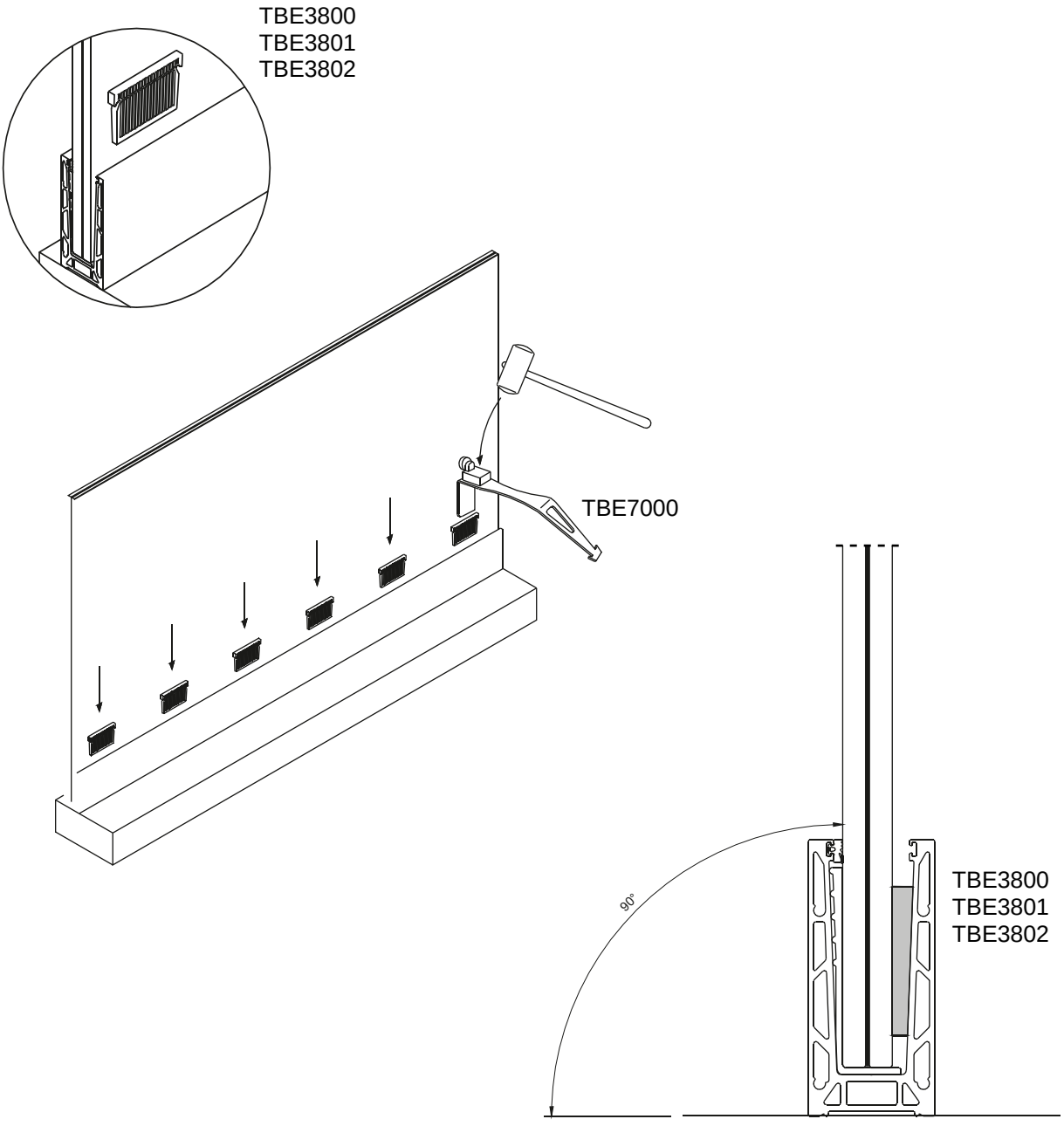




Assembly details

Placement of inner glazing shims

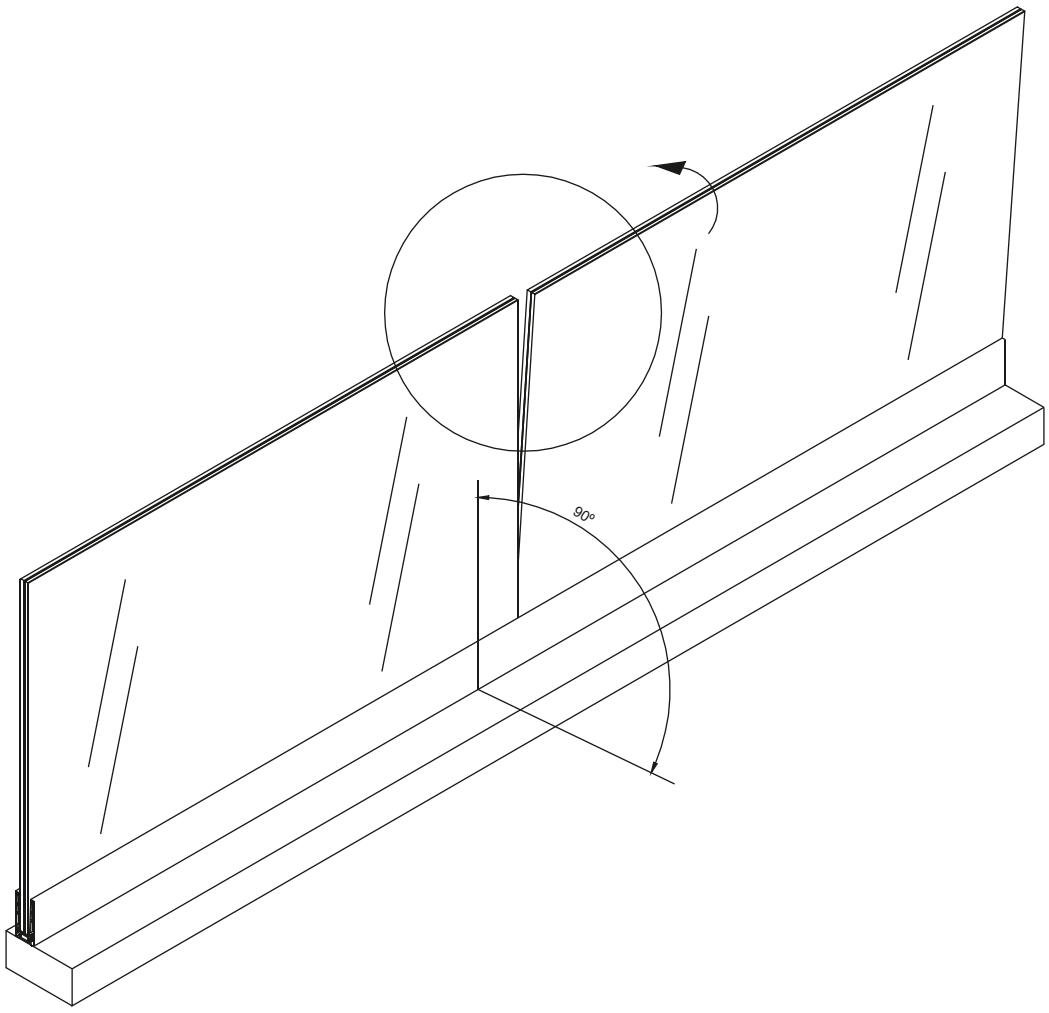
a) Choose the glazing shim suitable for the thickness of the applied glass (see glass infills table)
b) Apply the inner glazing shims, using the TBE7000 tool, with a maximum distance between them of 250mm
c) With a level, check that the glass panels are plumb (90º with the base plane)
d) If necessary, adjust the position of the shims until the verticality of the glass panel is verified



Assembly details

Alignment of glass panels

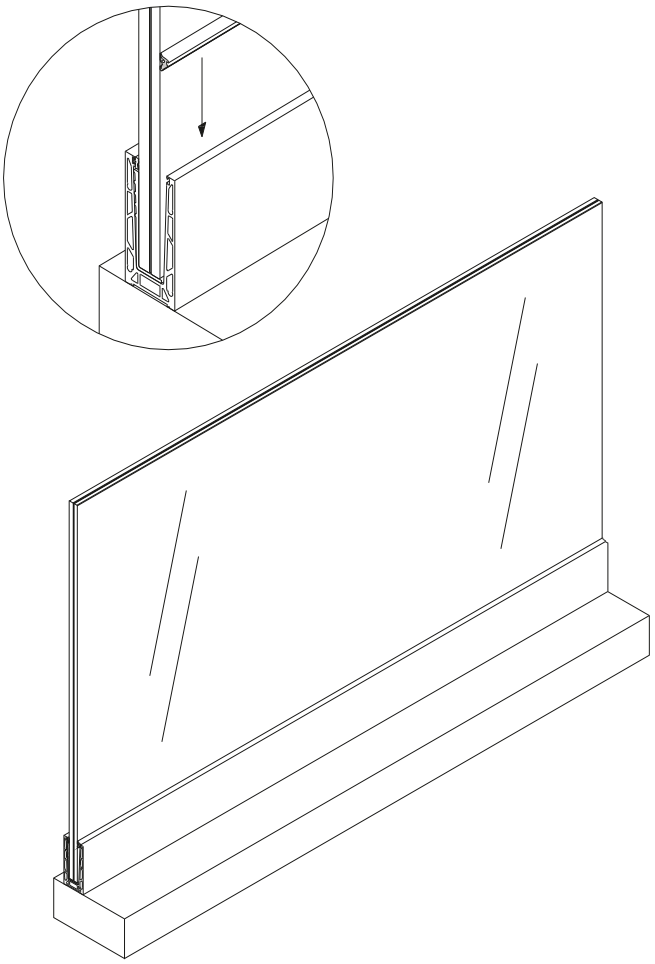
a) With a level, check that the glass panels are plumb (90º with the base plane) and form a flat surface
b) If necessary, adjust the position of the shims until the verticality of the glass is verified, using the TBE7000 tool

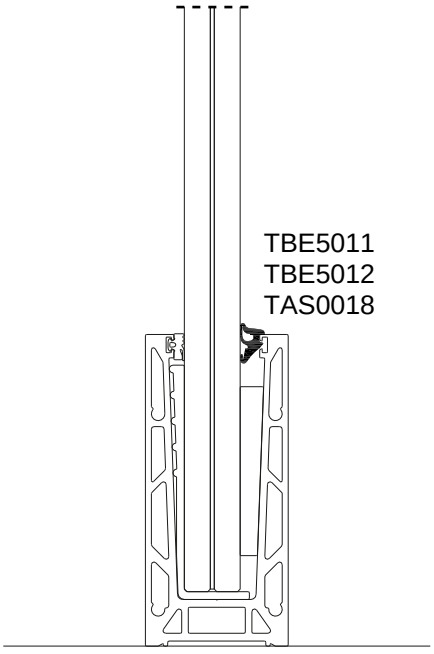


Assembly details

Installation of the inner glazing gasket

a) Apply the inner glazing gasket, depending on its thickness (see infills table)
b) Cut the inner glass joint with an additional 5% of the total width of the balustrade, keeping it compressed in its extension

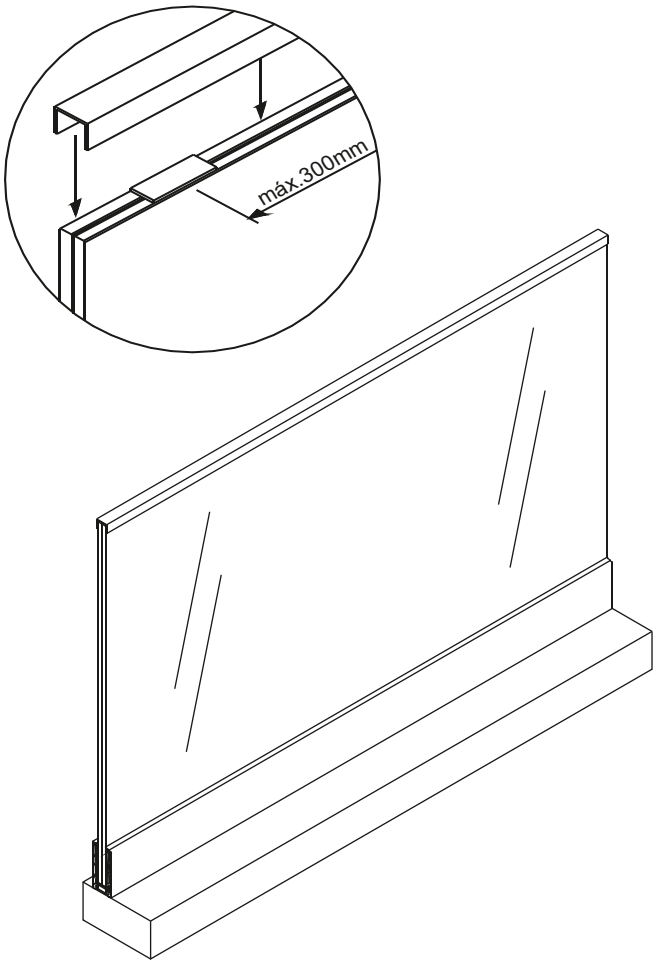


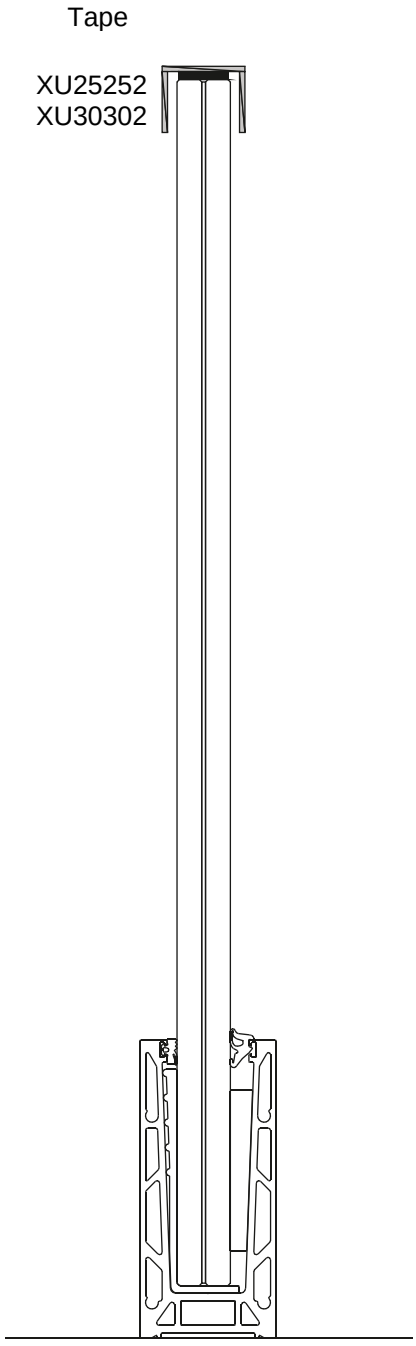


Assembly details

Application of the handrail

a) Apply sections of adhesive joint on the glass panels, previously cleaned with a primer and without grease, providing for a distance between them in the order of 300mm
b) Place the pass-through profile, exerting moderate pressure to glue it to the tape





Note: The application of the finishing / pass profile facilitates the maintenance of alignment and protects the edges of the glass. Whenever the architecture does not want to see it applied, it must be alert to the potential risks of small misalignment between the glass panels.

Assembly details

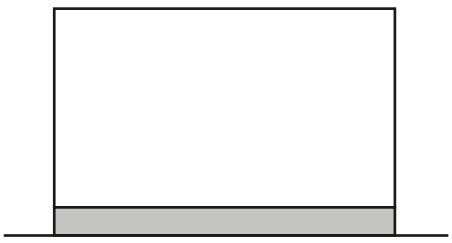
The BE balustrade system can be applied in horizontal or inclined planes, and must comply with the following rules:

a) stairs: maximum inclination 30º
b) ramps:
- 6% up to a maximum of 10 meters in length
- 8% up to a maximum of 5 meters in length
- 10 to 12% exclusive for existing buildings and only when a lower value is not possible (valid for very small extensions)

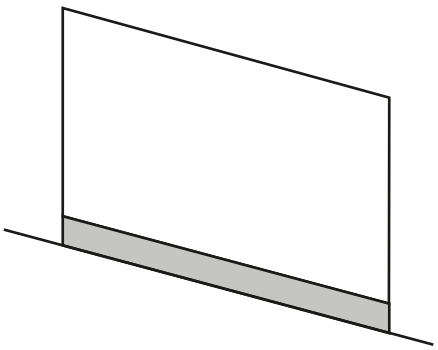
Depending on the type of structure / material where the guard is to be installed, the best model and type of attachment. For this, we recommend consulting experts in the field, including:

Hilti
Pecol
Wurth
etc.

Horizontal plane

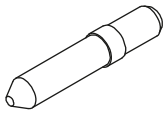


Inclined plane *

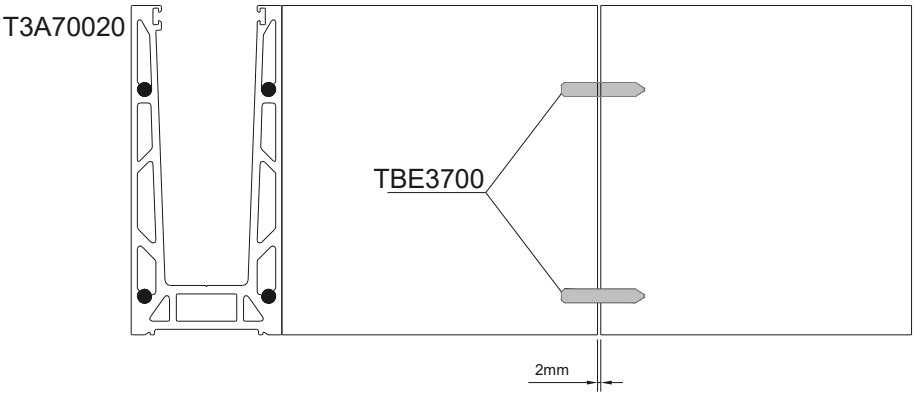


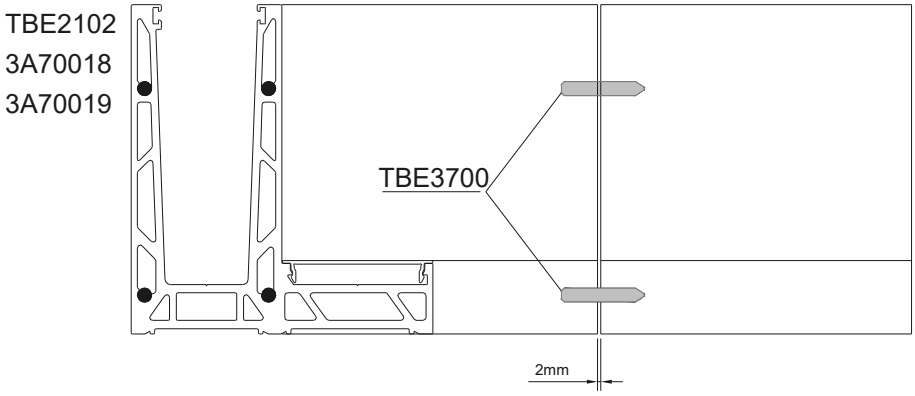
* subject to the inclination, consult TECHNAL

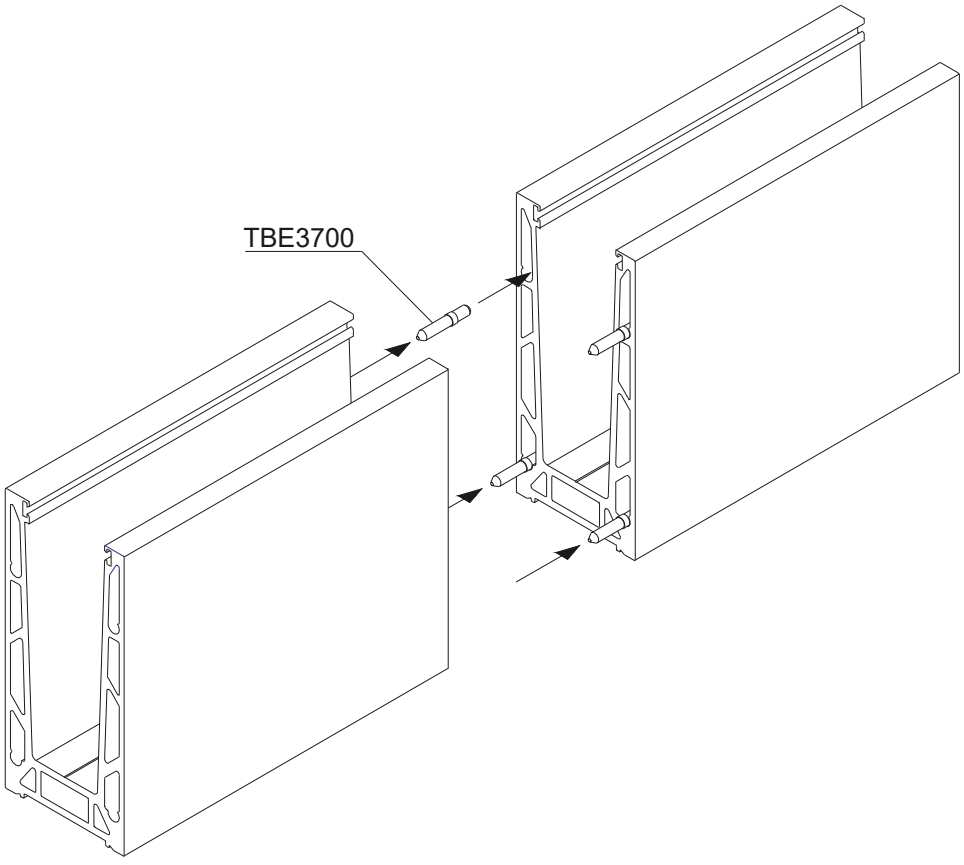
Assembly details



TBE3700
Alignment pin



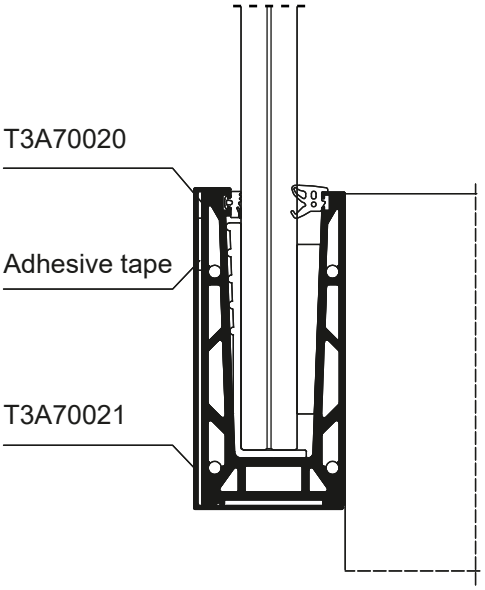


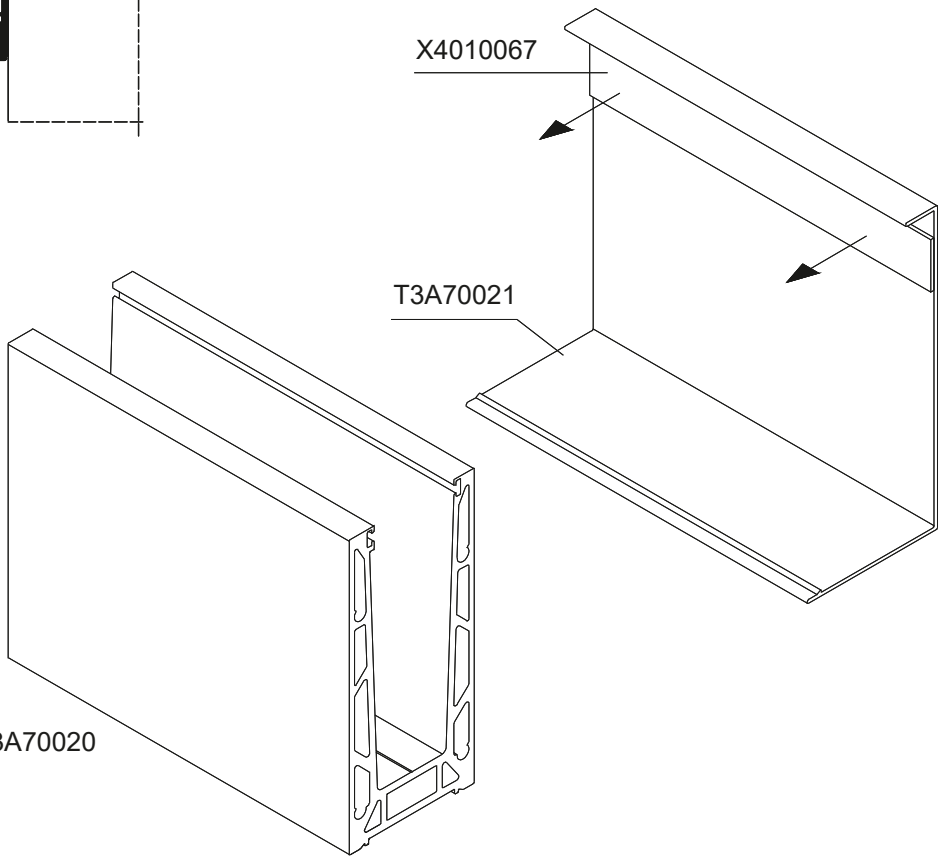


Assembly details

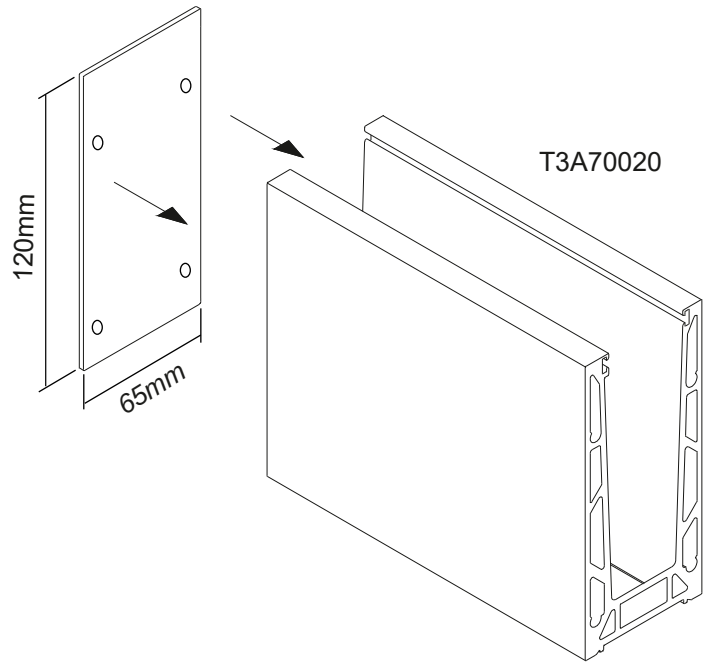
Face-mounted base rail

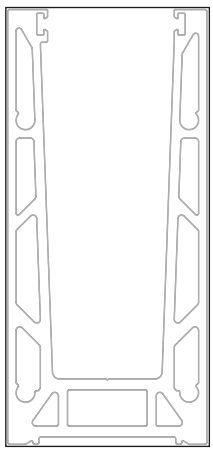
- Profiles T3S70020 and T3A70021 must be dry and free from grease
- Apply adhesive tape X4010067 to the inner face of theT3A70021 cover - Position the cover on theT3A70020 profile and press for better grip

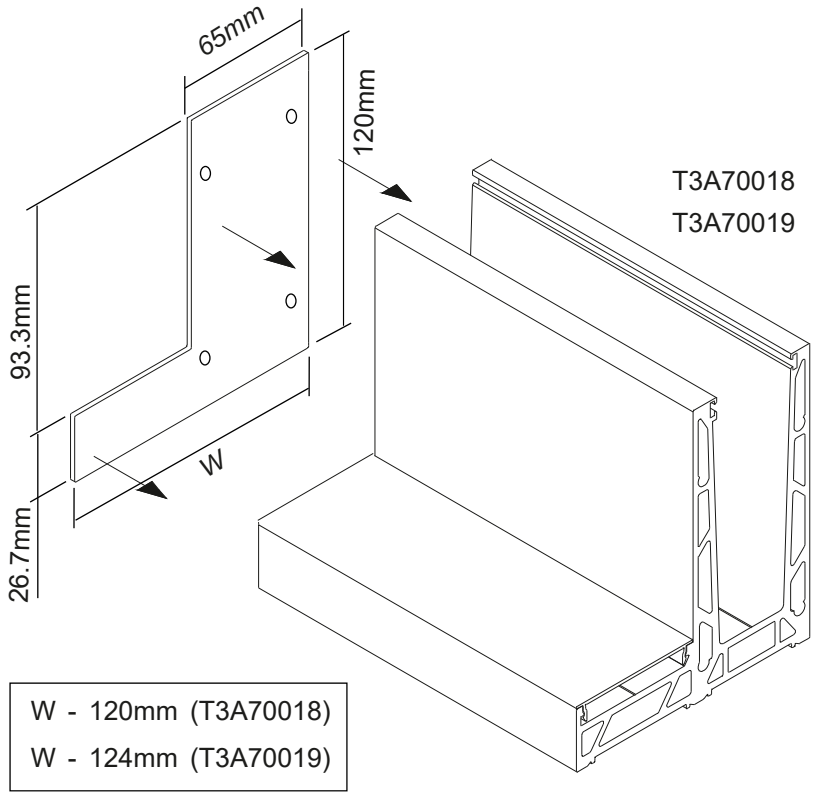




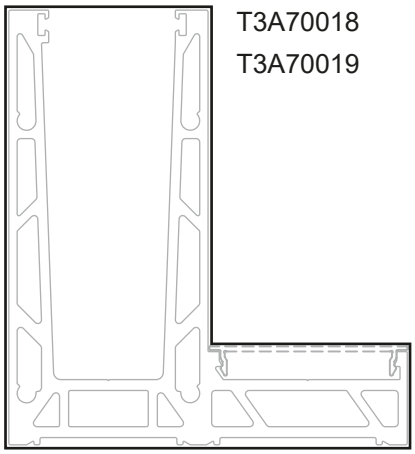
Assembly details







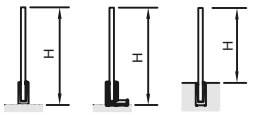
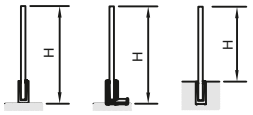
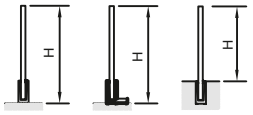
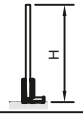
W - 120mm (T3A70018)
W - 124mm (T3A70019)



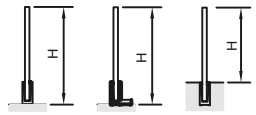
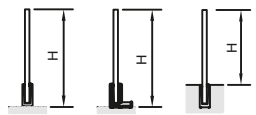
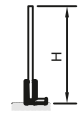
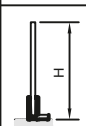
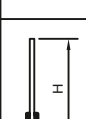
Note: For T3A70018, T3A70019 & T3A70020, end caps to be provided by the fabricators

Infills table

Infill table for T3A70018 & T3A70020

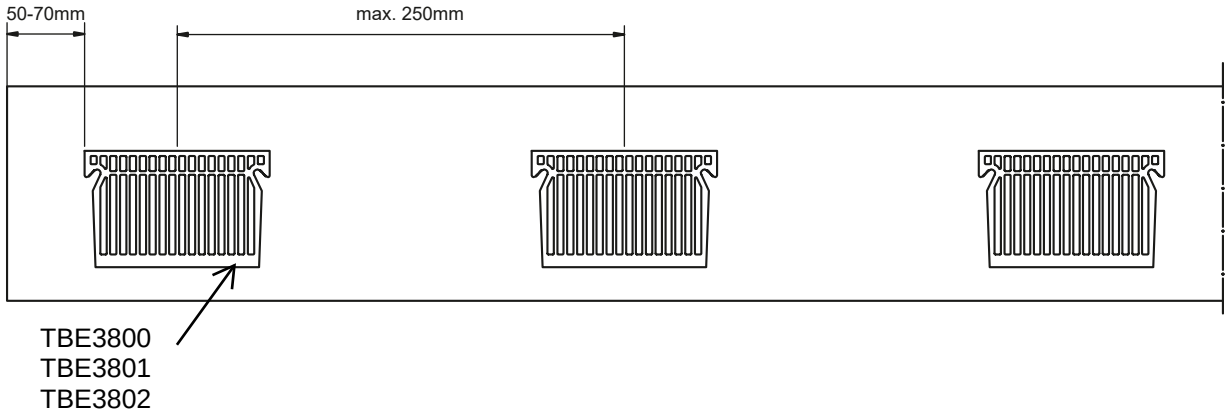
Standard	Glass Thickness	Example Glass composition	Outer shim	Inner shim	Outer gasket	Inner gasket	Typologies
BS	12 (13.52)	6mm Clear tempered glass 1.52 Sentry glass interlayer 6mm Clear tempered glass	TBE4002	TBE3801	X4010007	TBE5011	
BS ASTM	16 (17.52)	8mm Clear tempered glass 1.52 Sentry glass interlayer 8mm Clear tempered glass	TBE4000	TBE3801	X0190008	TBE5011	
BS ASTM	18 (19.52)	10mm Clear tempered glass 1.52 Sentry glass interlayer 8mm Clear tempered glass	TBE4002	TBE3802	X4010007	TAS0018	
BS ASTM	20 (21.52)	10mm Clear tempered glass 1.52 Sentry glass interlayer 10mm Clear tempered glass	TBE4000	TBE3800	X0190008	TBE5012	
ASTM	22 (23.52)	10mm Clear tempered glass 1.52 Sentry glass interlayer 12mm Clear tempered glass	TBE4000	TBE3802	X0190008	TAS0018	

Infill table for T3A70019

Standard	Glass Thickness	Example Glass composition	Outer shim	Inner shim	Outer gasket	Inner gasket	Typologies
BS ASTM	16 (17.52)	8mm Clear tempered glass 1.52 Sentry glass interlayer 8mm Clear tempered glass	TBE4000	TBE3801	X0190008	TBE5011	
BS ASTM	20 (21.52)	10mm Clear tempered glass 1.52 Sentry glass interlayer 10mm Clear tempered glass	TBE4000	TBE3801	X0190008	TBE5011	
BS ASTM	22 (23.52)	10mm Clear tempered glass 1.52 Sentry glass interlayer 12mm Clear tempered glass	TBE4002	TBE3802	X4010007	TAS0018	
BS ASTM	24 (25.52)	10mm Clear tempered glass 0.76 Sentry glass interlayer 6mm Clear tempered glass 0.76 Sentry glass interlayer 8mm Clear tempered glass	TBE4000	TBE3800	X0190008	TBE5012	
ASTM	26 (27.52)	10mm Clear tempered glass 0.76 Sentry glass interlayer 6mm Clear tempered glass 0.76 Sentry glass interlayer 10mm Clear tempered glass	TBE4000	TBE3802	X0190008	TAS0018	

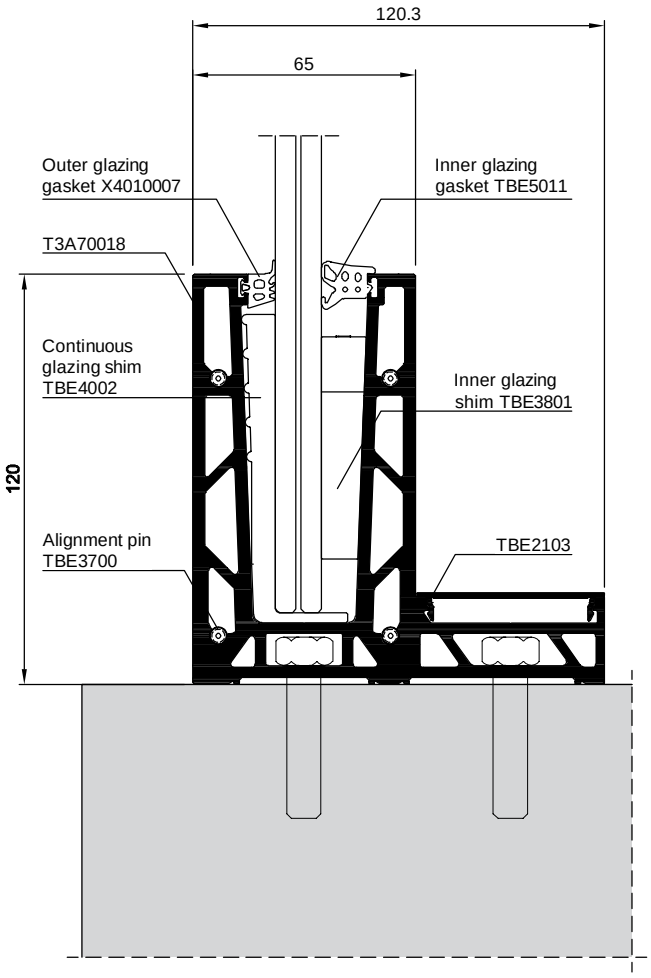
Infills

Arrange the inner glazing shims equidistant, with a maximum distance of 250mm between axes. The first shim must be at a distance of 50mm-70mm in relation to the end of the base rail.



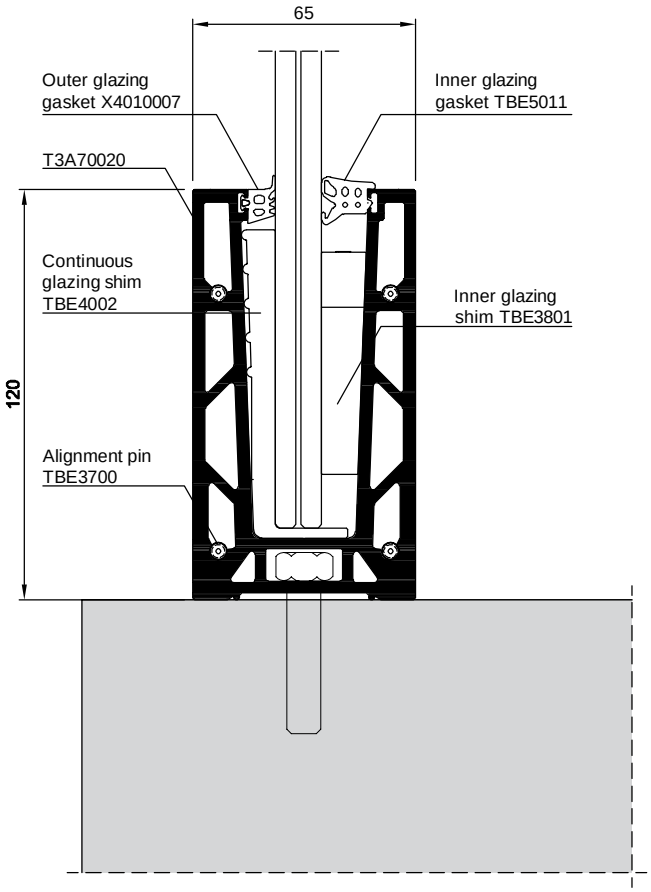
Infill of 13.52mm laminated glass

Rail 3A70018



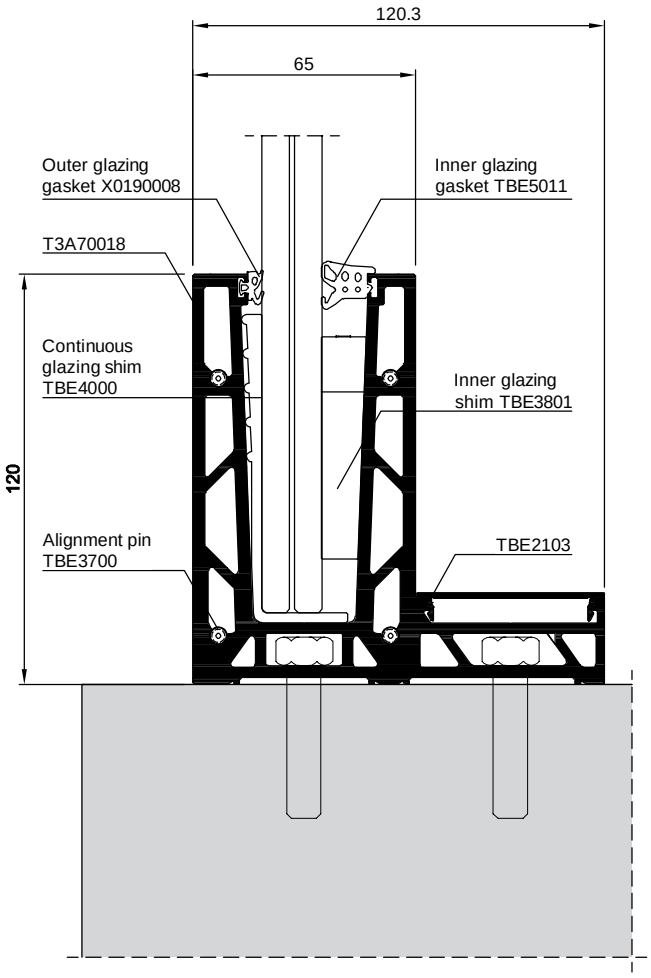
Note: Anchor fixation in 1 row or 2 rows according to height & load type

Rail 3A70020



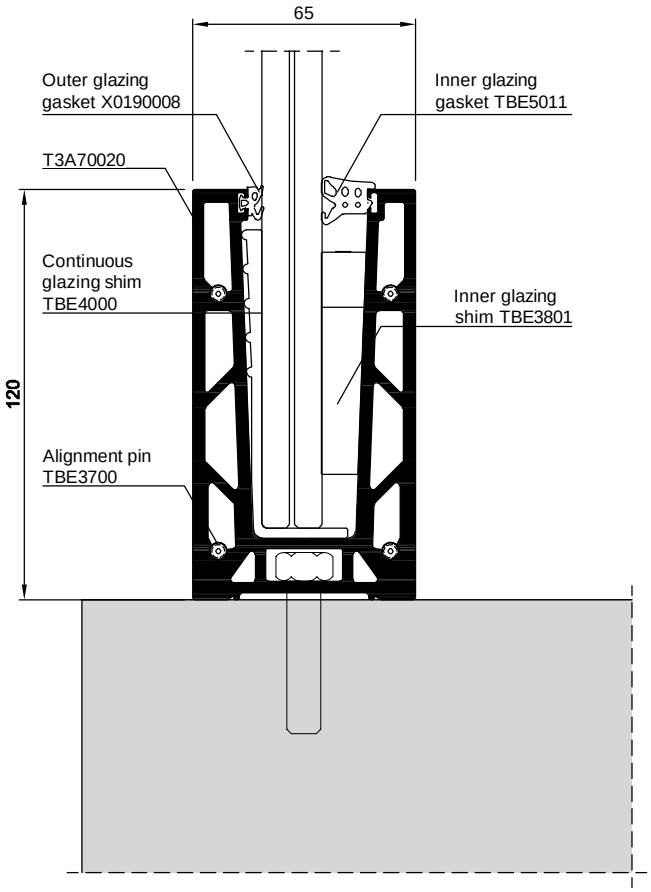
Infill of 17.52mm laminated glass

Rail 3A70018



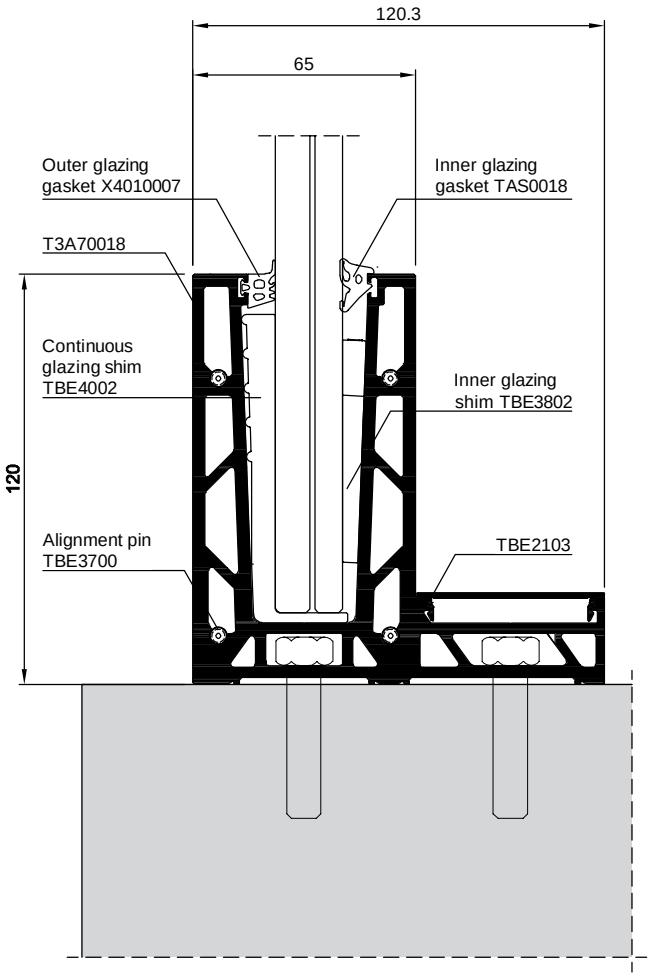
Note: Anchor fixation in 1 row or 2 rows according to height & load type

Rail 3A70020



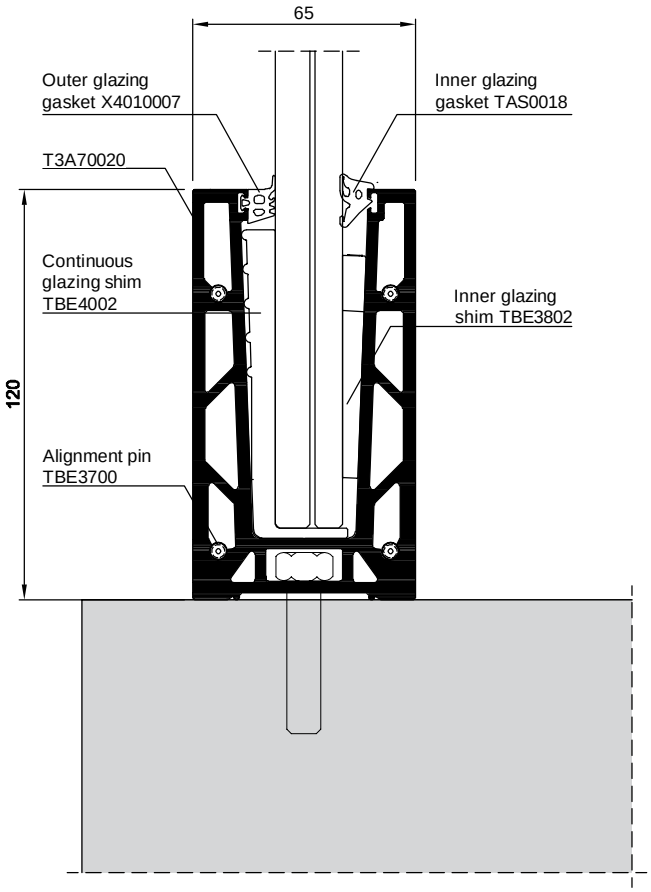
Infill of 19.52mm laminated glass

Rail 3A70018



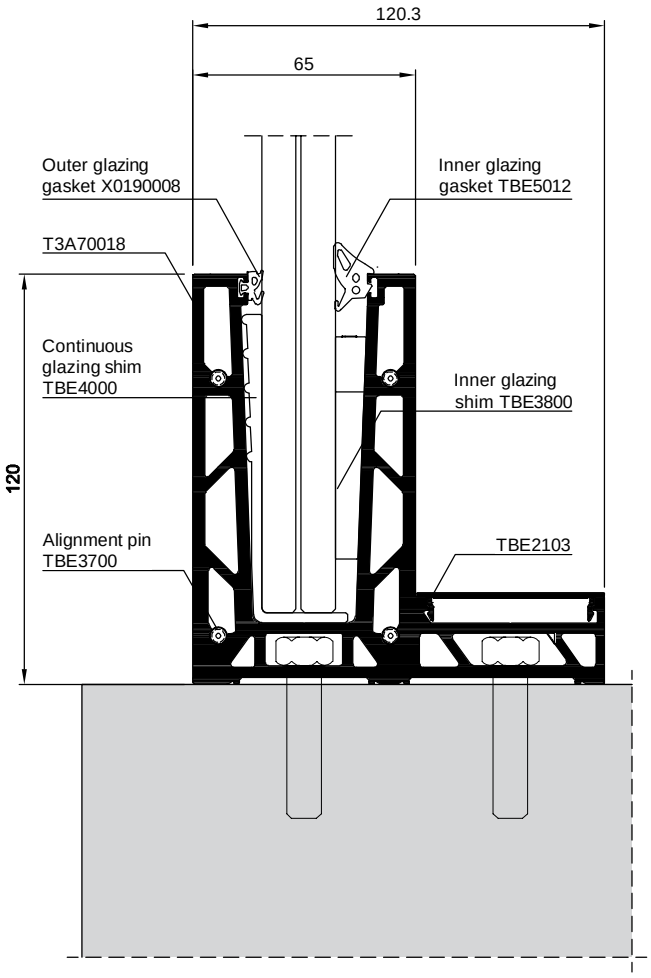
Note: Anchor fixation in 1 row or 2 rows according to height & load type

Rail 3A70020



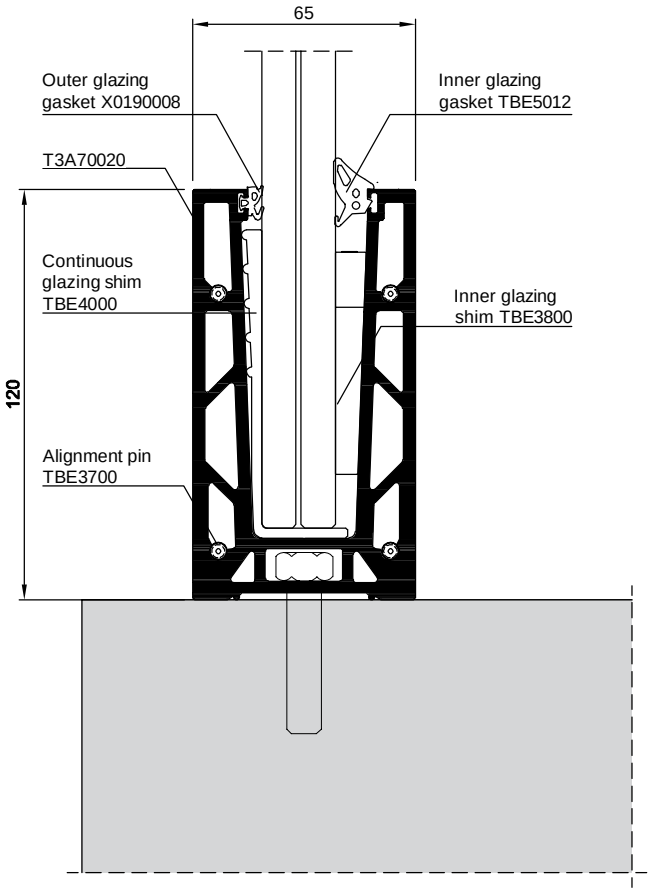
Infill of 21.52mm laminated glass

Rail 3A70018



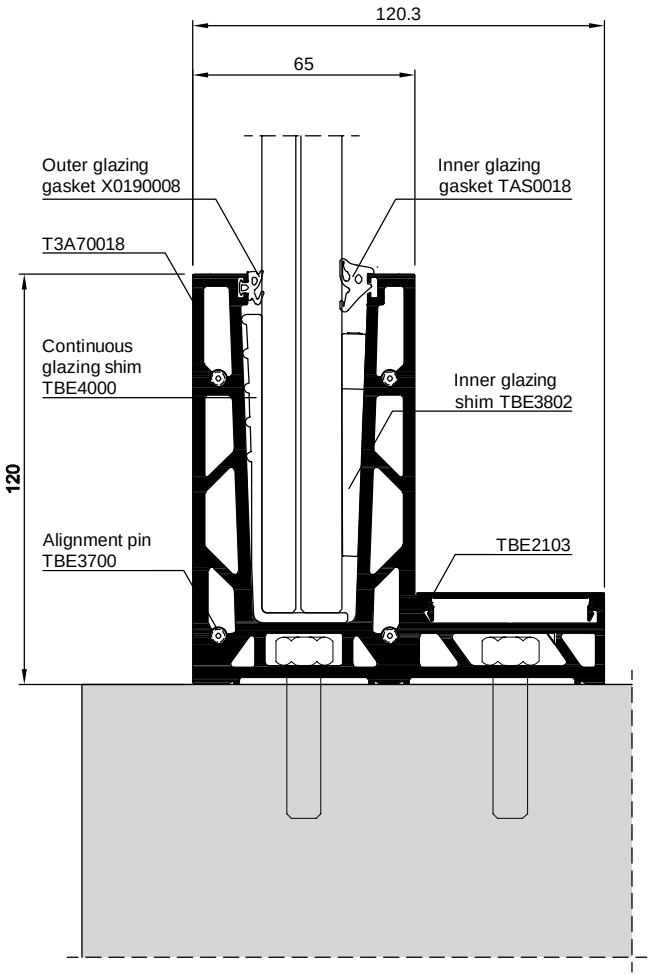
Note: Anchor fixation in 1 row or 2 rows according to height & load type

Rail 3A70020



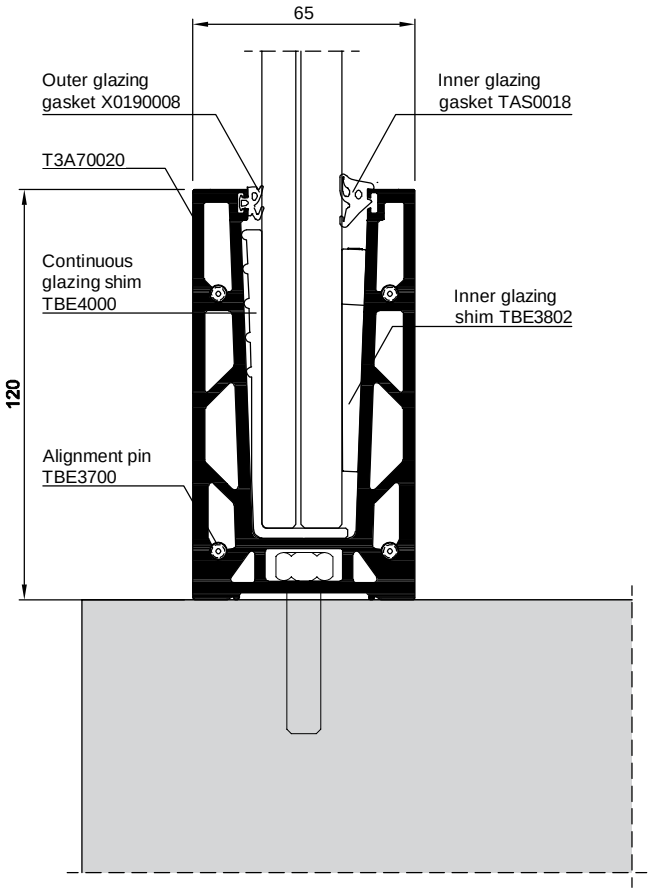
Infill of 23.52mm laminated glass

Rail 3A70018



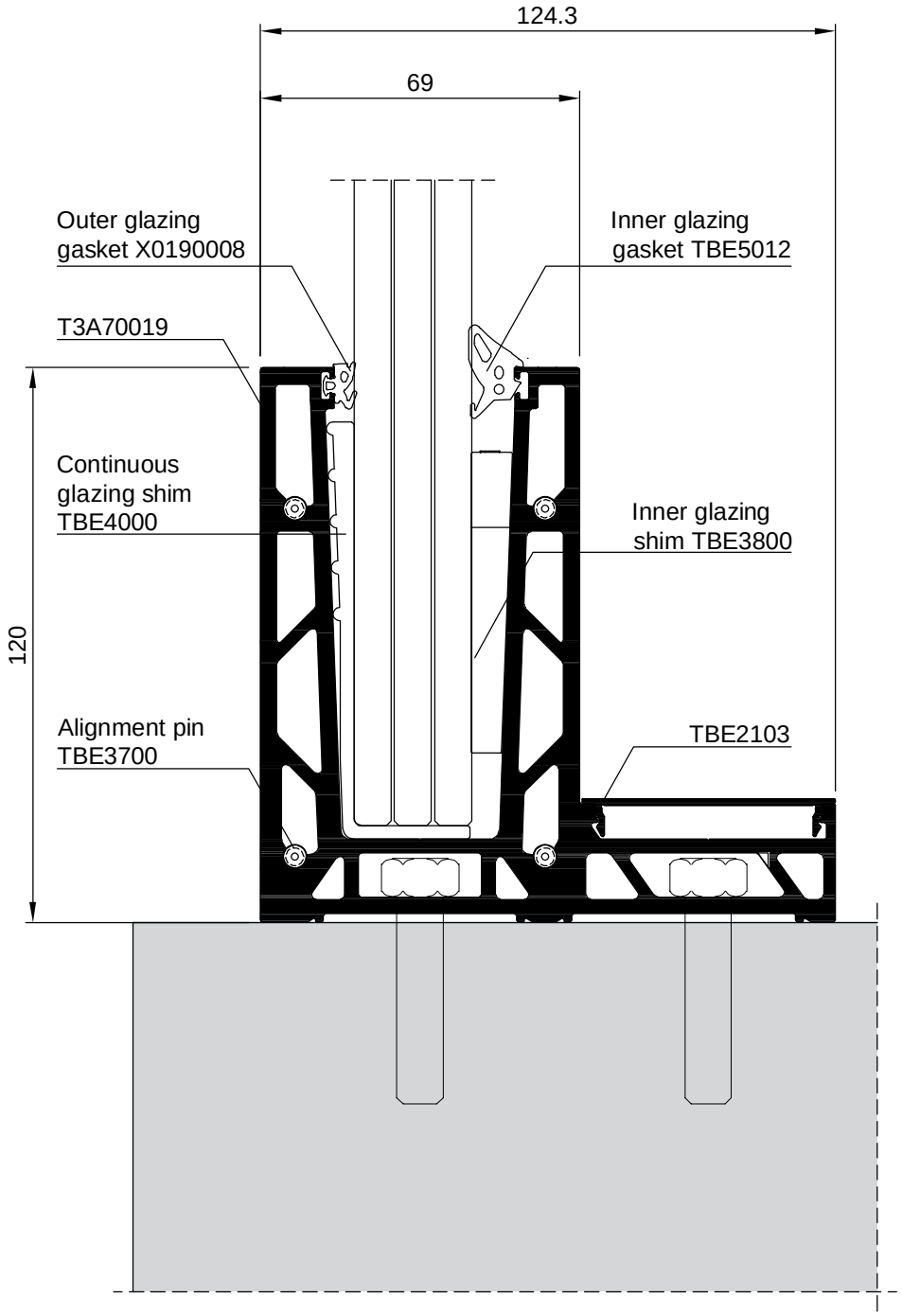
Note: Anchor fixation in 1 row or 2 rows according to height & load type

Rail 3A70020



Infill of 25.52mm laminated glass

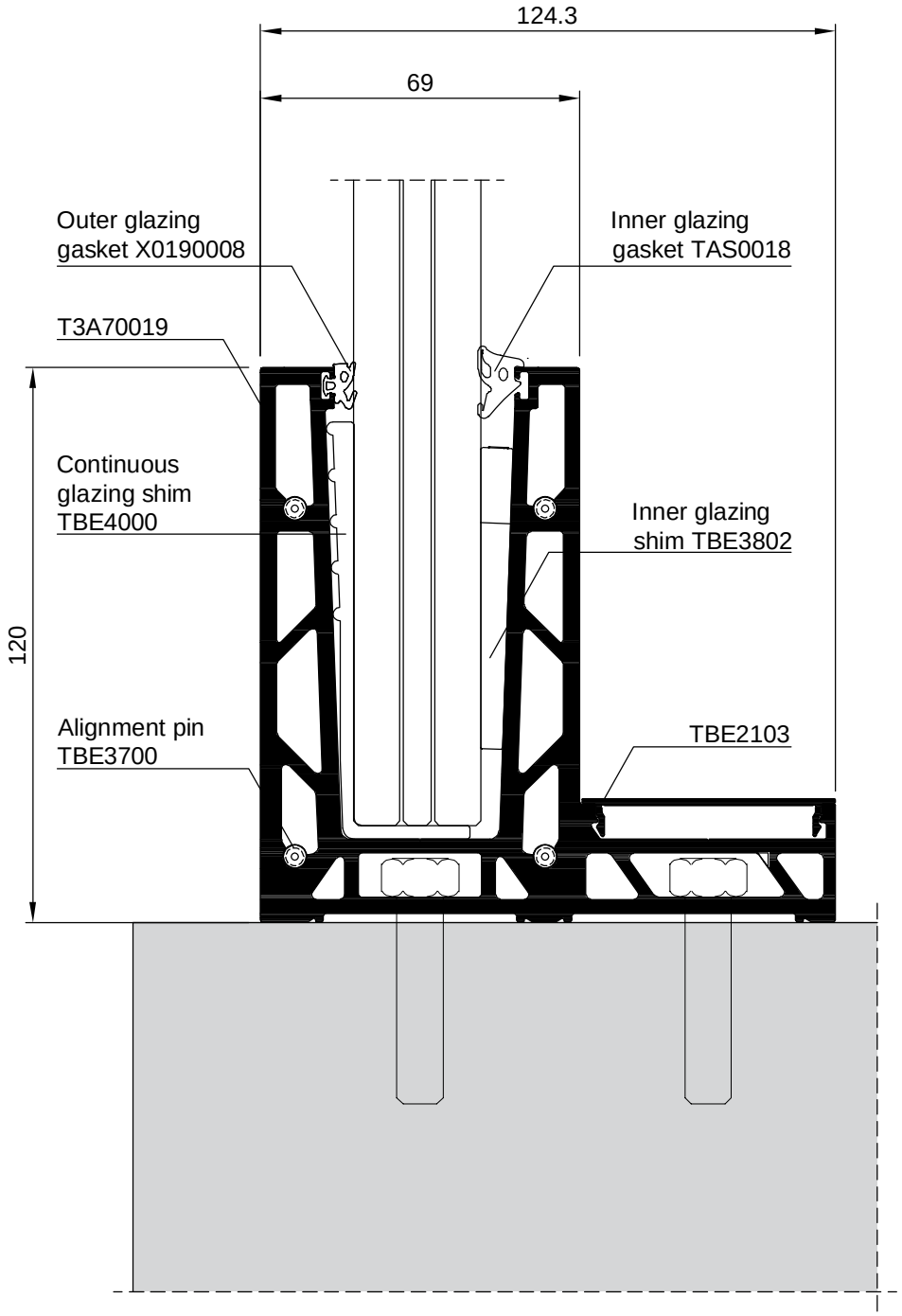
Rail 3A70019



Note: Anchor fixation in 1 row or 2 rows according to height & load type

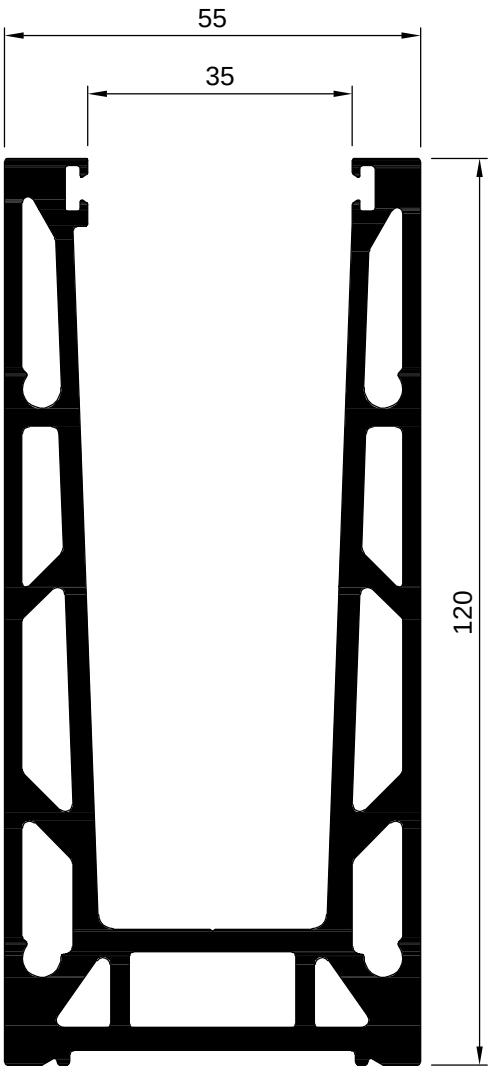
Infill of 27.52mm laminated glass

Rail 3A70019

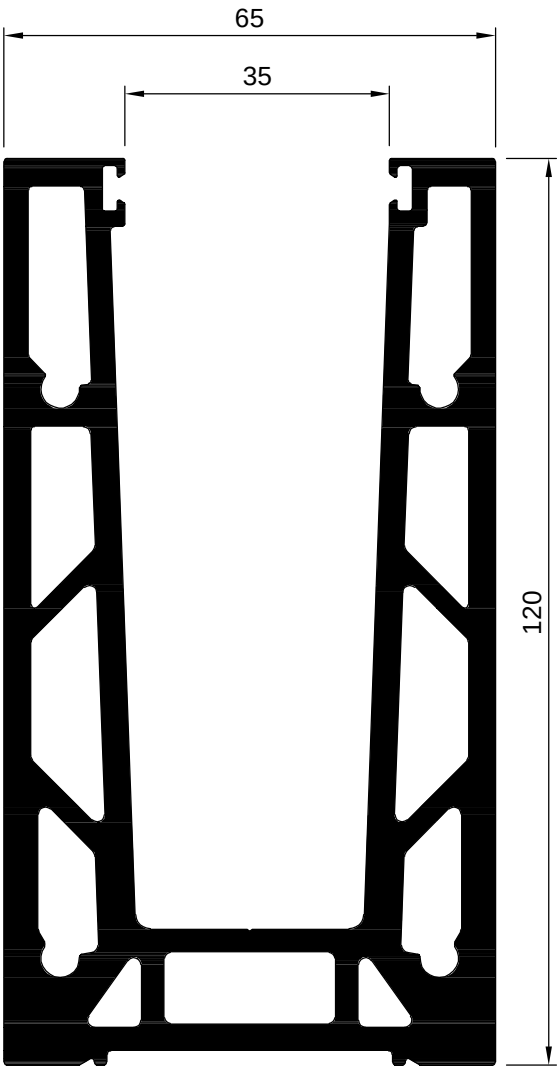


Note: Anchor fixation in 1 row or 2 rows according to height & load type

Profile summary



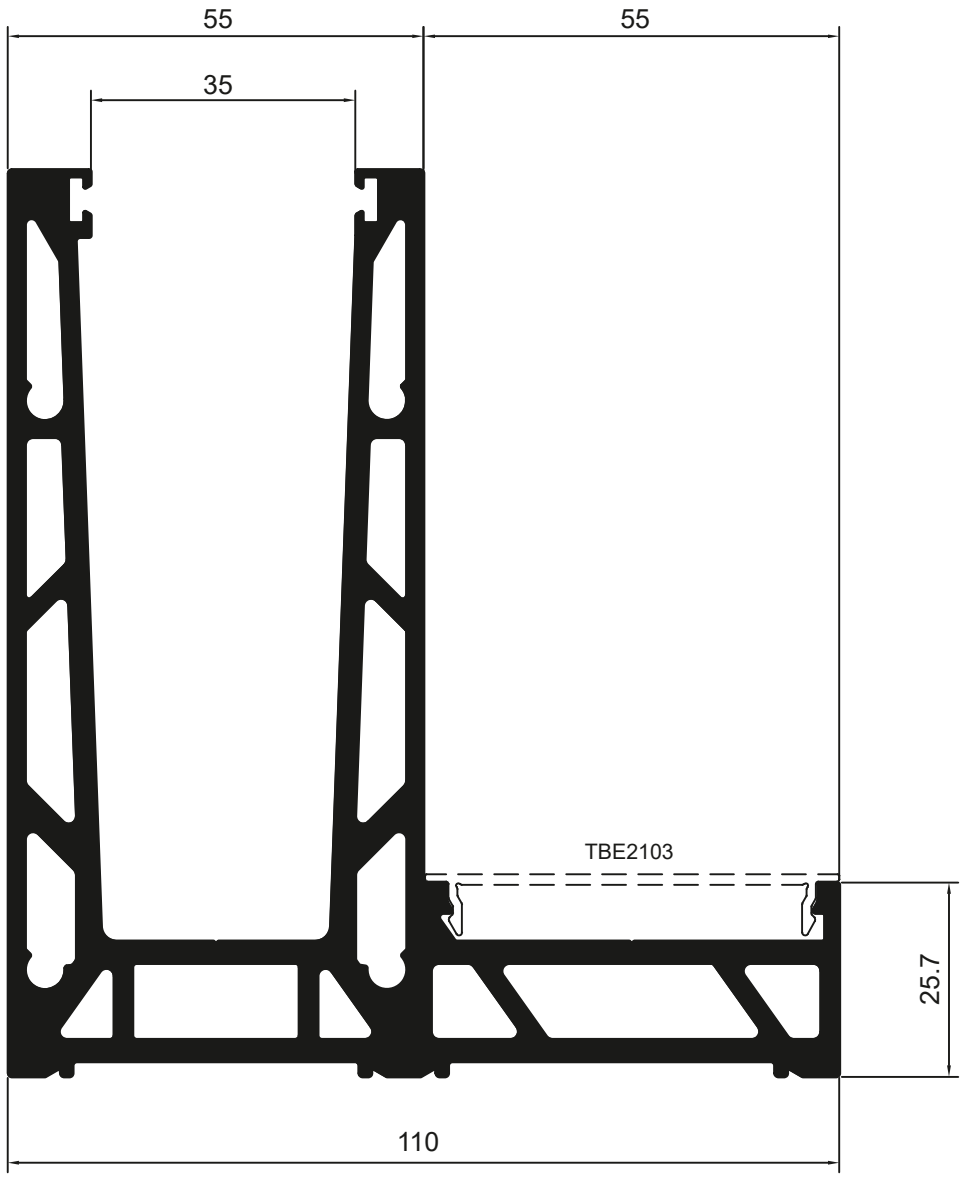
TBE2101



T3A70020

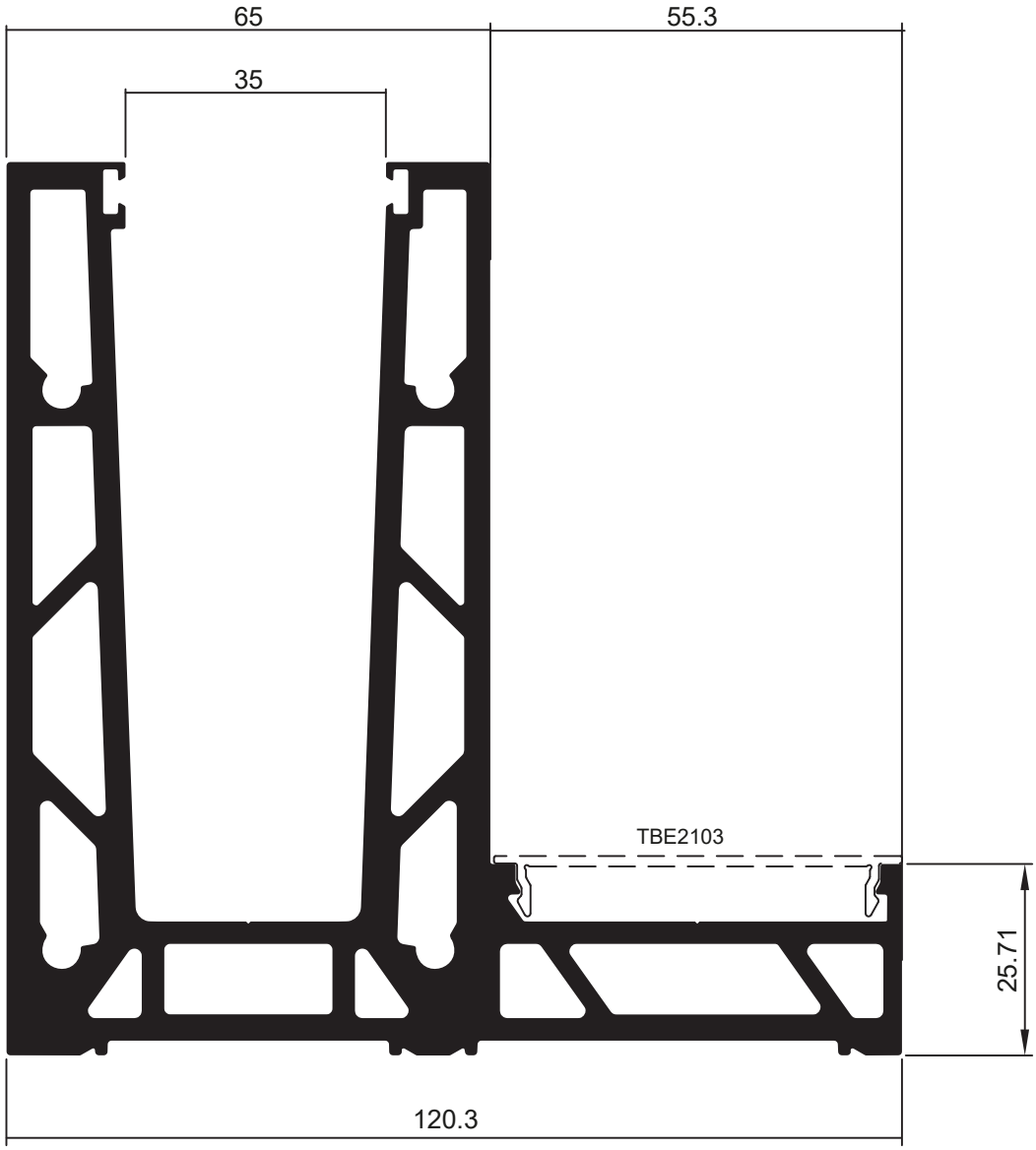
Note: with T3A70020, end caps to be adapted when needed.

Profile summary



TBE2102

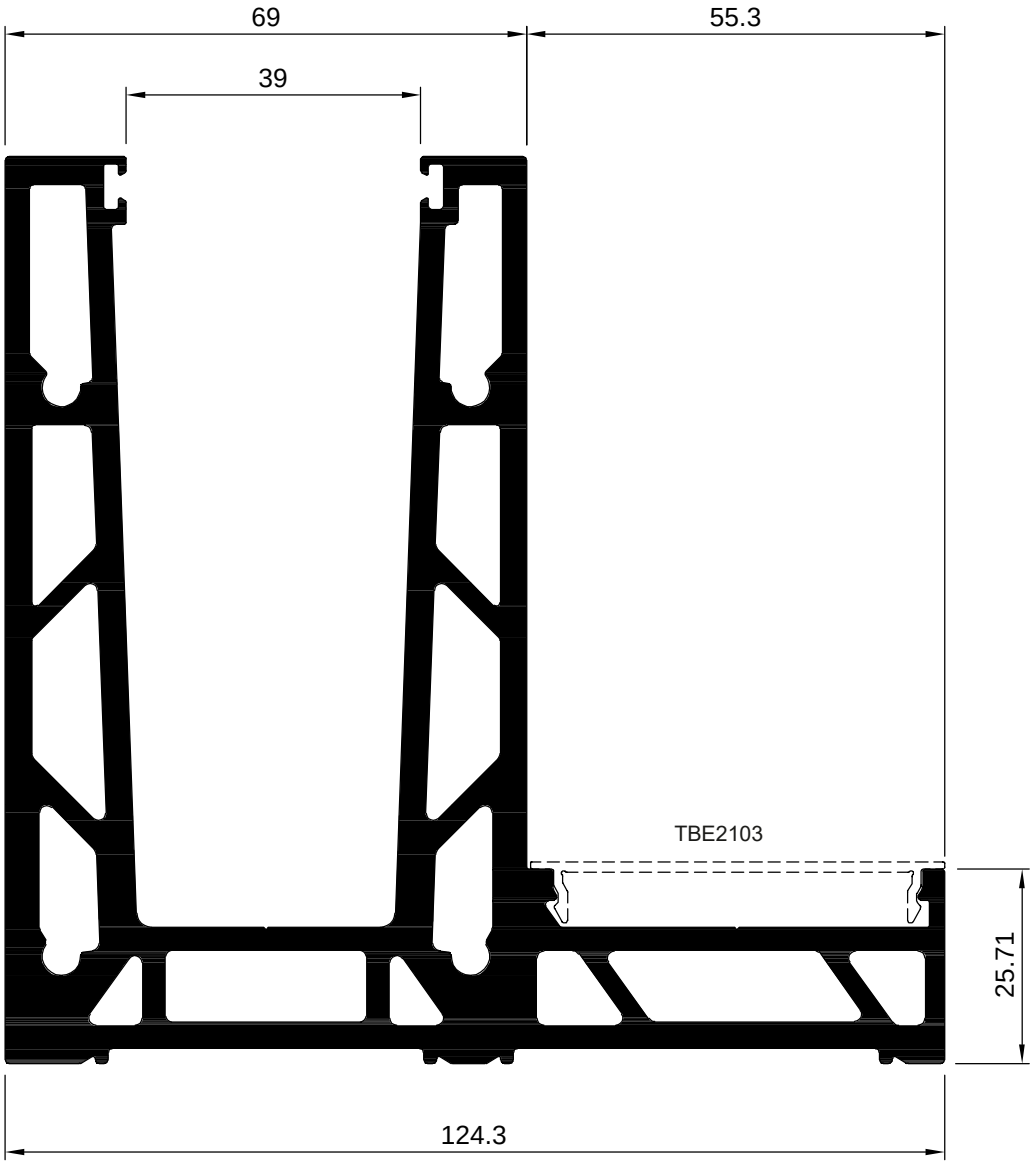
Profile summary



T3A70018

Note: with this model, end caps to be adapted when needed.

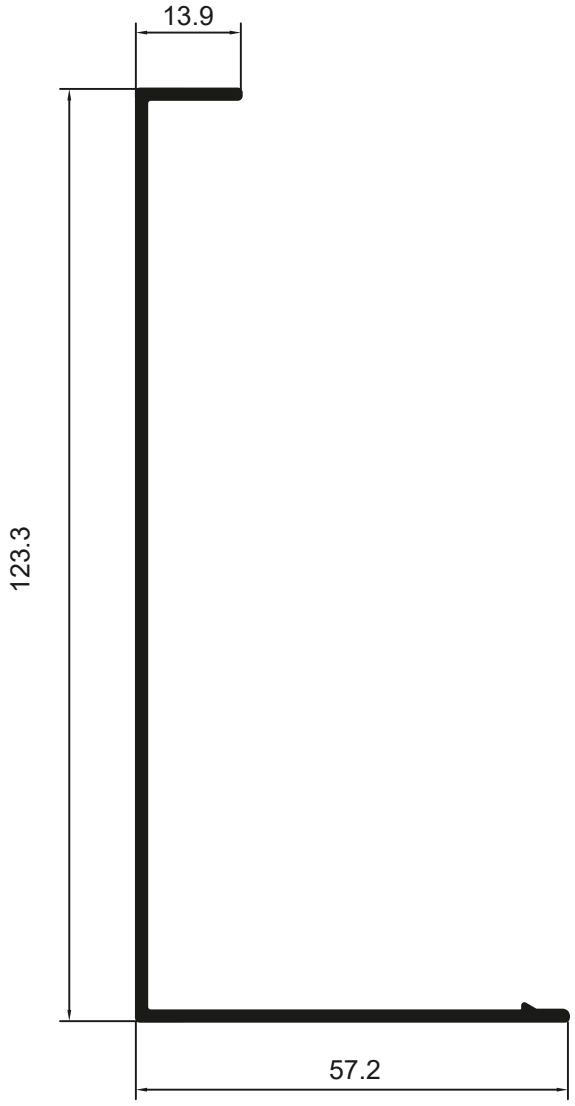
Profile summary



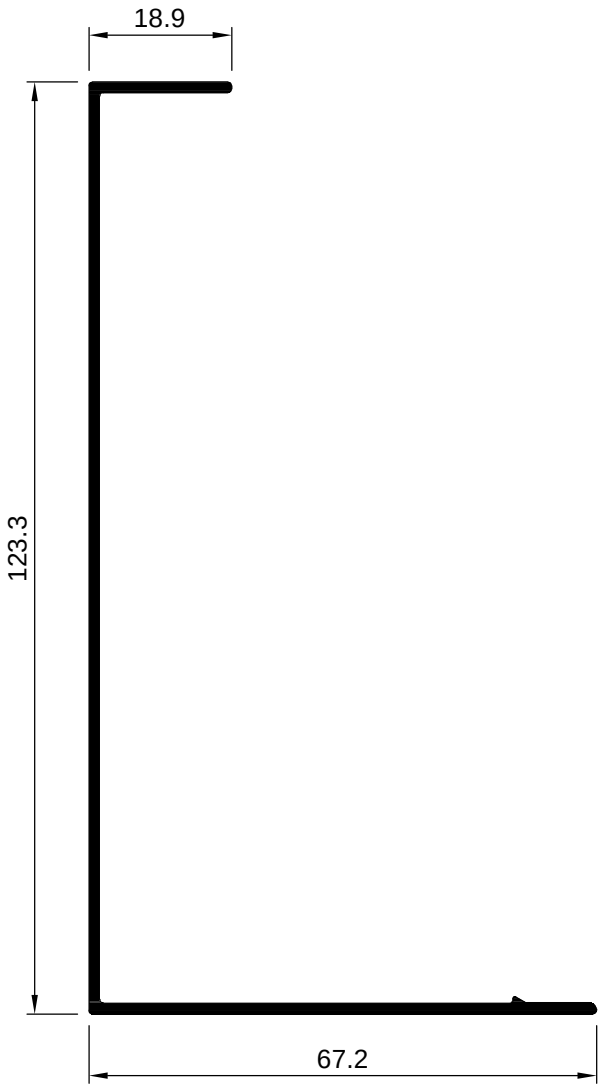
T3A70019

Note: with this model, end caps to be adapted when needed.

Profile summary

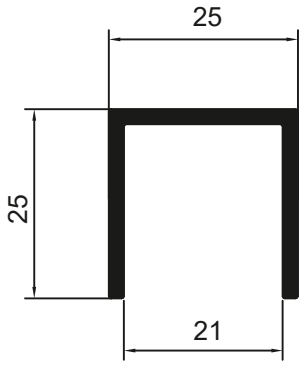


TBE2502

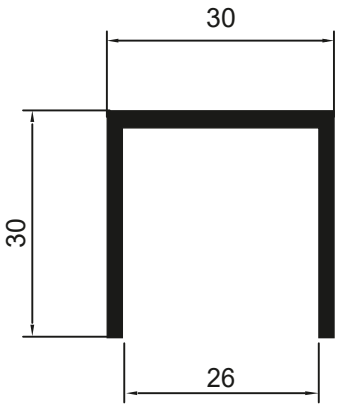


T3A70021

TBE2103

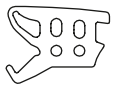


XU25252



XU30302

Accessories summary

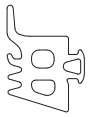


TBE5011 Inner glazing gasket

TBE5012 Inner glazing gasket

TAS0018 Inner glazing gasket

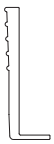
X0190008 Outer glazing gasket



X4010007 Outer glazing gasket

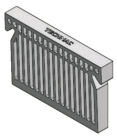
X4010067 Adhesive tape 19x1.1

TBE4000 Continuous glazing shim

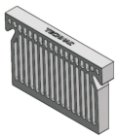


TBE4002 Continuous glazing shim

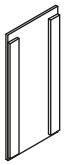
TBE3800 inner glazing shim



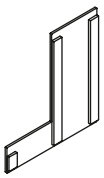
TBE3801 inner glazing shim



TBE3802 inner glazing shim



TBE3605 End cap BE2101



TBE3606 End cap BE2102

TBE3700 Alignment pin

TBE3601 16mm glass wall connection piece

TBE3602 18mm glass wall connection piece

TBE3603 20mm glass wall connection piece

TBE7000 Tool for the application of the inner glazing shims